US Army Corps of Engineers®
Alaska District

NORTHEAST CAPE HTRW
REMEDIAL ACTIONS
Northeast Cape, St. Lawrence Island, Alaska
FUDS No. F10AK0969-03
Contract No. W911KB-06-D-0007/
W911KB-12-C-0003

WORK PLAN
REVISION 1
July 2012

Submitted by:

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ACRONYMS AND ABBREVIATIONS

′	minutes
°	degrees
°F	degrees Fahrenheit
$\mu g/100\ cm^2$	micrograms per 100 square centimeters
µg/kg	micrograms per kilogram
AAC	Alaska Administrative Code
AC&WS	Aircraft Control and Warning Station
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
AK	Alaska Test Method
ANCSA	Alaska Native Claims Settlement Act
APP	Accident Prevention Plan
AS	Alaska Statute
bgs	below ground surface
Bristol	Bristol Environmental Remediation Services, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Contracting Officer
CPR	cardiopulmonary resuscitation
CQC	contractor quality control
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control Systems Manager
DO	dissolved oxygen
DoD	Department of Defense
DOT	U.S. Department of Transportation
DQCR	Daily Quality Control Report

ACRONYMS AND ABBREVIATIONS (continued)

DRO	diesel range organics
DU	decision unit
E.O.	Executive Order
EM	Engineer Manual
EPA	U.S. Environmental Protection Agency
FUDS	formerly used defense sites
GAC	granular activated carbon
GPS	Global Positioning System
GRO	gasoline range organics
HSM	Health and Safety Manager
HTRW	hazardous, toxic, and radioactive waste
HWAP	hazardous waste accumulation point
IDW	investigation-derived waste
ISO	International Standards Organization
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MI	*MULTI INCREMENT®*
MNA	monitored natural attenuation
MOC	Main Operations Complex
NE Cape	Northeast Cape
Northland	Northland Services
NPDES	National Pollutant Discharge Elimination System
ORP	oxygen-reduction potential
OSHA	Occupational Safety & Health Administration
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCS	petroleum-contaminated soil(s)

ACRONYMS AND ABBREVIATIONS (continued)

pH	potential hydrogen
PM	Project Manager
POL	petroleum, oil, and lubricants
PPE	personal protective equipment
QAR	Quality Assurance Representative
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RRO	residual range organics
SOP	Standard Operating Procedure
SOW	Scope of Work
SPCC	Spill Prevention, Control, and Countermeasures Plan
SS	Site Superintendent
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SWPPP	Storm Water Pollution Prevention Plan
T&D	transportation and disposal
Tech Memo	Technical Memorandum
TestAmerica	TestAmerica Laboratories, Inc.
TOC	total organic carbon
TSCA	Toxic Substances Control Act
U.S.C.	U.S. Code
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
USACE	US Army Corps of Engineers
USAF	U.S. Air Force
UVOST	UltraViolet Optical Screening Tool
WP	Work Plan

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APPROVALS

By their signatures, the undersigned approve this Work Plan.

Molly Welker
Project Manager

July 19, 2012
Date

Charles L. Croley

Chuck Croley
Site Superintendent

July 19, 2012
Date

PLAN PREPARATION

Clark Roberts, C.I.H., has reviewed the Site Safety and Health Plan in accordance with the guidance and requirements of US Army Corps of Engineers Engineer Manual (EM) 385-1-1, 2008 edition.

Clark Roberts

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

July 19, 2012
Date

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1.0 INTRODUCTION

This Work Plan (WP) has been developed for approval by the US Army Corps of Engineers® (USACE), Alaska District, as a control mechanism for the work to be performed under Contract Nos. W911KB-12-C-0003 and W911KB-06-D-0007, Task Order 0007, for Hazardous, Toxic, and Radioactive Waste (HTRW) remedial actions (RAs) at Northeast Cape (NE Cape), St. Lawrence Island, Alaska. The USACE has awarded the contracts to Bristol Engineering Services Corporation and Bristol Environmental Remediation Services, LLC (Bristol). Bristol is tasked with completing the proposed contracts. This WP covers the work to be performed at sites located at NE Cape, as well as one area-wide cleanup/removal effort.

The 2012 Scope of Work (SOW) addresses specific selected remedies described in the Decision Document for the HTRW at NE Cape (USACE, 2009). The SOW for this project includes the following:

- Preparation of plans and reports.
- Mobilization/demobilization to/from the NE Cape site in 2012.
- Excavation and disposal of petroleum-contaminated soils (PCS) at Main Operations Complex (MOC) Sites 10, 11, 13, 15, 19, and 27. These sites approximately correlate to Areas A2, B1, B2, C, E1, E2, E3, E4, F, G2, and I1 on the MOC excavation plan.
- Excavation and disposal of polychlorinated biphenyl- (PCB-) contaminated soils from Site 13 (Heat and Power Plant) and Site 31 (White Alice Communications Station).
- Continued monitored natural attenuation (MNA) of petroleum-contaminated sediment and surface water at the petroleum, oil, and lubricants (POL) spill at Site 8 (POL Spill).
- Continued MNA of groundwater from monitoring wells in the vicinity of the MOC.
- Excavation and disposal of arsenic-contaminated soil from Site 21 Wastewater Treatment Tank.
- Surface water sampling at Site 21.

- Sediment mapping and Phase I removal of contaminated sediment at Site 28 Drainage Basin.
- Sediment sampling and characterization at Site 28.
- Confirmation soil sampling at Site 28 (up to 30 samples) following Phase I sediment removal actions (optional task currently not awarded).
- Excavation and disposal of drums, drum liquids, and associated contaminated soil at the MOC, specifically Site 10.
- *MULTI INCREMENT*®[1] (MI) soil sampling for diesel range organics (DRO) and PCBs at the following bulk bag staging areas: Cargo Beach, Site 6, and the areas south of the Bristol refueling area (International Standards Organization [ISO] tanks [ISO-adherent tanks]).
- MI soil sampling for POL at the present-day refueling (ISO tanks) area (optional task currently not awarded).
- Soil sampling alongside the road leading to the former radar dome on top of Kangukhsam Mountain.
- Removal and disposal of dangerous debris, drums, and poles from tundra areas site-wide, where clearly identified.
- Stabilization of disturbed site areas, as detailed in the Storm Water Pollution Prevention Plan (SWPPP).
- Preparation of an HTRW RA report that includes survey and as-built drawings, data review, and discussion of all RA work, including soil excavation and removal, sediment removal, waste disposal documentation, sample results, debris removal, and other relevant project details.
- Mobilization/demobilization to/from the NE Cape site in 2013 (optional task currently not awarded).

This WP contains the following elements:

- Waste Management Plan (Appendix A)
- Contractor Quality Control Plan (CQCP) (Appendix B)
- Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP) (Appendix C)
- Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) (Appendix D)
- Spill Prevention, Control, and Countermeasures (SPCC) Plan (Appendix E)

[1] *MULTI INCREMENT*® is a registered trademark of EnviroStat, Inc.

- Permits and Quarry Agreement (Appendix F)
- Resumes and Training Certificates (Appendix G)
- Project Schedule (Appendix H)
- Response to Comments (Appendix I)

Any changes to the WP will be submitted as addendums. The SWPPP is an additional document developed for the 2011 HTRW RAs at NE Cape (Bristol, 2012).

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2.0 SITE DESCRIPTION

2.1 LOCATION

St. Lawrence Island is located in the northern Bering Sea off the western coast of Alaska. Northeast Cape lies approximately 135 air miles southwest of Nome, Alaska (Figure 1). The project site, which originally encompassed 4,800 acres, 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 (°) 20 minutes (′) north latitude and 168° 59′ west longitude, in Township 25 South, Range 54 West, Kateel River Meridian.

2.2 CLIMATE

St. Lawrence Island has a cool, moist, subarctic maritime climate, with some continental influences during winter when much of the Bering Sea is capped with ice pack. Winds and fog are common, and precipitation occurs approximately 300 days per year as light rain, mist, or snow. Annual snowfall is approximately 80 inches per year. Total annual precipitation is about 16 inches per year, and more than half falls as light rain between June and September. Summer temperatures average between 34 degrees Fahrenheit (°F) and 48°F, with a record high of 65°F. Winter temperatures range from -2°F to 10°F, with an extreme low of -30°F. Freeze-up normally occurs in October or November, and breakup normally occurs in June.

Winds are generally in a northerly to northeasterly direction from September to June and southwesterly in July and August. Winds exceeding 11 miles per hour occur 70 percent of the time. In the winter, winds average 23 miles per hour. The average wind speed is 18 miles per hour. Gusts in the NE Cape area have measured as high as 110 miles per hour (USACE, 2002).

2.2.1 Weather Conditions during Field Work

Weather conditions are typical of a summer subarctic maritime climate. Variable winds, light precipitation or fog, and temperatures ranging from the mid 30s to the mid 50s are representative of the daily weather in lowland and lower mountain areas. Periodic violent storms with high, sustained winds in excess of 50 miles per hour and high precipitation are encountered, as well as periods of clear, calm conditions. Wind is often the most significant factor affecting work conditions. Snow is not uncommon beginning late in September, especially in the higher elevations.

2.3 TOPOGRAPHY

The lower mountain area consists mainly of flat coastal plains that gradually turn into rolling tundra toward the base of the Kinipaghulghat Mountains. The mountains rise abruptly to a maximum elevation of approximately 1,850 feet above mean sea level. Elevations across the work areas will range from sea level to approximately 1,800 feet above mean sea level. The majority of work will be performed at or below 300 feet elevation.

2.4 GEOLOGY

St. Lawrence Island consists of isolated bedrock highlands of igneous, metamorphic, and older sedimentary rocks surrounded by unconsolidated surficial deposits overlying a relatively shallow erosional bedrock surface. In the immediate vicinity of the lower mountain area south of the MOC, shallow, unconsolidated surficial materials overlie quartz monzonitic rocks of the Kinipaghulghat Pluton. The pluton forms the mountainous work area south of the MOC, including Kangukhsam Mountain. The Suqitughneq River drainage in the Kinipaghulghat Pluton has created an erosional valley and alluvial fan of unconsolidated sediments. Granitic bedrock materials are exposed at the coast north of the site at Kitnagak Bay, suggesting that quartz monzonitic bedrock underlies the unconsolidated materials at a relatively shallow depth on a wave-cut erosional platform.

The unconsolidated materials exhibit an alluvial soil profile in areas that have not been disturbed by man. In general, silts near the surface, which overlie more sand-dominated soils, characterize the soil stratigraphy at the site. The silt may contain varying quantities of clay, sand, and gravel and may vary from zero to 10 feet in thickness. The silt is dark brown to dark green and sometimes exhibits a mottled texture. In some areas, the silt exhibits an aqua green or blue color. Dark brown silts are observed in outcrops. The sand at depth contains varying degrees of silt, gravel, and cobbles and varies from 2 feet to more than 20 feet in thickness. These deeper, coarse-grained materials are generally unsorted and are likely to be of glaciofluvial origin. The depth to bedrock at the lower elevation areas of the site is unknown.

Beach material primarily consists of coarse gravel, approximately 1-inch in diameter with minor sand. Areas along the beach also contain large concentrations of cobbles and boulders (USACE, 2002).

2.5 SURFACE WATER AND GROUNDWATER

Because of the relatively remote and undeveloped nature of St. Lawrence Island, there are little data about regional groundwater. Bedrock materials south of the site (and underlying the unconsolidated deposits) are not expected to store and transmit significant quantities of groundwater. Typically, these types of granitic rocks are impermeable and transmit groundwater only through localized fractures and weathered soil zones at the surface.

The primary potential aquifer at the NE Cape site is the unconsolidated alluvial material that underlies the area, although a deeper, confined aquifer may also exist. The mountainous area to the south provides an ideal recharge area for the unconsolidated materials, providing runoff from rain and snowmelt during the summer. Based on the topography and geology of the site, the regional groundwater flow direction is expected to be from the mountainous recharge area south of the site, flowing north, eventually discharging to the Bering Sea.

Key factors influencing the flow of groundwater at the site are the permafrost and frozen soils, which render the unconsolidated materials effectively impermeable in some areas. The U.S. Geological Survey has classified St. Lawrence Island as an area of moderately thick to thin permafrost (Ferrians, 1965). Although the depth of permafrost at St. Lawrence Island is unknown, the base of permafrost on the mainland at Nome (135 air miles to the northeast) is estimated to be at a depth of 120 feet. The deeper, unconsolidated deposits at the site are probably permanently frozen, and the shallow soils represent the active layer, where soils are thawed only during portions of the year. Frozen soils have a profound effect in retarding groundwater flow during most of the year.

In addition to the Bering Sea north of the NE Cape facility, surface water in the vicinity of the work area consists of small streams, small- to moderate-sized lakes, and marshy areas. Surface water generally flows northward from the more southerly located highland area. Small surface water bodies are common throughout the area. The primary stream drainage in the area, the Suqitughneq River, is fed by runoff from the prominent drainage of the Kinipaghulghat Mountain valley in the lower mountain area. Several smaller tributaries feed the drainage as it flows north to Kitnagak Point. The Suqitughneq River was impacted by a diesel fuel spill in the 1960s. The smaller tributaries originate from two small, unnamed lakes (USACE, 2002).

2.6 AIR QUALITY

Air quality in the area is good. There are minimal sources of air emissions at the site because of its remote nature. The occasional boat motor, vehicle engine, or fire has a negligible effect. Air emissions at the site increase during RA work because more equipment and vehicles are at the site. Winds typical of the area disperse emissions (USACE, 2002).

2.7 VEGETATION

The NE Cape area has several major habitat types, including moist tundra dominated by heaths, grasses, sedges, mosses, and lichens, with shrubs that include bearberry, dwarf birch, narrow-leaf Labrador tea, and willow. These plants typically grow in 1 to 3 feet of undecayed organic mat over saturated and frozen soil. Alpine tundra plants (dwarf, prostrate plants that include heaths and tundra species adapted to dry, thin soil conditions) grow on the slopes and exposed ridges of the nearby mountains. The NE Cape area has many low-lying areas with lakes, bogs, and poorly drained soils (USACE, 2002).

2.8 FISH AND WILDLIFE

Large mammals are generally not abundant on St. Lawrence Island. Polar bears may be on the island anytime during the year but are most often present when the ice pack is near shore. Some years, polar bears become stranded on the island throughout the summer when the ice pack moves out earlier than usual. A population of approximately 1,000 reindeer inhabit the island. Arctic foxes, cross foxes, red foxes (less common), wolves (rarely), and several small mammals (tundra shrews, arctic ground squirrels, Greenland collared lemmings, red-backed voles, and tundra voles) also inhabit the island. Animals usually seen in or around the work sites are small mammals such as ground squirrels and foxes. The information provided in this section is based on government-furnished material, previous work plans, RA reports, and oral communications with locals.

Marine mammals are present in the vicinity of the NE Cape area as seasonal migrants in the offshore and nearshore marine waters, at haul-out sites, and in association with the advancing and retreating ice pack. No haul-out sites are within the work area. During the summer, walrus, sea lions, and spotted seals may be present in offshore waters. During the ice season, ringed seals, bearded seals, walrus, and spotted seals can be found in nearshore and offshore leads and open water. Bowhead, gray, minke, killer, right, humpback, blue, and beluga whales inhabit offshore waters.

The only breeding seabird colony known to exist at the NE Cape facility consists of about 60 glaucous gulls and 60 herring gulls at Seevookhan Mountain, about 5 miles southeast of the NE Cape site. Several other species of birds have been sighted in the vicinity of the NE Cape site, including common ravens, snow buntings, sandhill cranes, whistling swans, Lapland longspurs, and gulls.

Ten primary species of fish reside in the streams and tundra ponds of St. Lawrence Island. These include blackfish, nine-spined stickleback, grayling, whitefish, Arctic char, and Dolly Varden trout. Five of the six species of Pacific salmon occur around the island and rear in many of the larger drainages.

2.9 COMMUNITY PROFILE

The nearest community on St. Lawrence Island to the project site is the Village of Savoonga, approximately 60 miles northwest of the site, with a population of approximately 800 people, according to elders from Savoonga. There are no longer any permanent residents at the NE Cape site, but there is a small subsistence hunting and fishing camp in the area that is infrequently inhabited in the summer by residents of Savoonga and Gambell. There are fewer residents of Gambell coming by the NE Cape in the summer, but with snow machines, the locals travel far in the winter. They also tend to gather at their own hunting camps. The fish camp at NE Cape is a rest stop. The island is accessible by boat, regularly scheduled airlines (to Gambell and Savoonga), and chartered air flights out of Nome. There is no regularly scheduled commercial access to the project site (USACE, 2002).

2.10 Subsistence Activities

Savoonga is a traditional St. Lawrence Island Yup'ik village, with a subsistence lifestyle. Whale, seal, walrus, and reindeer compose 80 percent of islanders' diets. The economy is largely based upon subsistence hunting of walrus, seal, fish, and whale, with some cash income. Berries and edible plants are also harvested. Subsistence and commercial fishing for halibut takes place in the vicinity of NE Cape.

2.11 History

St. Lawrence Island was established as a reindeer reserve by Executive Order on January 7, 1903. The present project site was acquired by the U.S. Air Force (USAF) on January 16, 1952, under Public Land Order 970, which removed 21,013 acres from the reserve. In 1952, the USAF Aircraft Control and Warning Station (AC&WS) was formally activated by assignment of the 712th AC&WS Squadron and the 698th Security Squadron. The original site was designed to support 212 personnel. Throughout its existence, the NE Cape facility has been a surveillance station, providing radar coverage for the Alaskan Air Command and, later, for the North American Air Defense Command, as part of an Alaska-wide system constructed to reduce potential vulnerability to bomber attacks across the polar regions.

The White Alice Station area remained in operation with minimal military staff until 1972. All lands were then withdrawn from the military under Public Land Order 5187 for classification under Section 17(d)(1) of the Alaska Native Claims Settlement Act (ANCSA) of 1971, which entitled local community village corporations to select and receive specific tracts of federal land. Interim Conveyance No. 203 (June 1979) conveyed unsurveyed lands of St. Lawrence Island to Sivuqaq, Inc., in Gambell, and Savoonga Native Corporation, known today as Kukulget, Inc. Surveyed land, easements, and land-use permits effective before conveyance were excluded from the transfer.

In 1982, transfer of the White Alice Station area, south of the MOC, to the U.S. Department of the Navy was initiated. However, this transaction was not formally completed and was superseded by ANCSA. The Navy conducted a removal action under its Comprehensive Long-Term Environmental Action Navy program. The action included removal of specified hazardous items and containerized hazardous and toxic waste.

In 2000, the White Alice Station was reclassified as a Formerly Used Defense Sites- (FUDS-) eligible property. In response, the USACE included the area in the ongoing cleanup program for NE Cape (USACE, 2002).

2.11.1 Previous Studies and Actions

Environmental investigations and cleanup activities at NE Cape began in the mid 1980s, with the goal of locating and identifying areas of contamination and gathering enough information to develop a cleanup plan. Remedial investigations (RIs) were initiated at NE Cape during the summer of 1994. Additional sampling was performed during subsequent investigations: Phase II RI (Montgomery Watson, 1996 and 1999); Phase III RI (Montgomery Watson Harza, 2003); and Phase IV RI (Shannon & Wilson, Inc., 2005). The studies divided the concerns among 34 separate sites. The results of the RIs showed that contaminants were present at some but not all sites. Bristol Environmental & Engineering Services Corporation performed removal actions in both 2003 and 2005. In 2009, Bristol Environmental Remediation Services, LLC (Bristol), returned to the island to construct a landfill cap, remove POL-containing drums, and perform a chemical oxidation study. Bristol again returned to NE Cape during the summer of 2010 to excavate POL-contaminated soils from Sites 1, 3, 6, and 32; to excavate PCB-contaminated soils from Sites 13, 16, 21, and 31; to excavate arsenic-contaminated soils from Site 21; to cap the Site 9 landfill; and to continue monitoring Site 8 for natural attenuation. In 2011, Bristol excavated 8,091 tons of DRO-contaminated soil from two areas within the MOC, excavated 3,838 tons of PCB-contaminated soil from Sites 13 and 31, and excavated

14.8 tons of arsenic-contaminated soil from Site 21. Extensive soil and sediment sampling was conducted in the Site 28 wetland, and additional samples were collected from Site 8 and from groundwater monitoring wells within the MOC. Thirty-four tons of metal and miscellaneous debris were also removed and disposed of during field activities in 2011.

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3.0 SCOPE OF WORK

3.1 SCOPE OF WORK

The SOW for this project includes the following:

- Excavation and disposal of 8,782 tons of PCS at the MOC sites 10, 11, 13, 15, 19, and 27. These sites approximately correlate to plumes A2, B1, B2, C, E1, E2, E3, E4, F, G2, and I1.
- Excavation and disposal of 2,700 tons of PCB-contaminated soils from Site 13 (Heat and Power Plant) and Site 31 (White Alice Communications Station).
- Continued MNA of petroleum-contaminated sediment and surface water at Site 8.
- Continued MNA of groundwater from monitoring wells in the vicinity of the MOC.
- Excavation and disposal of 100 tons of arsenic-contaminated soil from Site 21 (Wastewater Treatment Tank).
- Sediment mapping and sampling at Site 28 (Drainage Basin).
- Phase I Removal of 140 bank cubic yards of sediment at Site 28 (Drainage Basin).
- Excavation and disposal of 1 ton of drums, 100 gallons of drum liquids, and 50 tons of associated contaminated soil at the MOC, specifically Site 10.
- MI soil sampling for DRO and PCBs at the following bulk bag staging areas: Cargo Beach, Site 6, two areas south of the Bristol refueling area (ISO tanks), and a former camp location at Site 26.
- Soil sampling alongside the road leading to the former radar dome on top of Kangukhsam Mountain.
- Removal and disposal of 25 tons of miscellaneous metal debris, 1 ton of drums, and 100 pole stumps from tundra areas site-wide, where clearly identified.
- Removal and disposal of an additional 10 tons of debris/drums/poles.
- Inclusion of new work activities described by the SOW and the associated results in the 2012 HTRW Remedial Action Report.

The SOW also includes the following options that have not been exercised:

- Excavation and disposal of up to 4,000 additional tons of POL-contaminated soil
- Excavation and disposal of up to 1,400 additional tons of PCB-contaminated soil

- Confirmation soil sampling at Site 28 (up to 30 samples) following Phase I sediment removal actions
- MI soil sampling for POL at the present-day refueling area
- 2013 mobilization/demobilization

3.2 SITE DESCRIPTIONS

An overview of the NE Cape project work sites is shown in Figure 3.

3.2.1 Main Operations Complex

The MOC (outlined in Figure 3; detailed in Figure 4 and Figure 5) once provided the majority of the site infrastructure, including central housing, administrative buildings, power generation sites, fuel storage tanks, and maintenance areas for the entire NE Cape facility. The MOC comprises multiple sites, including Sites 10, 11, 13, 15, 19, and 27.

Remedial investigations and removal actions were conducted at the MOC from 1994 to 2011. All of the MOC structures have been demolished. PCB-contaminated concrete, PCB-contaminated soils, and fuel-stained soils were excavated and transported off site during removal actions from 2000 to 2011. In 2009, a Phase I in-situ chemical oxidation study was performed by Bristol at the MOC, but it was unsuccessful in remediating the soils below the DRO cleanup level. In 2010, an UltraViolet Optical Screening Tool (UVOST) investigation delineated the extent of DRO contamination at the MOC. Operations conducted in 2011 consisted of additional excavation and removal of PCB- and POL-contaminated soil.

The primary contaminant of concern in soils at the MOC is DRO. Surface and subsurface soils are contaminated at depths extending to more than 15 feet below ground surface (bgs). Based on an evaluation of the 2010 UVOST investigation and groundwater depths, Bristol estimated that 11,000 to 16,000 tons of contaminated soil could feasibly be excavated at the MOC gravel pad. The amount of contaminated soil that can be removed is dependent on depth to groundwater, which generally follows surface topography (see topographic contours and groundwater elevation contours shown in Figure 4). During past field operations, groundwater elevations had been observed to vary seasonally and also to respond quickly to rainfall events.

The primary contaminants of concern in shallow groundwater at the MOC are gasoline range organics (GRO), DRO, residual range organics (RRO), benzene, and naphthalene. Based on available data, monitoring wells on site are thought to be screened within the shallow water table aquifer. The depth to groundwater in the area varies significantly. Perched aquifers of unknown extent are potentially present in some areas where groundwater is encountered between 4 and 7 feet bgs. A potentially confined aquifer is also present in areas with water depths ranging from 10 to 25 feet bgs. There are also discontinuous permafrost layers at the MOC.

Nine monitoring wells were sampled at the MOC in 2010 and 2011 (Figure 12). In 2010, three wells contained contaminant concentrations exceeding cleanup levels: MW 88-4, MW 88-5, and MW 88-10. All three wells exceeded cleanup levels (1.5 mg/L) for DRO at 3.3 milligrams per liter (mg/L), 12 mg/L, and 1.6 mg/L, respectively. Well MW 88-5 also contained concentrations of benzene (0.0093 mg/L) and RRO (1.6 mg/L), exceeding cleanup criteria. In 2011, monitoring wells MW 88-4 and MW 88-5 contained DRO concentrations of 2.3 mg/L and 7.5 mg/L, respectively. MW 88-4 contained benzene and arsenic concentrations of 0.0094 mg/L and 0.011 mg/L, respectively. MW 88-5 contained benzene and RRO concentrations of 0.020 mg/L and 2.0 mg/L, respectively. MW 88-10, which exhibited DRO concentrations in excess of cleanup levels in 2010, did not exceed cleanup levels in 2011. Table 3-1 shows historical sampling results from wells within the MOC.

Table 3-1 Historical Sampling Results from Wells within the MOC

	Matrix	Water	Water	Water	Water	Water
	Method	8260B	AK101	AK102	AK103	RSK-175
	Analyte	Benzene (mg/L)	GRO (mg/L)	DRO (mg/L)	RRO (mg/L)	Methane (mg/L)
	ADEC Table C Cleanup Level	0.005	1.3	1.5	1.1	N/A
	Unit	mg/L	mg/L	mg/L	mg/L	µg/L
Well ID	Year					
88-4	2004	**0.0337**	1.25	**3.89**	**1.46**	---
	2010	0.0024	0.24	**3.3**	0.43 M	2,100
	2011	**0.0094**	0.4	**2.3**	0.55	2,100
88-10	2004	0.0004 U	0.0357	1.38	0.549 U	---
	2010	0.00015 U	0.044 U	**1.6**	0.036 J	0.4 M
	2011	0.00045 U	0.044 U	0.54	0.15	1.8
88-5	2004	**0.0093**	**1.5**	**11.3**	**2.28**	---
	2010	**0.0093**	0.19	**12**	**1.6**	99 M
	2011	**0.020**	0.24	**7.5**	**2.0**	630

Notes:

--- = not sampled
µg/L = micrograms per liter
AK = Alaska Test Method
DRO = diesel range organics
GRO = gasoline range organics
j = result is an estimate
M = matrix effect was present
mg/L = milligrams per liter
MOC = Main Operations Complex
N/A = not applicable
RRO = residual range organics
U = non-detect

The wells containing concentrations of DRO exceeding cleanup criteria had the lowest dissolved oxygen (DO) concentrations. Monitoring wells 88-4 and 88-5 contained the highest concentrations of ferrous iron, alkalinity, and methane. Ferrous iron, methane, and alkalinity are metabolic byproducts of microbial respiration. The wells with the lowest contaminant concentrations had comparatively high DO, suggesting that microbes are depleting oxygen to aerobically degrade DRO. The high concentrations of methane in MWs 88-4 and 88-5 indicate anaerobic degradation of DRO by methanogenic microbes.

These factors suggest that natural attenuation is occurring, and the 2011 results are generally consistent with results from the 2010 sampling event.

3.2.2 Site 13 – Power and Heat Building

Site 13 is located in the MOC and consisted of the Heat and Electrical Power Building (Building 110) (Figure 3). Several tanks, diesel generators, and power transformers were formerly located at this site. Prior to 2010, during previous field remediation activities, over 300 tons of PCB-contaminated soils were excavated and removed. An estimated 592 tons of PCB-contaminated soil was excavated from Site 13 in 2010. In 2011, Bristol excavated and disposed of 2,419.8 tons of PCB-contaminated soil from Site 13.

By the end of the 2011 field season, four separate excavation areas were open at the site on the southern and western sides of the former Building 110 foundation (Figure 7). Confirmation samples indicated that contamination remains at various locations in each excavation. The northernmost excavation at Site 13 is extending into a POL excavation area, plume A2.

3.2.3 Site 31 – White Alice Communications Station

Site 31 is located south of the MOC, uphill toward a valley at the base of Mt. Kangukhsam (Figure 3). The site formerly contained four large antennas, a central main electronics building, supporting structures, and seven aboveground storage tanks, all of which were demolished and removed during the 2003 removal action.

A total of 118 tons of PCB-contaminated soil was excavated south and west of the former main electronics building, adjacent to a former transformer pad, and at the septic tank outfall during the 2005 field season. Seventy-nine tons of PCB-contaminated concrete was also removed from portions of the Building 1001 foundation.

Soil samples were collected to analyze for petroleum hydrocarbons and PCBs associated with the site in 2001, 2003, and 2004. There is no longer any POL-contaminated soil remaining above the cleanup level at Site 31. Three previously identified PCB-contaminated areas were excavated in 2005. Confirmation samples indicated that PCB concentrations remained above cleanup levels in one of the three areas located adjacent to the former transformer pad.

In 2010, 638 tons of PCB-contaminated soil was excavated from Site 31. PCB contamination above the cleanup level of 1 mg/kg was still present at Site 31 based on field-screening results and confirmation samples. During removal actions in 2011, 1,418.5 tons of PCB-contaminated soil was removed and the excavation area was expanded. Laboratory analyses from soil samples indicate that PCB contamination remains at a number of locations throughout the excavation (Figure 8).

3.2.4 Site 21 – Wastewater Treatment Tank

Site 21 included the wastewater treatment system for the main housing and operations complex (Figure 3). Located west of the perimeter road, the site consisted of a concrete septic settling tank, which discharged via an 8-inch, insulated, cast-iron pipe to the wetland area approximately 450 feet west. The septic tank compartments were cleaned and decommissioned during the 2003 RA. The utility corridor, which extended from the main complex to the septic tank, was also decommissioned in 2003, along with the wooden utilidor outfall line.

Following the 2003 RA, confirmation soil samples were collected and analyzed for PCBs. PCBs were detected above cleanup levels in one location situated directly beneath the outfall piping, adjacent to the septic tank. During 2010 removal actions, 10.4 tons of PCB-contaminated soils were excavated from Site 21, and confirmation samples confirmed that no PCB-contaminated soils remained above cleanup levels.

Samples collected from the sewer outfall area in 1994 contained arsenic concentrations that exceeded cleanup levels. The location was excavated in 2010 and 2011 but still contains concentrations of arsenic above the cleanup level. In 2010, Bristol excavated 16.7 tons of arsenic-contaminated soil from this location, and confirmation sample results showed that arsenic concentrations above the cleanup level of 11 milligrams per kilogram (mg/kg), with concentrations ranging from 12 mg/kg to 180 mg/kg, remained at the site. In 2011, Bristol removed 14.8 tons of arsenic-contaminated soil. Confirmation results indicated that arsenic contamination persists throughout the excavated areas in concentrations exceeding cleanup levels. Arsenic concentrations range from 22 mg/kg to 180 mg/kg (Figure 9).

3.2.5 Site 8 – POL Spill

Site 8 is located in an area where the fuel pipeline ran from the Cargo Beach pump house to the bulk storage tanks at the MOC (Figure 3). A break was reported in the pipeline west of the main road embankment north of the Suqitughneq River. The location of the break lies approximately 75 feet southwest of the intersection of Cargo Beach Road and the Airport Access Road. The fuel pipeline was drained and removed in 2000.

The site is a dense, grassy wetland that slopes southward and narrows toward the Suqitughneq River. A spring of flowing water emerges near the wetland's confluence with the Suqitughneq River. Sand and cobbles are present beneath the vegetative mat.

Samples collected in 2004 indicate DRO in soils ranging from 6,700 mg/kg to 19,500 mg/kg. Surface water samples were also collected, but contaminants were not detected. The highest concentrations of DRO in soil samples were discovered in samples taken approximately 50 feet downgradient of the pipeline break.

In 2010, Bristol developed and implemented a Sampling and Analysis Plan to monitor natural attenuation parameters and collect surface water samples. Three decision units (DUs) were established for soil and MNA sampling based on field observations and the approximate location of the pipeline break. The middle DU near the pipeline break had two polynuclear aromatic hydrocarbon (PAH) compounds slightly above the Alaska Department of Environmental Conservation (ADEC) cleanup level in the soil, as well as a duplicate sample that exceeded cleanup levels for DRO. The middle DU soil concentrations of 2-Methylnaphthalene exceeded ADEC soil cleanup levels (0.6 mg/kg) in field duplicate samples 10NC08SB02 and 10NC08SB03, with concentrations of 7.5 mg/kg and 7.6 mg/kg, respectively. Sample 10NC08SB03 had a reportable fluorene concentration of 0.820 mg/kg, which exceeded the 0.8 mg/kg cleanup level. Sample 10NC08SB02 had a fluorene concentration of 0.630 mg/kg. Sample 10NC08SB03, from the middle DU, contained a DRO concentration of 9,300 mg/kg. Samples from the other DUs did not return values in excess of the cleanup levels.

Soil samples were collected from all DUs in 2011, and none of the samples contained contaminant concentrations in excess of cleanup levels (Figure 11). The MNA parameters have not varied significantly between the three DUs. Two surface water samples were collected downgradient of the Site 8 wetland near the confluence of the Suqitughneq River; all the analyses were below surface water cleanup standards, and no petrogenic sheen was seen. There is no record of any biogenic or petrogenic sheen at this location, and none were observed during sample collection. Sediments were not disturbed during the collection of surface water samples. This vegetation does not appear stressed, though petroleum odor is evident when a person walks across the vegetative mat. In 2012, Bristol will continue to monitor soil and surface water at Site 8 to determine whether MNA is occurring.

3.2.6 Site 28 – Drainage Basin

Site 28 Drainage Basin lies north of the MOC and flows north into the Suqitughneq River (Figure 3). This site has been impacted by fuel releases from the bulk fuel storage tanks and other releases. Surface water runoff and subsurface water seeps from the MOC gravel pad into this tundra and wetland area.

Three drainages originate from the MOC gravel pad and contribute flow to Site 28 (Figure 10). The eastern drainage flows from the area adjacent to sites 10 and 11, a vegetated area north of the former fuel tanks; the middle drainage originated from a culvert removed during 2010 that previously directed flow from Site 27; and the western drainage is downgradient of Site 13.

Soil staining has been observed near the head of the eastern drainage and at the former tank locations. The western drainage originated from a manhole and small concrete supporting structure just north of the perimeter access road, which emptied into an artificially created swale. The manhole likely served as the drain for Building 110, Heat and Electric Power. In 2010, the concrete manhole structure was cleaned and removed. A 12-inch corrugated metal pipe, which attached to the manhole and continued toward the MOC, was cut and 63 feet of the pipe was removed. The pipe was capped just north of the perimeter road at the head of the western drainage. The open end of the pipe that extended from the MOC was filled with bentonite and welded shut. Another 12-inch corrugated metal pipe in the eastern drainage, measuring approximately 32 feet in length, was completely removed. Sediments in this area have been described as stained and will produce sheen when disturbed. The extent and magnitude of sediment contamination at Site 28 will be delineated in 2012. Sampling activities occurred at the drainage basin between 1994 and 2001. The primary contaminants of concern in sediments are chromium, lead, zinc, PCBs, PAHs, DRO, and RRO. The highest concentrations of contaminants are located proximal to the edge of the MOC.

Surface water samples were collected in the drainage basin in 1994, 1996, and 2001. According to the Decision Document, concentrations of DRO, total recoverable petroleum hydrocarbons, PCBs, and lead were elevated in 1994. Surface water samples collected in 2001 were analyzed for DRO, RRO, and PCBs. The samples were not analyzed for lead. DRO was detected at concentrations ranging from 0.39 to 2.3 mg/L; the ADEC Table C cleanup level is 1.5 mg/L. PCBs and RRO were not detected. The most heavily contaminated areas of the drainage basin were found immediately below the former locations of two culverts, located in the western and middle drainages.

Bristol collected soil and sediment samples from the Site 28 Drainage Basin in 2011. The 2011 analytical results from samples collected in 2011 indicate exceedances in ADEC and site-specific cleanup levels for DRO, RRO, toluene, ethylbenzene, total xylenes, PAHs, PCBs, arsenic, cadmium, chromium, lead, and selenium. Full results are available in the Site 28 Technical Memorandum (Bristol Engineering Services Corporation, 2012).

4.0 2012 FIELD ACTIVITIES

The fieldwork at NE Cape for the 2012 field season will consist of the following major activities:

- Mobilization/demobilization to/from the NE Cape site in 2012 and 2013.
- Excavation and disposal of PCS at the MOC sites 10, 11, 13, 15, 19, and 27. These sites approximately correlate to plumes A2, B1, B2, C, E1, E2, E3, E4, F, G2, and I1 in the MOC excavation plan.
- Excavation and disposal of PCB-contaminated soils from Site 13 (Heat and Power Plant) and Site 31 (White Alice Communications Station).
- Continued MNA of petroleum-contaminated sediment and surface water at Site 8.
- Continued MNA of groundwater from monitoring wells in the vicinity of the MOC.
- Excavation and disposal of arsenic-contaminated soil from Site 21 (Wastewater Treatment Tank).
- Surface water sampling at Site 21.
- Sediment mapping, sampling, and characterization at Site 28 (Drainage Basin) and subsequent Phase I excavation and disposal of contaminated sediment.
- Excavation and disposal of drums, drum liquids, and associated contaminated soil at the MOC, specifically Site 10.
- Soil sampling for DRO and PCBs at bulk bag staging areas Cargo Beach, Site 6, and the areas south of the Bristol ISO tanks.
- Soil sampling along the radar dome road.
- Removal and disposal of dangerous debris, drums, and poles from tundra areas site-wide, where clearly identified.
- Inclusion of new work activities described by this SOW and the associated results in the 2012 HTRW Remedial Action Report.

4.1 LOGISTICS, GENERAL WORK SITES, AND PROCEDURES

4.1.1 Subcontractors

Bristol's primary subcontractors for this project are listed in Table 4-1. All subcontractors will comply with the applicable portions of the APP as a condition of work.

Subcontractors will not be allowed to enter work zones until they have met the qualifications of the APP and been properly briefed by the Site Safety and Health Officer (SSHO).

Table 4-1 Major Subcontractors

Subcontractor	Assignment
Bering Air	Aircraft charters
ECO-LAND, LLC	Surveying
Fairweather, LLC	Infirmary and emergency medical services
Global Services, Inc.	Camp services
Northland Services	Marine transportation
Security Aviation	Aircraft charters
TestAmerica Laboratories, Inc.	Fixed-based analytical testing laboratory and field laboratory analysts
Waste Management, Inc.	Solid, RCRA, and TSCA soil disposal

Notes:
RCRA = Resource Conservation and Recovery Act
TSCA = Toxic Substances Control Act

4.1.2 Mobilization/Demobilization

Northland Services (Northland) will be utilized for marine transportation of supplies and equipment to NE Cape in 2012 and 2013. An open-deck barge will be used for mobilization and demobilization. Northland's barge will depart Seattle in early May 2012 and will depart from Anchorage for Nome, Alaska, by mid-May 2012. A flat-deck landing craft will shuttle equipment and supplies between the barge and Cargo Beach at NE Cape once the beach is free of ice. Bristol has heavy equipment currently staged on the island that can be utilized to assist the landing craft. Most of the cargo will be loaded on flats so that it can be rolled off the barge using a front-end loader, minimizing the time the barge is beached.

Demobilization will take place no later than October 15, 2012. Landing craft will visit NE Cape periodically throughout the summer to transport bulk bags to Nome. The landing craft can accommodate approximately 40 to 50 bulk bags per trip. In 2011, Bristol utilized 19 landing craft for bag transport and demobilization activities. It will require approximately 10 landing craft trips to transport the remaining 451 bags from 2011 currently staged at the NE Cape site, filled with soil and ready for transport.

4.1.3 Air Support

Most resupply items will be air-freighted to Nome on Alaska Airlines or Northern Air Cargo. Crew transport and day-to-day resupply of perishable items, shipment of critical parts, and sample shipments will be accomplished using charter flights out of Nome. Bristol will frequently utilize Bering Air for chartered aircraft flights between NE Cape and Nome. A CASA 212 chartered out of Nome will be used to transport large items that cannot be carried by a passenger aircraft. Additional charter flights will be made as necessary to transport local labor between Savoonga and NE Cape.

Security Aviation, of Anchorage, Alaska, will be used to transport USACE personnel in order to comply with U.S. Department of Defense (DoD) Directive 4500.53 and the DoD Commercial Review Board.

4.1.4 Temporary Construction Camp

The construction camp, including sleeping facilities, mess facilities, restrooms, laundry and office space, will be located on the airport parking area pad. The camp will be capable of accommodating all personnel and will include lodging for government representatives. Satellite communications for the project will be provided. Construction of the camp will begin immediately upon arrival at NE Cape when mobilization begins in 2012.

Drinking water for the camp will be bottled water supplemented, if needed, with filtered and treated water from the nearby Suqitughneq River. Drinking water will be of sufficient quality to meet the requirements set forth in the Engineer Manual EM 385-1-1, Section 02.C (USACE, 2008). Toilet facilities will meet the requirements of EM 385-1-1, Section 02.E. Bristol may have a mixed-gender workforce and will set up facilities accordingly. Other camp processes, such as water treatment, power generation, and solid waste disposal, will meet State of Alaska permitting restrictions and will be addressed in Bristol's contract with the camp provider. All gray and black water from the camp facilities will be treated through a septic system.

The infirmary will be located at the camp, will comply with the requirements set forth in Section 3 of EM 385-1-1, and will be attended by a full-time Emergency Medical Technician III/Paramedic.

4.1.5 Work Site Access

Four stream crossings, consisting of three culverts and one bridge, exist within the work areas at the NE Cape site. The stream crossings were repaired during previous field operations, but may require additional work. Bristol expects that culvert repairs may be required and will have sections of culvert available to address necessary repairs. All efforts will be made to minimize adverse impacts to the streams. Bristol has acquired Fish Habitat Permits for the Suqitughneq and Quangeghsaq Rivers in case bridge and road repairs are necessary on these rivers (Appendix F).

Other work to support access to the sites includes repair of road surfaces. These repairs will be accomplished where necessary with available equipment, using on-site materials.

4.1.6 Container Storage Area

Containers may be stored at various locations throughout the NE Cape site. Container storage areas will be located near the intersection of the MOC Perimeter Road and Airport Road/Cargo Beach Road on a pad at the MOC, at the Mechanic Shop area, at the camp site, and/or at Cargo Beach. Bulk bags may be staged at various locations, including the MOC, Cargo Beach, Site 6, the Site 26 Former Construction Camp, and/or an area directly east of the fuel storage containment. Bags will be transferred to Cargo Beach and placed on shipping flats (two bags per flat) prior to off-island transport.

4.1.7 Fuel Storage

The fuel storage area will be located immediately east of the MOC, across the MOC Perimeter Access Road (Figure 4). Nine 5,500-gallon ISO tanks (filled to approximately 4,500 gallons each) were taken to the site in 2011. A lined fuel containment area is present on site to hold the ISO tanks and facilitate truck fueling operations. An SPCC plan for the temporary fuel facility is presented in Appendix E of this document.

4.1.8 Hazardous Waste Accumulation Point (HWAP)

Any hazardous waste found and removed during the 2012 RAs, including POL-contaminated liquids, sludge, batteries, or transformers, will be properly contained and stored on a concrete foundation pad inside Conex containers at the MOC until they are transported off site to a disposal facility in Oregon. The HWAP area will be demarcated with signs and is shown in Figure 4.

4.1.9 Mechanic Shop Area

Bristol will use a temporary mechanics shop to support equipment maintenance operations for the duration of the project. The shop will be set up at the MOC on the former Building 103 floor slab (shown in Figure 4).

4.1.10 On-Site Laboratory

An on-site field-screening laboratory will be set up at the camp site and will utilize gas chromatographs to provide results for DRO and RRO analyses using Alaska Test Method AK102/103 and for PCB analyses using U.S. Environmental Protection Agency (EPA) Method 8082. Results from the on-site screening laboratory will be used to direct excavations and characterize waste, but will not be used to confirm that cleanup goals have been achieved at the sites.

Bristol will employ two on-site analysts from TestAmerica Laboratories, Inc. (TestAmerica) to operate the laboratory equipment. Additionally, two extractionists will assist in sample preparation.

4.1.11 Borrow Source

A local borrow source is located south of the MOC, the location of which is outlined in Figure 3. Articulating rock trucks will perform hauling operations between the borrow source and excavation sites. A signed quarry agreement between Bristol and the local Native corporations is included in Appendix F. The volume of borrow material will be tracked by the truckload each day on the Daily Quality Control Report (DQCR).

4.1.12 Backfill of Excavated Areas and Site Stabilization

Upon completion of excavation and sampling activities, the disturbed areas will be backfilled after concurrence from the USACE Quality Assurance Representative (QAR) that the confirmation samples are below the cleanup level. Backfill material may come from the borrow site, from clean excavation overburden, or from soil processed through the screening plant with particle sizes exceeding 2 inches in diameter. Backfill will be placed in 1-foot lifts and then compacted by running heavy equipment back and forth over the fill area a minimum of two passes. The restored surface will be graded to promote surface water drainage while minimizing erosion and preventing pooling in the excavated area. Following placement and compaction of backfill in the MOC, the area will be topographically surveyed to confirm that MOC site topography sufficiently drains without promoting erosion. The amount of imported backfill will depend on the volume of debris and soil removed during the field activities. The borrow pit material is clean, coarse, angular material.

The available borrow material runs <30 percent 2-inch minus, based on previous screening of the borrow material in 2009 and 2010. Previous attempts to grow grass at the

MOC for site stabilization have only been marginally successful due to the coarse-grain, angular material that is available for backfill. The landfills at Sites 7 and 9 have been capped with this material and are slowly regaining vegetative cover following multiple seeding attempts.

4.1.13 Survey and Site Identification

The horizontal location of all confirmation soil samples, soil excavation final depths and boundaries, debris/drum/pole locations, Site 28 Drainage Basin features, and points collected to produce a topographical map will be surveyed to 1.5-foot accuracy by ECO-LAND, LLC, a professional land surveyor registered in the State of Alaska. The vertical location of confirmation soil samples, soil excavation final depths and boundaries, and points collected to produce a topographical map will be surveyed with an accuracy of 0.1 foot by the professional land surveyor. The elevation of monitoring wells will be measured to 0.01 foot. Horizontal control units will be expressed in feet and will be referenced to the North American Datum of 1983 (NAD 83), projected in Alaska State Plane Zone 9. Vertical control will reference the North American Vertical Datum 1988 (NAVD 88). A surveying crew will be on site throughout the duration of the active field operation.

Site identification and soil excavations will utilize a crew consisting of field scientists, a professional land surveying team, and heavy equipment operators. Field scientists and surveyors will locate impacted areas using a variety of methods, including but not limited to Global Positioning System (GPS), surveying, report figures/maps, field-screening tools, environmental laboratory samples, and visual observations of existing markers and liners. The positions of the 2011 excavations, sample locations, and 2010 UVOST probe locations were surveyed in 2011 and will be re-located by the surveyor in 2012. Surveyors will maintain vertical and horizontal control as guidance for the POL excavations.

4.1.14 Demobilization

A scaled-down demobilization will begin when fieldwork is complete at the end of the 2012 construction season. As was done at the end of the 2011 field season, Bristol will overwinter equipment, supplies, and the remote camp at NE Cape in 2012 in an attempt to extend the working field season and minimize mobilization/demobilization costs. Overwintering will allow the field crew to work later in 2012 and return earlier in 2013 to complete the HTRW RAs scoped in the 2012 contract.

A six- to 11-person crew, consisting of Bristol and Global Services, Inc., personnel, will require approximately 10 days for dismantling the camp facilities and staging them, along with other equipment and supplies, for overwintering at the site. The barge will remove bulk bags, empty ISO tanks, and possibly some equipment at the end of the 2012 field season. Mobilization will be minimized in 2013 due to the majority of equipment being left on the job site. At the end of the 2013 field season (estimated to be September 15, 2013), all of Bristol's equipment and the camp facilities will be transported to Anchorage, Alaska. In 2012 and 2013, wastes will be transported from NE Cape to Seattle (intermediate stops are expected) for transportation to their respective disposal/recycling facilities. After the barge has been loaded and the demobilization tasks have been completed in 2012 and 2013 at NE Cape, aircraft will fly the demobilization crew to Nome, Alaska.

Landing craft are expected to begin arriving in late June or early July 2012 to begin the task of removing bulk bags of contaminated soil from Cargo Beach and transporting them off-island. Landing craft will be scheduled at every opportunity to transport bags off-island throughout the duration of field activities. Upon completion of field activities in 2012, if weather and scheduling permit, Bristol will remove the remaining bulk bags of contaminated soil and all accumulated debris and waste generated during this field season.

Other items that may be removed from NE Cape in 2012 will include any equipment not necessary for work activities in 2013 and items such as empty ISO containers.

Final demobilization typically occurs in mid-September and continues until weather prevents the landing craft from safely landing at Cargo Beach or all demobilization activities are complete. All construction-related support areas will be restored to their existing conditions when all the work is complete in 2013.

4.1.15 Rock Screening Plant

Because a large percentage of the material at NE Cape is naturally coarse, Bristol will attempt to employ methods to separate larger-diameter rocks from finer particles of the POL-contaminated soil with the caveat that significant amounts of fine material or visible contamination do not adhere to the larger-diameter rocks. Segregated material greater than 2 inches in diameter will be used as backfill in excavation areas in accordance with the ADEC Technical Memorandum, Petroleum Hydrocarbon Cleanup for Oversize Material, which states: *Rock material greater than two inches does not require remediation or testing, unless it has the potential to hold excessive amounts of contamination or contains visible petroleum product on the surface (surface stain)* (ADEC, 2005).

Building Pad 98 at the MOC (shown in Figure 4) will serve as the primary location for rock-screening activities. A Powerscreen® Chieftain 1400 will be set up at Building Pad 98 to screen out particle sizes exceeding 2 inches in diameter from the POL-contaminated soil. PCB-contaminated soils will not be screened, but will instead be containerized directly at the excavation site. Excavated soil to be processed at the screening plant will be transported via rock trucks from the various excavation sites to the screening plant. After the soil has been screened, the minus 2-inch material will be placed into bulk bags for transportation off-island. A berm made from borrow pit material will be constructed around the outer edge of the concrete pad to prevent any incidental water migration of contaminated soil while it is stockpiled on the concrete pad.

Prior to berm removal at the end of the project, the soil in the berm will be analyzed in the field laboratory, and those soils less than 7,360 mg/kg DRO will be used as backfill. The 7,360 mg/kg field action level is 80 percent of the certified laboratory confirmation sample cleanup level of 9,200 mg/kg and is used as a conservative screening level for field laboratory results.

Visibly stained rocks will not be segregated from the contaminated soil and will be disposed of and processed as required. Additionally, dense silts, peat, and frozen clumps or clods of soil will not be segregated out as oversized material and instead will be directly placed in bulk bags. The decision to screen will be made at the excavation site based on the field scientist's observation (in consultation with the QAR) of the type and nature of soil being excavated.

In 2010, Bristol was able to screen a majority of the material excavated from Site 6. In 2011, however, POL excavations at the MOC were generally not screened due to the high moisture in the soils, which caused fine particles to adhere to the larger rocks. Screening operations will cease during inclement weather conditions, such as heavy rains or winds (e.g., gusting to, or in excess of, 30 miles per hour). Bristol will conduct dust control around the MOC site with a water truck.

Any secondary contamination resulting from screening activities will be remediated by sweeping and cleaning the concrete at the Building 98 Pad and disposing of any of the swept soil in a bulk bag. PCB-contaminated soil will not be processed through the screen plant.

4.1.16 Soil Stockpiles

Soil may be stockpiled at multiple locations across the MOC and Site 31. Soil that requires removal in order to access underlying contaminated soils will be stockpiled on site prior to being used later as backfill. Stockpiles will be created at Pad 98 during mechanical screening or dewatering operations. Stockpiles at Pad 98 will sit atop the concrete pad of the former building. Bermed sides will be constructed at Pad 98 and covered with a liner to prevent migration of contaminants off-site. Stockpiled material located on Pad 98 that is less than 2 inches in diameter will ultimately be loaded into bulk bags and transported off-island for disposal. All stockpile footprint areas site-wide will be lined and will have bermed sides. Any stockpile intended to be used as backfill will be sampled in accordance with ADEC guidance prior to its use as backfill to confirm that contaminants of concern are not present in the soil (ADEC, 2010).

4.1.17 Soil Mixing

Soils excavated from beneath the groundwater table are saturated with water and of a consistency that is unfavorable for bulk bag loading and transport. These wet soils will require mixing with a drier, more granular material in order to improve their consistency and ability to travel in the bulk bags. Following excavation, excess water will be allowed to drain off the saturated soils in a dewatering area, prior to mixing. Nonhazardous soils will be mixed at the concrete Pad 98 area, and the soils will be loaded into bulk bags adjacent to Pad 98.

If PCB-contaminated soils are transported to Pad 98, Bristol will be prepared to collect wipe samples from any concrete that comes into contact with PCB-contaminated soils in excess of cleanup levels. PCB wipe samples will be collected as described in *Wipe Sampling and Double Wash/Rinse Cleanup as Recommended by the Environmental Protection Agency PCB Spill Cleanup Policy* (Smith, 1991).

4.1.18 Bulk Bag Loading Procedures

Empty bulk bags will be situated into a loading frame, lined with plastic, and filled while seated in the frame. Once filled, the soil in the bulk bag will be sampled for waste characterization purposes; the bag will be zipped shut and removed from the frame by connecting sewn-on straps to a lifting frame, which will reside on the forks of a heavy loader. Site personnel will not work underneath equipment buckets or loads during filling and transport operations and will stand clear of bulk bags as they are being loaded. Each bag will be weighed, marked with a unique identifying number, and transferred to the Cargo Beach staging area.

Waste characterization procedures are discussed in Section 4.1.20.

4.1.19 Bulk Bag Weighing

A Volvo L330 heavy lift loader has been outfitted with a scale that works off the loader's hydraulic system. This scale is rated as "certified for trade" and was installed under the supervision of a factory representative. The factory representative trained the Bristol Shop Foreman, NE Cape Site Foreman, and two NE Cape operators on its use. A calibration weight, consisting of five concrete jersey barriers mounted on a steel shipping flat, was constructed. This flat was then weighed over two different state-certified scales. The difference between the two scales was 20 pounds on a weight of 24,520 pounds. The scale will be field-calibrated on a regular basis with this known weight.

Each bulk bag containing contaminated soil will be individually marked with a bag number and weight following removal from the load frames and on-site weighing. Weights are only good at the time of weighing due to the fact that individual bulk bag weights can be affected over time by a variety of factors.

4.1.20 Waste Characterization

All soils packaged for removal will undergo waste characterization sampling in order to aid in determining the most appropriate disposal methods. All waste characterization samples will be collected in accordance with the *ADEC Draft Field Sampling Guidance* (ADEC, 2010).

Waste characterization samples will consist of a soil composite comprising material from a set of seven bulk bags. Environmental samplers will extract a small amount of material from each of the seven bulk bags and mix the soil in a stainless steel bowl. Sample jars will be filled directly from the bowl using a stainless steel instrument. Any excess soil will be returned to one of the seven bulk bags.

For PCB waste characterization, the field samplers will take into account prior field-screening results and confirmation sample results to ensure soils exceeding 50 mg/kg are classified as hazardous material. Soil with PCB concentrations greater than 50 mg/kg will be isolated from soil with PCB concentrations below 50 mg/kg for shipping and disposal purposes.

Reusable equipment will be properly decontaminated following each sampling event. Non-reusable materials will be disposed of appropriately. More detail regarding waste characterization is provided in the UFP-QAPP, Worksheet #14 (Appendix D).

4.1.21 Equipment Decontamination

Throughout the course of the field season, work will be performed at multiple sites. Decontamination efforts will be implemented to prevent cross-contamination and will be conducted according to *ADEC Draft Field Sampling Guidance, Section VIII E* (ADEC, 2010). Decontamination of non-disposable sampling equipment will consist of an Alconox® wash solution followed by a fresh water rinse and a deionized water rinse. The wash and rinse water generated during decontamination procedures will be treated or disposed of as follows:

- The wash and rinse water may be added to bulk bags containing soil with a matching waste stream.
- Wash and rinse water associated with POL contamination may be treated through a granular activated carbon (GAC) filter or a petroleum absorbent material (water-scrubber). The water-scrubbing material is a natural fiber cellulose material that selectively absorbs hydrocarbons while repelling water.

- The wash and rinse water may be containerized in bung-top 55-gallon drums.

Heavy equipment will require decontamination following a soil excavation and prior to relocating to a new work area. Gross soil will be physically removed from the equipment using brooms and stiff-bristled brushes. The resulting soils will be bulked with excavated soils from the same waste stream.

4.1.22 Personnel Decontamination

Level D personal protective equipment (PPE), at a minimum, will always be worn. Should site conditions place personnel in close contact with contaminated materials, the SSHO will determine whether higher levels of PPE will be required. Decontamination methods for equipment and personnel will be monitored by the SSHO to determine their efficacy. No operations are expected at the NE Cape site that will require full body protection with inner and outer suits, gloves, boots, and respiratory protection.

4.1.23 Investigation-Derived Waste (IDW)

Various field procedures may result in IDW. Decontamination procedures, in particular, will produce water and soil particles that will require appropriate handling. Groundwater sampling will result in wastewater that will require treatment. Wastewater from all monitoring wells except for MW 88-4 and MW 88-5 will be treated through a GAC filter and discharged to the ground. Ground discharge will occur at the same site from which the sample was collected. Wastewater from MW 88-4 and MW 88-5 will be contained in 5-gallon buckets pending analytical results and treated appropriately following their receipt.

Excess soil produced during decontamination procedures will be added to a bulk soil container with soils from a similar waste stream.

Soil/sediment removal activities may produce large volumes of water requiring impoundment, treatment, and sampling. This water will be treated with a water scrubber, impounded, and then sampled to confirm that it is below the ADEC Table C groundwater cleanup levels. The water collected from the Site 28 dewatering impoundment will be analyzed for GRO/BTEX, DRO/RRO, PAHs, total and dissolved metals (includes 8 RCRA metals plus nickel, vanadium, and zinc) and PCBs, which has previously been approved by ADEC, prior to the water being discharged to the ground.

4.2 POL-Contaminated Soil Removal at the MOC

At the MOC, POL-contaminated soils will be removed to a depth of up to 15 feet, or 2 feet below groundwater, whichever occurs first. An estimated total of 6,782 tons of POL soil is scoped for removal. Contract Number W911KB-06-D-0007, Task Order 0007, has 4,782 tons of POL soil remaining to excavate, and Contract Number W911KB-12-C-0003 has 4,000 tons of POL soil for removal. Historical sample locations and data collected using UVOST technology during the 2010 field season will be used to plan and guide the excavations at the MOC.

Areas that will be targeted for excavation in 2012 are shown in Figure 4. Figure 5 shows the UVOST probe locations that were drilled in 2010. Bristol will utilize the UVOST information and information in Table 4-2 as a guide to excavating locations and targeting depths that are above the cleanup level of 9,200 mg/kg DRO on the MOC gravel pad. The field action level for DRO results from the field laboratory will be 7,360 mg/kg. The field action level is 80 percent of the cleanup level and is a conservative value used to ensure that field laboratory results fall below the 9,200 mg/kg confirmation sample cleanup level.

The MOC POL excavation areas are partitioned into several plumes, each plume defined as a contiguous area of soil estimated to exceed the site-specific cleanup level (Figure 4). The plumes have been divided into discrete excavation units based on common depth to contamination. Volume and weight estimates of excavated soil for two water table depth scenarios, low and high, are presented in Table 4-2; water table estimates are based on historical water levels observed in monitoring wells and test pits. Note that in 2011, the northwestern section of the Site 13 PCB excavation entered the eastern section of the POL plume A2 (Figure 7). PCB-contaminated soils remaining at Site 13 that exceed the cleanup action level must be excavated before the POL-contaminated soil is removed. PCBs are the primary contaminant of concern at Site 13; therefore, soils contaminated with both POL and PCBs above cleanup levels must be screened, removed, and disposed of based on PCB concentrations. Once confirmation samples indicate that PCB concentrations in remaining soils are below the cleanup level, remaining POL-contaminated soils adjacent to the PCB site will be screened, removed, and disposed of based on the site-specific POL criteria.

In 2011, excavation on plumes J1A and A1 began. At the end of the 2011 season, both excavations were backfilled. Liner was placed between the excavation sidewalls and the backfill in the A1 excavation. At this time the USACE does not have plans to reopen and excavate more soil at J1A, due to the adjacent wetland. Excavation on plume A1 will continue in 2012 at sample location 11NCMOCSS068, where DRO concentrations still exceed cleanup levels. The proposed excavation area at Plume A1 is shown in Figure 6.

Some excavations at the MOC will require the removal of overlying soil, where DRO concentrations do not exceed the cleanup level, prior to the deeper, contaminated soils being excavated. The clean overburden will be temporarily stockpiled on a liner at convenient locations until it can later be used as backfill. Confirmation sampling of stockpiles will occur according to Table 2A in the *ADEC Draft Field Sampling Guidance* (ADEC, 2010) prior to backfill.

In 2011 when excavation began on the G and H plumes, relatively shallow groundwater infiltrated the excavations. The excavation at the H plume showed groundwater at approximately 5.2 feet bgs. Two UVOST points were installed within the H plume area in 2010, 10NC27 UV-110 and 10NC27 UV-111. UV-110 indicated that DRO contamination exceeding cleanup levels begins at 7.5 feet bgs (based on a 9.2 percent Laser-Induced

Fluorescence [LIF] response), and UV-111 did not show indications of contaminants that exceeded cleanup levels until a depth of approximately 10.5 feet was reached. Groundwater infiltrated the excavation at approximately 5 feet bgs in the H plume near UVOST location 10NC27 UV-110. Since the top of the contaminated zone of soil is located approximately 2.5 feet below groundwater in this area, no soil was removed. Likewise at 10NC27 UV-111 (also located within the H plume), the contaminated zone of soil was in excess of 2 feet below groundwater. One UVOST point was installed within the G1 plume (10NC27 UV-108) and indicated a contaminated zone located approximately 11 feet bgs. Excavations in and near plume G1 were infiltrated with groundwater at approximately 7 feet bgs. Since the contaminated zone of soil is in excess of 2 feet below groundwater in plume G1, no soil was removed from this location. The depth to contamination in the G2 plume is 8 feet bgs, and excavations encountered groundwater at approximately 7 feet bgs. UVOST locations 10NC27 UV-93 and UV-94 are located within the G2 plume and show a depth to contamination of 8 feet and 9 feet bgs, respectively. No soil was excavated from this area in 2011, but excavation may be possible in 2012 if groundwater conditions are similar or if the groundwater table is lower. A test pit near these plumes will be dug at the start of the 2012 field effort at the MOC to determine whether Bristol will encounter shallow groundwater in this area again in 2012.

If groundwater is encountered when the G and H plumes are excavated in 2012, Bristol will collect confirmation sidewall samples above the groundwater and floor samples 2 feet below the water table. Confirmation samples will also be collected if groundwater is encountered during the excavation and groundwater is at a level above the targeted contamination layers shown by the UVOST logs in these plumes. It will be difficult to provide accurate survey data of the floor samples that are collected below the water table using the excavator bucket. No groundwater samples will be collected. According to the

USACE, a groundwater monitoring network will be installed at the MOC when the soil removal tasks have been completed.

Field laboratory screening samples will be collected at a rate of one sample per 100 square feet on the excavation floor; sidewall samples will be collected at a rate of one per 10 linear feet as described in the *ADEC Draft Field Sampling Guidance* (ADEC, 2010). Sidewall samples will be collected from the depth exhibiting the highest percent relative emittance (%RE) response for the nearest UVOST probe location, or at a preferential pathway identified in the field with consideration for the hydrologic characteristics of the soil profile. Samples will not be collected from beneath the water table. If field laboratory sample results are above the 7,360 mg/kg DRO field action level (80 percent of the cleanup level of 9,200 mg/kg), the excavation will be expanded and additional samples will be collected.

Confirmation sampling will occur when field laboratory results indicate that samples do not exceed 7,360 mg/kg DRO. Confirmation samples will be approximately collocated with field laboratory samples and sent to TestAmerica in Tacoma, Washington, for analysis. Confirmation samples from an excavation's floor will be collected in accordance with the *ADEC Draft Field Sampling Guidance* (ADEC, 2010) at a rate of two samples per 250 square feet, plus one additional sample for each additional 250 square feet. Confirmation sidewall samples will be collected at a rate of one sample per 20 linear feet.

Field laboratory samples will be collected from stockpiled soil at a rate of three, plus one sample for each additional 200 cubic yards in accordance with the *ADEC Draft Field Sampling Guidance* (ADEC, 2010). If field laboratory results indicate that contamination exceeds 7,360 mg/kg DRO, the stockpiled material will be bagged for removal.

Surface water samples will be collected from three locations (shown in Figure 4) at three times throughout the course of work: a few days prior to excavation activities, during excavation activities, and within a few days following backfill operations. The samples will be collected from surface waters in close proximity to the MOC excavation areas and will be analyzed for DRO/RRO. The purpose of the sampling is to ensure that excavation activities are not resulting in transport of contaminated material off site. Sampling will be conducted as described in Table 11-2 and Attachment 1 of the UFP-QAPP (Appendix D). Additional surface water samples may need to be collected if increased turbidity or effluent is noted in the wetlands due to the MOC excavation activities. Contaminate plumes shown on Figure 4 based on the UVOST data that are off the MOC pad and are located in the adjacent wetland areas (e.g., I2-I4; J1B, J2-J5; and D1-D4 plumes) will not be excavated in the wetland area to avoid adverse impacts.

Should time constraints force an end to the field season before an excavation can be confirmed clean via confirmation sampling, a geotextile liner will be placed along the limits of the excavation to demarcate the boundary between backfill and potentially contaminated soil. The liner will be of sufficient quality to resist abrasion and tearing during backfill activities.

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Table 4-2 NE Cape MOC UVOST®-Guided Excavation Volume and Weight Estimates for On-Pad Excavation Units

	Area	Top Depth	Bottom Depth	Bottom Depth	Volume Excavated Soil	Weight Excavated Soil	Volume Excavated Soil	Weight Excavated Soil	Overburden Volume	Overburden Weight
Units	Sq Ft	Ft Bgs	Ft Bgs	Ft Bgs	Cubic Yards	Tons	Cubic Yards	Tons	Cubic Yards	Tons
Location	Water Table Scenario		Low	High	Low	Low	High	High	Low	Low
A1	5,800	12	15	14	644	1,030	429	687	2,575	4,120
A2	3,600	8	15	14	932	1,492	799	1,279	1,066	1,705
B1	800	11	14	14	89	142	89	142	326	521
B2	1,800	7	15	15	533	852	533	852	466	746
C	1,800	10	14	14	266	426	266	426	666	1,066
E1	3,700	7	15	9	1,095	1,752	274	438	958	1,533
E2	6,200	4	11	10	1,606	2,569	1,376	2,202	918	1,468
E3	6,200	2	8	8	1,376	2,202	1,376	2,202	459	734
E4	1,400	5	13	11	414	663	311	497	259	414
F	600	11	15	15	89	142	89	142	244	391
G1	1,000	10	12	10	74	118	0	0	370	592
G2	1,500	8	15	9	389	622	56	89	444	710
H	1,400	6	12	9	311	497	155	249	311	497

Table 4-2 NE Cape MOC UVOST®-Guided Excavation Volume and Weight Estimates for On-Pad Excavation Units (continued)

	Area	Top Depth	Bottom Depth	Bottom Depth	Volume Excavated Soil	Weight Excavated Soil	Volume Excavated Soil	Weight Excavated Soil	Overburden Volume	Overburden Weight
Units	Sq Ft	Ft Bgs	Ft Bgs	Ft Bgs	Cubic Yards	Tons	Cubic Yards	Tons	Cubic Yards	Tons
Location	Water Table Scenario		Low	High	Low	Low	High	High	Low	Low
I1	3,000	10	15	10	555	888	0	0	1,110	1,776
J1A	4,500	0	15	11	1,832	2,930	1,166	1,865	666	1066
			On-Pad Totals:		**10,205**	**16,325**	**6,919**	**11,070**	**10,838**	**17,339**

Notes: The conversion factor for volume to weight is 1.6

"Low" water table scenario is calculated using a projected depth to water 2 feet below historical lows for data closest to the excavation unit.

ft bgs = feet below ground surface
sq ft = square feet
MOC = Main Operations Complex
UVOST = UltraViolet Optical Screening Tool
NE Cape = Northeast Cape

4.2.1 Options for Additional Quantities

Bristol will track the quantities of excavated POL-contaminated soil and will update the QAR on a daily basis with excavation weights. If it appears excavation will be required in excess of contract base amounts, Bristol will request that USACE exercise options for additional soil removal. Optional task 4.6.1 provides for 2,000 additional tons of POL-contaminated soil and may be exercised up to two times, for a total additional weight of 4,000 tons.

4.3 PCB-CONTAMINATED SOIL REMOVAL AT SITES 13 AND 31

In 2012, Bristol will excavate up to 2,700 tons of PCB-contaminated soils from Site 13 and Site 31. The existing liner from 2011 will be located and carefully removed to expose the historical excavation area, while also minimizing cross-contamination of the clean backfill material. Bristol used only the quantity of backfill necessary to hold the liner in place following the 2011 excavation activities, so the volume of potentially cross-contaminated soil has been greatly reduced. The area excavated in 2011 included the stockpile area shown in Figure 7. Prior to stockpiling material in the area depicted in Figure 7, samples were collected in 5-foot grids following TSCA sample requirements. The area was then used as a stockpile location. Upon removal of the stockpile, those locations with PCB results from the field laboratory above the 0.8 mg/kg action level were excavated as depicted in the figure. Backfill removed from on top of a lined PCB excavation will be loaded into a bulk bag for disposal. If practical, clean overburden material will be stockpiled on a liner in an area that has been sampled for PCBs. Following the completion of excavation activities, any stockpiled material will be analyzed by the field laboratory for PCB concentrations and, if results are below cleanup levels, will be used as backfill. The number of samples collected from the stockpile will be determined by the stockpile's volume and ADEC regulations (Table 2A, *ADEC Draft Field Sampling Guidance* [ADEC, 2010]). Results will be discussed with the QAR before the stockpiled soil is used as backfill. After the stockpile and liner have been removed, the field laboratory will again screen the area beneath the lined stockpile area for PCBs.

Initial excavation will begin at the areas outlined in Figure 7 (Site 13) and Figure 8 (Site 31), which correspond to confirmation sample locations collected at the end of field operations in 2011 where PCB concentrations exceeded cleanup levels. At each of the excavation locations, approximately 18 inches of material will be excavated and loaded into bulk bags. Waste characterization sampling will be conducted as described in Worksheet #14 and Attachment 1 of the UFP-QAPP (Appendix D). Following excavation, field-screening samples will be collected in 5-foot grids and submitted to the field laboratory. Results from the field laboratory will determine whether additional excavation is necessary or whether the freshly exposed areas can be sampled for confirmation purposes. Locations where sample results indicate PCB concentrations present at 80 percent of the site cleanup level of 1 mg/kg or higher will be further excavated. Locations with PCB concentrations below 80 percent of the cleanup level will be sampled for confirmation purposes. Once contaminant concentrations from confirmation samples have been confirmed to be below cleanup levels based on the fixed-base analytical laboratory results, the site will be backfilled. The laboratory results and backfill decisions will be made in consultation with the QAR.

Bulk bags loaded with PCB-contaminated soil will be weighed and staged at the MOC, Site 6, or Cargo Beach prior to off-island transport.

Heavy equipment, such as excavators, front-end loaders, or other equipment that has contacted contaminated soil, will be decontaminated using shovels, rakes, and brushes to remove any residual soil from excavator buckets, tracks, wheels, or other areas that have contacted contaminated soil. No water will be used for decontamination of PCB-contaminated soil from heavy equipment, which differs from the Standard Operating

Procedure (SOP) presented in the UFP-QAPP. The deviation is noted in Worksheet #21 of the QAPP.

Excavation activities may expose buried concrete in contact with PCB-contaminated soils. Concrete that has been exposed to soils containing PCB concentrations above cleanup levels will be wipe-sampled to determine the appropriate disposal methods for concrete. Samples from the concrete will be collected at a rate of one sample per 250 square feet of exposed concrete. Field and sampling procedures will consist of the following as determined by Toxic Substances Control Act (TSCA) requirements and Title 40, Code of Federal Regulations, Part 761.125 (40 CFR 761.125):

- Determine the sample location and prepare for sampling by cleaning the area. Cleaning will consist of dry brushing followed by pressure washing. Once the area has air dried, it will be brushed again prior to sample collection.
- The sample area will be measured and marked with indelible marker to comprise an area that is 10 centimeters wide by 10 centimeters long.
- A piece of cotton gauze will be folded and coated with 5 milliliters of hexane solvent. The sampler will wear two layers of nitrile gloves and will change gloves between sample locations.
- The sample will be collected by wiping the gauze twice across the entire sample area, first from left to right and then from top to bottom.
- The gauze will then be placed into a sampling vial, upon which the sample identification will be marked. The vial will be capped for submission to the field laboratory.
- Sampling details will be recorded in the sampler's field book, and digital photographs will be taken.

Wipe samples will be analyzed in the field laboratory with PCB results reported in micrograms per 100 square centimeters ($\mu g/100\ cm^2$). The cleanup criterion for PCB-contaminated concrete is 10 $\mu g/100\ cm^2$, so any concrete exceeding this level will be segregated and encapsulated with a geotextile. Correlation samples will be collected at a rate of 10% and submitted to TestAmerica for analysis. Correlation samples will be collected from an area directly adjacent to a concrete wipe sample collected for field lab analysis. Any concrete with results below the cleanup level will be used as backfill. Wipe test results will be discussed with the QAR prior to using the concrete as backfill. Concrete with wipe sample results that exceed cleanup criteria will be disposed of off-island.

4.3.1 Options for Additional Quantities

Bristol will track the quantities of excavated PCB-contaminated soil and will update the QAR on a daily basis with excavation weights. If it appears excavation will be required in excess of contract base amounts, Bristol will request that USACE exercise options for additional soil removal. Optional task 4.6.2 provides for 100 additional tons of PCB-contaminated soil and may be exercised up to 20 times for a total additional weight of 2,000 tons. This option has currently been exercised seven times, for an additional 700 tons.

4.4 ARSENIC SOIL REMOVAL AT SITE 21

In 2011, Bristol excavated 14.8 tons of arsenic-contaminated soil from Site 21 and collected confirmation samples from seven locations within the excavation. All seven samples displayed arsenic concentrations in excess of cleanup levels. The excavation area and 2011 sample locations are shown in Figure 9. Following soil removal in 2011, discrete soil confirmation samples were collected from the excavation at the locations shown in Figure 9. Confirmation samples were collected from the excavator bucket because the excavation was inundated with water.

In 2012, Bristol will remove an additional 50 tons of material from the area. Excavation activities will expand the excavation in all directions. Bristol will only excavate to a depth of 2 feet below water. Following the initial removal of 50 tons of material, confirmation samples will be collected along the excavation sidewalls above the water level and 2 feet below the water table at a rate of one sample per 20 linear feet and submitted to TestAmerica for arsenic analysis. Accurate survey locations of the confirmation floor samples will be difficult to obtain since these samples are collected from an excavator bucket. One surface water sample (plus QC samples) will be collected from the excavation and submitted to TestAmerica for arsenic analysis. The backfilling of Site 21 will be delayed until the 2012 confirmation samples have been summarized and evaluated. Backfilling Site 21 will require that a road be constructed out to the site to allow for a heavy rock truck to reach Site 21 with clean borrow pit material.

4.4.1 Options for Additional Quantities

If confirmation samples indicate arsenic remaining above cleanup levels, Bristol will request that USACE exercise options for additional soil removal. Optional task 4.6.9 provides for 10 additional tons of arsenic-contaminated soil and may be exercised up to five times for a total additional weight of 50 tons. This option has currently been exercised five times for an additional 50 tons of arsenic-contaminated soil, making 100 tons total weight of arsenic-contaminated soil for removal.

4.5 RADAR DOME ROAD SOIL SAMPLING

A citizen of Savoonga reported an anomalous lack of vegetation along both sides of the road/trail at the top of Kangukhsam Mountain that leads to the location of the former radar dome. As a result, Bristol will resample such areas and collect six discrete soil samples from this vicinity exhibiting stressed or absent vegetation, and a sample will be collected from a location where vegetation is vigorous and does not appear to be stressed. Bristol will visit this site well into the growing season so that potentially stressed or missing vegetation is more readily apparent. Paired samples will be collected within 50 feet of the road centerline and at least 50 feet apart. The samples will be submitted to an analytical laboratory and analyzed for GRO; benzene, toluene, ethylbenzene, and xylenes (BTEX); DRO/RRO; PAHs; PCBs; and Resource Conservation and Recovery Act (RCRA) 8 metals plus nickel, vanadium, and zinc. Soil samples will be collected in accordance with Bristol

SOP “BERS-01 Soil Sampling SOP_Rev2” (Attachment 1 in UFP-QAPP) and the ADEC *Draft Field Sampling Guidance* (ADEC, 2010).

The sample site will be surveyed to produce a basic site map showing the sample locations in relation to the former radar dome and other surrounding features. Photographic documentation will be provided, and results will be described in the HTRW RA Report.

4.6 SITE 28 SEDIMENT MAPPING AND SAMPLING

Sediment and soil sampling was conducted in 2011 along 11 transects placed between the upper end of Site 28 (near the MOC) and its confluence with the Suqitughneq River to delineate the extent and magnitude of contamination at Site 28 (figures 6 and 17 from the February 2012 Site 28 Technical Memorandum, Revision 1, are provided at the end of Appendix I for reference). Transect lines were placed to include areas of historical contamination and were analyzed to gain a general understanding of the potential contaminants throughout the drainage and did not result in a full characterization of the drainage system. Results from the 2011 sampling event found contaminants that included DRO, RRO, toluene, ethylbenzene, total xylenes, PAHs, PCBs, arsenic, cadmium, chromium, lead, and selenium. The Site 28 Technical Memorandum (Tech Memo [Bristol, 2012a]) presents detailed information from the 2011 Site 28 investigation. A map of Site 28 is included as Figure 10.

During the 2012 field season, Bristol will map the location of sediments within the Site 28 Drainage Basin. Sediment will be defined as naturally occurring loose mineral and organic material found at the base of an active stream channel or pond connected to a stream channel, which was deposited by water during the processes of weathering and erosion. Mineral material atop a vegetative mat, or in a predominately peat interval, will not be considered sediment. Mapping will begin on the north end of the drainage basin at the Suqitughneq River and progress south to the MOC. Bristol will delineate the extent of sediment, the extent of vegetative mat in areas where sediment is present, and the extent and depth of water to the nearest 0.1 foot where sediment is present. The nature of the sediment and soil will be described in a manner similar to that found in the boring logs contained within the Site 28 Tech Memo (Bristol, 2012a).

The sediment mapping effort will begin with a visual survey. A field scientist or geologist will visually survey all streams 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. Probing will be conducted as needed along stream channels and ponds where sediment is visible. An underwater camera may be used to gather additional data in conjunction with the physical probing. Observations will be recorded in a field book or on field forms. A GPS unit will be available to record the locations where probing is conducted.

After the site has been mapped, sediment samples will be collected from the streams and ponds and analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the 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 total organic carbon (TOC) as described in ADEC Technical Memorandum 06-001 (ADEC, 2006). Samples will be collected from sediment-laden stream channels at approximately 50-foot intervals. If a sediment-containing section of stream is less than 50 feet, then one sample will be collected from the section. The total number of samples collected from streams will not exceed 24 samples. Sample densities and locations may be adjusted following the sediment mapping effort, as dictated by the presence or absence of sediment at Site 28. Samples will be concentrated in sediment dominated areas in the vicinity of historically contaminated locations. Three sediment samples are scoped to be collected from each of ten ponds for a total not to exceed 30 samples. At least 54 samples will be collected in 2012, and more samples may be required after the mapping results have been evaluated. One equipment rinsate (equipment blank) sample will be collected from the sampling tool during this sampling event and analyzed by TestAmerica for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the RCRA 8 metals plus nickel, vanadium, and zinc.

All sample locations, along with sediment extents and relative vegetative cover, will be surveyed by the on-site survey crew.

Analytical results and field efforts will be described in an addendum to the Site 28 Tech Memo (Bristol, 2012a). Included in the addendum will be maps showing sediment boundaries, sediment thicknesses, relation of vegetative cover to sediment areas, suggested sediment removal areas and associated depths and volumes, and necessary construction features such as roads, sediment basins, or dewatering structures. Mapping elements will derive from survey data provided by the on-site survey crew.

Results from the sediment mapping and characterization efforts will be discussed and evaluated with the on-site QAR, USACE personnel and ADEC personnel to determine the best approach for a mechanical removal of sediment at the Site 28 drainage basin. Part of the considerations will be an assessment to determine the potential for further environmental impact due to sediment removal activities. Once the project team has reached a consensus on the appropriate course of action at Site 28, Bristol will proceed as recommended by the project team.

4.7 SITE 28 PHASE I CONTAMINATED SEDIMENT REMOVAL

Following the sediment mapping and sampling effort at the Site 28 Drainage Basin, Bristol will initiate a Phase I contaminated sediment removal operation to remove approximately 140 bank cubic yards of contaminated sediment. This action will serve as an evaluation of multiple methods for mechanical removal of sediment at Site 28, and will be conducted in accordance with the sediment removal decisions made by the project team. For sediment removal, Bristol will first establish an infrastructure for operations. Construction elements will include tundra mats (Duradeck®), pumps and piping, suction/vacuum dredges, Geotubes®, water impoundments/collection sumps, and an in-stream sediment collection system. The Phase I sediment removal action will evaluate at least two methods for accessing contaminated sediment, removing and dewatering contaminated sediment, and controlling/minimizing suspended sediment downstream from removal operations.

The Phase I sediment removal is initially planned to be performed in two areas identified from the 2011 Site 28 characterization results: the stream channel where Transect-7 was established and the pond where soil sample 11NC28SS036 was collected (Figure 10). The Phase I sediment removal location may change based on the results of the 2012 sediment mapping effort. If so, the location change will be approved by the USACE Contracting Officer (CO).

The primary method for removing sediment will consist of a vacuum hose attached to pumps, tubing, and piping that will direct the sediment to a dewatering site at the MOC. Removal activities will be conducted in a manner that minimizes stream headcutting and follows Environmental Best Practice Guidelines 3 from the Wetlands and Waterways Works Manual (Gallagher, 2003). The depth of sediment removal will not exceed 2 feet in any removal area. Bristol will also evaluate the effectiveness of sediment removal operations using heavy equipment, such as an excavator and rock trucks.

The primary dewatering site will consist of a Geotube placed atop an impermeable liner. The Geotube will contain the sediment while allowing water to pass through the pore spaces. The wastewater will be captured by the liner and directed toward a primary water impoundment. Wastewater samples will be collected from the primary water impoundment and analyzed at TestAmerica for all contaminants of concern. Water from the primary impoundment will be treated through a filtering system and discharged into a secondary impoundment. Wastewater samples will be collected from the secondary impoundment and analyzed at TestAmerica for all contaminants of concern. Water will remain in the secondary impoundment until sample results confirm that all contaminant concentrations are below discharge criteria presented in the State of Alaska Wastewater General Permit 2009DB0004. If results indicate concentrations below discharge criteria, then the treated water will be discharged to the ground. Bristol will evaluate alternative dewatering methods, including dewatering of sediment placed atop a liner and allowed to drain.

It may be necessary to mix a chemical agent into the water just before it is pumped into the Geotube in order to drop the sediment out of suspension (referred to as a flocculants). In order to choose the most appropriate flocculating agent for the conditions, water samples will be sent to an off-site laboratory and tested to determine the optimum product and dosage.

The sediment will dewater in the Geotube for a period of time not yet determined. Field bench testing will aid in determining the appropriate amount of time necessary to achieve satisfactory dewatering. Once the sediments have sufficiently dewatered, the Geotube will be cut open and the sediments will be transferred into bulk bags for subsequent transportation and disposal. The dewatering process may require overwintering of the Geotube at the project site prior to containerization and disposal in 2013. Bristol will keep the QAR and USACE Project Manager (PM) updated on the dewatering progress and expected timeline. Two dewatered sediment samples representative of average soil type and water content will be collected in accordance with Bristol SOP “BERS-01 Soil Sampling SOP Rev 2” (Attachment 1 to the UFP-QAPP) and the *ADEC Draft Field Sampling Guidance* (ADEC, 2010) and submitted to a geotechnical laboratory to determine moisture content and density. A 2-inch brass sleeve will be pushed into the Geotube to collect the samples required for the geotechnical analyses for the following

ASTM International methods: ASTM D2216-10, ASTM 27263-09, and ASTM D422-63(07). One sample will also be subjected to sieve-test analysis. In addition, four representative sediment samples will be collected for waste characterization purposes and submitted to the analytical laboratory for analysis of GRO, BTEX, DRO/RRO, PAHs, PCBs, and RCRA 8 metals plus nickel, vanadium, and zinc. The analyses will also include silica gel cleanup and TOC analysis. Final disposal of the sediment will be determined based on the results from these samples.

Surface water samples will be collected at three locations before, during, and after the sediment removal process. Sample locations will be downstream of the sediment removal operations. The surface water samples will be collected by filling a clean, unpreserved jar with surface water and transferring water to appropriate containers. Surface water samples will be analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the RCRA 8 metals plus nickel, vanadium, and zinc. Surface water samples will also be analyzed for field turbidity using a Hach® portable turbidimeter.

Downstream sediment controls will be used to minimize migration of sediment off-site. A sediment trap will be installed immediately downstream from the work site to capture particles that may become suspended in the water column during construction activities. Sediment controls will be monitored throughout the sediment removal effort and adjusted or changed as necessary. Details and specifications of sediment controls are presented in the SWPPP (Bristol, 2012b).

All sediment removal areas will be surveyed by the on-site surveyor in addition to the locations of any confirmation samples collected from removal areas. A report will be prepared describing the sediment removal activities performed at Site 28 during the 2012 field season. The report will detail the effort involved and effectiveness of specific methods employed throughout the operation, including but not limited to removal techniques, downstream sediment containment, dewatering, flocculating agents, and water treatment. The report will include photographs of the site removal areas, infrastructure, dewatering areas, and treatment system. Maps will be included to show the Site 28 topography, location of all samples collected, location of sediment removed and of that recommended for future removal, and any infrastructure/physical components necessary for future, full-scale sediment removal operations. Recommendations will be made for future sediment removal operations based on information gleaned from the 2012 operations.

4.7.1 Optional Site 28 Confirmation Soil Sampling

Optional task 4.6.7 provides for confirmation soil samples following sediment removal operations at Site 28 and may be exercised up to 30 times for a maximum number of 30 samples. If this option is exercised, soil samples will be collected and submitted to the analytical laboratory to be analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the RCRA 8 metals plus nickel, vanadium, and zinc. Additionally, sample analyses will include silica gel cleanup and TOC. Soil samples will be collected using a T-handled auger from areas where sediment was removed during the Phase I sediment removal. All confirmation samples will be surveyed by the on-site survey crew. If this option is exercised, results will be included in the Site 28 Phase I Sediment Removal Report.

4.8 MI Sampling at Bag Staging Areas

Bristol will perform MI sampling at all areas where bulk bags have been stored throughout the project. These areas are Cargo Beach, Site 6, and three areas near the MOC: one location south of the fuel containment area at the Site 26 former construction camp, one directly northeast of the present-day ISO fuel tank containment area, and another north of the ISO tanks on the north side of Cargo Beach Road. Decision units will be established at each of these areas as described in the following sections. Soil samples will be analyzed for DRO and PCBs, the primary contaminants of concern for the sites at NE Cape.

Cargo Beach will be sampled early during the project while the beach is free of equipment, containers, and bulk bags. Since the remaining sites are currently being used as staging areas, they will be sampled as soon as possible when they become free of bulk bags. Post-use MI samples will be collected at Site 6 and the areas associated with the MOC at the end of the project when all bulk bags have been removed from those locations. MI sampling details are described below in sections 4.8.1, 4.8.2, and 4.8.3.

4.8.1 Cargo Beach

Cargo Beach will be divided into six DUs consisting of approximately 15,000 square feet. The DUs will be located along approximately 1,400 feet of shoreline and will vary in width, depending on the landscape, but the average width will be approximately 65 feet. Each DU will be divided into approximately 50 incremental units that will be sampled from 0 to 6 inches deep in an unbiased manner using a random number generator. One MI sample will be collected from each DU, for a total of 6 MI samples collected from Cargo Beach.

The DUs will be created in areas where equipment traveled and bags were placed. The eastern boundary of the site will be approximately where Cargo Beach Road intercepts Cargo Beach; the western boundary will be the furthest west point on the beach where bags were staged; the northern boundary of the site will be just above the high tide line; and the southern boundary of the site will vary but will not encroach on vegetated areas or slope/bank areas.

Samples will be collected as described in Bristol SOP *BERS-14 MULTI INCREMENT® Sampling SOP_Rev0* (presented in Attachment 1 of the UFP-QAPP). Bristol will refer to the *Draft Guidance on MULTI INCREMENT Soil Sampling* (ADEC, 2009a) for additional guidance during MI sampling activities. Various sampling tools will be tested on site to determine the best tool for the material on the beach. The MI samples will be analyzed for PCBs and DRO by the fixed-base analytical laboratory.

4.8.2 Site 6

The Site 6 staging area is approximately 30,000 square feet and will be divided into four DUs of approximately 7,500 square feet each; the DUs will be determined on site. Each DU will be divided into approximately 50 incremental units that will be sampled from 0 to 6 inches deep in an unbiased manner using a random number generator. One MI sample will be collected from each DU, for a total of four MI samples collected from Site 6 early in the project as soon as the site becomes free of bulk bags. Four post-use MI samples will also be collected at the end of the project, using the same DUs established during the first round of MI sampling. The MI samples will be analyzed for PCBs and DRO by the fixed-base analytical laboratory.

Samples will be collected as described in Bristol SOP *BERS-14 MULTI INCREMENT® Sampling SOP_Rev0* (presented in Attachment 1 of the UFP-QAPP). Bristol will refer to the *Draft Guidance on MULTI INCREMENT Soil Sampling* (ADEC, 2009a) for additional guidance during MI sampling activities. Various sampling tools will be tested on site to determine the best tool for the material at Site 6.

Site 6 is known to be rather coarse fill material, with some fine material mixed throughout. The sampling method that will be used will involve finding fine material within as compact a zone as possible within the area determined to be sampled within the incremental unit. This will allow for the exclusion of material that is too large to be used in a sample.

4.8.3 MOC

The MOC staging areas (shown in Figure 3 and Figure 4) consist of three areas; one area south of the present-day refueling area (ISO tanks) at the Site 26 Former Construction Camp; one area directly northeast of the ISO tanks; and the primary MOC bulk bag staging area located north of the ISO tanks directly across Cargo Beach Road. The MOC bag staging areas cover an area of approximately 10,000 square feet. Each DU will be approximately 3,333 square feet and will be divided into approximately 50 incremental units that will be sampled from 0 to 6 inches deep in an unbiased manner using a random number generator. One MI sample will be collected from each DU, for a total of three MI samples collected early in the project as soon as the site becomes free of bulk bags. Three post-use MI samples will also be collected at the end of the project, using the same DUs established during the first round of MI sampling.

Samples will be collected as described in Bristol SOP "BERS-14 *MULTI INCREMENT®* Sampling SOP_Rev0" (presented in Attachment 1 of the UFP-QAPP). Bristol will refer to the Draft Guidance on *MULTI INCREMENT* Soil Sampling (ADEC, 2009a) for additional guidance during MI sampling activities. Various sampling tools will be tested on site to determine the best tool for the material. The MI samples will be analyzed for PCBs and DRO by the fixed-base analytical laboratory.

4.9 DRUMS AND POL LIQUIDS FROM SITE 10

Drums and small amounts of associated POL liquids were encountered during POL-contaminated soil removal activities in 2011. It is believed that additional drums are present in the vicinity of Site 10 (Figure 3). An area of surface soil contamination was documented in 1994 along the western edge of the gravel pad at the Site 10 Buried Drums site. The maximum concentration of DRO was 26,500 mg/kg. Additional surface soil samples were collected in 1996, and the maximum DRO was 17,000 mg/kg. Soil borings were completed in 2004 and demonstrated that subsurface soils are not significantly impacted; the maximum DRO result was 619 mg/kg. The extent of the buried drums, drum liquids, and associated contaminated soil at Site 10 is currently unknown. Data gathered during the 2012 construction season will be used to determine whether or not further removal is necessary in the future. The maximum volume of contaminated soil removal scoped for this site in 2012 is 50 tons. Soil confirmation samples will be collected and analyzed for a full suite of potential contaminants (GRO/BTEX; DRO/RRO; PAHS, PCBs, and metals).

Bristol will attempt to locate any remaining drums using a metal detector and will mark the areas with survey lath or pin flags. An excavator will be used to recover the drums and any associated liquids. The drums, liquids, and any contaminated soil will be removed in quantities not to exceed 1 ton of drums, 50 gallons of liquid, and 50 tons of POL-stained soil. Bung-top and overpack drums will be available onsite to contain the liquid waste, and contaminated soil will be loaded into bulk bags. Empty drums will be loaded into a Conex with other miscellaneous metallic debris. The disturbed site will be backfilled as described in Section 4.1.12.

Waste characterization samples will be collected from the POL liquids and submitted to TestAmerica. If contaminated soil is excavated, confirmation samples will be collected from the excavation areas in accordance with the *ADEC Draft Field Sampling Guidance* (ADEC, 2010) and submitted to TestAmerica in Tacoma, Washington.

4.9.1 Options for Additional Quantities

Optional task 4.6.13 provides for additional quantities of POL liquids if any are encountered at the project site. The option quantity is 1 gallon and may be exercised up to fifty times for a combined quantity of 50 gallons. This option has been exercised. Bristol will have sufficient containers available on site to allow for this volume should they be needed.

4.10 SITE 8 NATURAL ATTENUATION MONITORING

Two surface water samples will be collected from Site 8 near the confluence with the Suqitughneq River. This will include both drainage and natural spring water samples, if present. The locations will be the same as those sampled in 2010 and 2011 (Figure 11).

The field team will use the on-site surveyors to locate the historical locations. The surface water samples will be analyzed for DRO, RRO, and PAHs by TestAmerica.

The Bristol field-sampling crew will divide the wetland area into three sample DUs as originally delineated in 2010. One DU will be established upstream (background) of the suspected fuel pipeline release location, one in the area of suspected highest fuel impacts, and one further downstream near the Site 3/Suqitughneq River confluence. The investigation crew will use the on-site surveyors and existing site markers to reestablish the DUs from previous years. The surface water and soil samples will be collected in the order beginning with the most downgradient DU and then moving toward the upgradient DUs.

The 2010 sampling event at Site 8 was designed to create a baseline data set for MNA parameters that, according to the USACE, will continue to be sampled and monitored for 3 years. The 2012 MNA sampling event will be the third of 3 years. Data from each year will be compared in order to approximate the rate of natural attenuation.

The wetland is approximately 40 feet wide (east-west) and 300 feet long in the study area. The upper (northerly) portion will represent the non-impacted (background) DU, the center section will represent the high-fuel impact DU, and the lower portion toward the Suqitughneq River will represent a lower (downgradient) fuel-impacted area.

Sampling grids have been developed for each DU. Each grid is divided into four-sections-wide by ten-sections-long for 40 possible sample points, with grid squares measuring approximately 10 feet by 10 feet. A random number generator will select eight sample points, corresponding to eight grids within each DU. Surface water samples will be collected first from each of these grids and field analyzed for potential hydrogen (pH), DO, conductivity, oxidation-reduction potential (ORP), temperature, turbidity, nitrate, sulfate, ferrous iron, alkalinity, and dissolved manganese. Surface water samples will also be collected for laboratory analysis of methane.

After all of the surface water samples have been collected, soil samples will be collected for DRO/RRO, TOC, PAHs, DRO-silica gel, and RRO-silica gel analysis from each of the eight sample points in each DU. The silica gel cleanup and total organic carbon samples will be used to evaluate biogenic interference, following the ADEC Technical Memorandum 06-001 (ADEC, 2006). The eight soil samples from each DU will then be composited as one sample. A field duplicate will be split from one of the composite samples after the soil has been homogenized. Soil and surface water sample collection procedures are described in the UFP-QAPP and in Bristol SOPs. The soil samples will be subjected to silica gel cleanup as described in the UFP-QAPP to evaluate the presence and proportion of biogenic materials at the site.

The primary line of evidence for determining whether natural attenuation is occurring at a site is the decrease in the contaminants of concern; in this case, POL. The geochemical parameters are used as secondary indications that natural attenuation is occurring. The POL and MNA data will be evaluated to determine whether natural attenuation is occurring at the site and whether it is an adequate remedy to meet cleanup goals. If natural attenuation is occurring, DO, nitrate, and sulfate should have relatively low or no concentrations detected with field parameters. These compounds provide a source of oxygen (electron acceptors) to facilitate beta-oxidation (aerobic) of organic compounds. It will not determine whether oxidation is occurring on natural sources or POL. If anaerobic degradation is occurring, the levels of dissolved ferric iron (Fe^{2+}), dissolved manganese (Mn^{2+}), and dissolved methane will increase. Alkalinity will also increase in the plume or source area if microbial activity is occurring, as alkalinity is most influenced by carbon dioxide content in the water. A negative ORP value also indicates that natural attenuation is occurring in an anaerobic state.

4.11 MOC Groundwater Monitoring

Bristol will conduct groundwater monitoring from nine wells at the MOC (Figure 12). The monitoring well locations that have been selected by the USACE for sampling include MW 88-1, MW88-4, MW88-5, MW88-10, MW 10-1, 17MW1, 22MW2, 20MW1, and 26MW1. Bristol sampled these monitoring wells in 2010 and 2011 and will sample them again in 2012 unless they were damaged during the winter. Bristol will sample all accessible and productive wells in 2012. The data collected in 2012 will be compared with 2010 and 2011 results, and an attempt to approximate a time when site cleanup levels might be attained will be discussed in the final report.

Groundwater samples will be collected using a Monsoon submersible pump and high-density polyethylene tubing using a low-flow sampling protocol, as described in Bristol SOP "BERS-02 Groundwater Sampling SOP Rev 2" (Attachment 1 in the UFP-QAPP), and in accordance with Section IV of the *ADEC Draft Field Sampling Guidance* (ADEC, 2010). Groundwater parameters, including temperature, pH, DO, conductivity, and ORP, will be collected in the field using a YSI 556 water quality meter with flow-through cell. Turbidity measurements will be taken using a Hach portable turbidimeter, and water level measurements will be taken using a water level meter. Groundwater samples will be taken when parameters have stabilized or when three casing volumes have been purged, in accordance with Section IV of the *ADEC Draft Field Sampling Guidance* (ADEC, 2010). Groundwater samples will be analyzed in the field using Hach kits for nitrate, sulfate, ferrous iron, alkalinity, and dissolved manganese. Groundwater samples will be analyzed by a fixed-based laboratory for methane, BTEX, GRO, DRO/RRO, PAHs, PCBs, and the RCRA 8 metals plus nickel, vanadium, and zinc. Equipment will be decontaminated as described in Section 4.1.21, and IDW will be handled as described in Section 4.1.23.

4.12 Monitoring Well Abandonment

Two monitoring wells (MW88-4 and MW88-5) are in the footprint of the excavation at the MOC. These wells will be preferentially sampled prior to excavation at the MOC.

Wells that are in or near the footprint of an excavation area at the MOC may eventually be abandoned in accordance with ADEC guidance (ADEC, 2009b). Optional task 4.6.15 provides for the removal of three monitoring wells. The abandonment specifics will be detailed in field notes and photographs. The USACE plans to install additional monitoring wells at the MOC following completion of soil removal.

4.13 DEBRIS REMOVAL

Miscellaneous debris is scattered throughout the NE Cape Site. Contributing to the debris are drums, wire, metal sheeting, various pieces of scrap metal, wood, tires, and other various articles. Bristol will identify areas site-wide that contain buried wooden pole stumps, miscellaneous debris, drums, and visible wire. Bristol has removed approximately 59 tons of miscellaneous debris and 43 pole stumps over the past 2 years. In 2012, Bristol will remove 25 tons of miscellaneous metal debris, 1 ton of drums and 100 pole stumps under Task 4.6.11.

The poles are likely encased in permafrost and have been frost-jacked since they were last cut down and removed. An excavator will be the primary means of removing the poles and digging out the stumps. If, for some reason, the excavation is not successful by itself, water will be injected around the pole stubs to melt the surrounding ice. The poles will then be pulled out of the ground. Soil removed during the pole extraction will be placed back in the hole; no additional material will be imported for backfill.

Wire recovery may be accomplished by one of three methods: excavator, cable spooler, or—if the wire is too thick to properly spool—it will be cut into small, manageable pieces and loaded into containers by hand.

The poles and the wire will be placed into intermodal shipping containers for transportation and disposal off site.

4.13.1 Options for Additional Debris

Optional task 4.6.12 provides for the removal of 1 additional ton of debris or drums. The option has been exercised a maximum of 10 times for a total additional weight of 10 tons.

4.14 SUMMARY OF BASE AND OPTIONAL ITEMS

Table 4-3 presents the base field tasks and their associated descriptions; Table 4-4 presents the optional tasks and their associated descriptions.

Table 4-3 Base Field Tasks

Task	Description	Quantities/Details
4.4.9	POL-Contaminated Soil Removal	2,000 tons
4.4.10	PCB-Contaminated Soil Removal	2,000 tons
4.4.11	Monitored Natural Attenuation Sampling at Site 8	24 Sediment Samples; 2 Surface Water Samples
4.4.12	Monitored Natural Attenuation of Groundwater at the MOC	9 Monitoring Wells

Notes:
MOC = Main Operations Complex
PCBs = polychlorinated biphenyls
POL = petroleum, oil, and lubricants

Table 4-4 Optional Field Tasks

Option / Item	Exercised	Description	Quantity per Option	Number of Options Available
4.6.1	Yes – 1 time	Additional POL-Contaminated Soil	2,000 tons	2
4.6.2	Yes – 7 times	Additional PCB-Contaminated Soil	100 tons	20
4.6.7	No	Site 28 Confirmation Soil Sampling	1 sample	30
4.6.8	Yes	Arsenic-Contaminated Soil	50 tons	1
4.6.9	Yes – All	Additional Arsenic-Contaminated Soil	10 tons	5
4.6.10	Yes	Drums, Drum Liquids, and Associated POL-Stained Soil at the MOC (Site 10)	1 ton drums; 50 gallons liquid; 50 tons soil	1
4.6.11	Yes – All	Miscellaneous Debris/Drums/Poles	25 tons debris; 1 ton drums; 100 poles	1
4.6.12	Yes – All	Additional Miscellaneous Debris/Drums	1 ton	10
4.6.13	Yes – All	POL Liquids	1 gallon	50
4.6.14	No	Present-day Refueling Area Post-Use MI Soil Sampling	1 sampling event	1
4.6.15	Yes – All	Additional Monitoring Well Abandonment	1 well	3
4.6.16	Yes	2013 Mobilization/Demobilization	1 lump sum	1
4.6.17	Yes	Site 28 Sediment Mapping and Sampling to Fill Data Gaps	1 lump sum	1
4.6.18	Yes	Site 28 Phase I Sediment Removal	1 lump sum	1
4.6.19	Yes	Radar Dome Road Soil Sampling	6 soil samples	1
4.6.20	Yes	Bulk Bag Staging Areas Pre- and Post-Use MI Soil Sampling	5 locations	1

Notes:

MI = *MULTI INCREMENT®*

MOC = Main Operations Complex

PCBs = polychlorinated biphenyls

POL = petroleum, oil, and lubricants

4.15 REPORTING

After completion of the project, Bristol will submit the HTRW RA Report in accordance with Section 4.5 of the SOW under Task 5. The HTRW RA Report will contain the following information:

- A cover letter signed and sealed by a Professional Engineer (registered in the state of Alaska) that all services have been performed in accordance with the terms and conditions of the contract.
- Executive summary of fieldwork and results.
- A narrative report describing activities undertaken to complete the project, including variances from the planning documents. At a minimum, the following activities will be described: contaminated soil excavation, transport, disposal, and clean backfill placement; Site 8 MNA results compared with data from previous years, including conclusions based on all data; groundwater MNA monitoring and comparison with data from previous years, including interpretation of data trends for all analytes, calculating the biodegradation rate for POL, as well as the time frame in which site cleanup levels will be achieved, and conclusions based on all data; removal and disposal of identified drums, drum liquids, and associated POL-stained soil at the MOC (Site 10); bulk bag staging area soil sampling methods and results; present-day refueling area soil sampling methods and results; and removal and disposal of miscellaneous debris, poles, drums, and drum contents site-wide.
- Tables, drawings, figures, and calculations to support the narrative report, summarize site data, show locations of field activities, and illustrate processes and decision matrices. Figures will include but not be limited to a topographic (1.0 foot primary and 0.5 foot secondary contours) map of the MOC and Site 28 showing the pre- and post-backfill surfaces, as well as map(s) displaying excavation boundaries, volumes, and confirmation soil sample locations and results.
- Appendices containing copies of all chemical data generated; copies of all permits; copies of waste manifests, waste profile sheets, certificates of disposal, and other pertinent documentation; sample summary sheet, chemical data tables, copies of all field notes, logs, forms, DQCRs, and other reports; and progress photographs.
- ADEC Contaminated Sites Laboratory Approval Letter.
- ADEC Laboratory Data Review Checklists completed and submitted with laboratory data.

- Recommendations for additional activities, including but not limited to an approach or approaches for removal of soil/sediment from Site 28 in areas where cleanup levels are exceeded.
- References.

In addition to the HTRW RA Report, Bristol will prepare an addendum to the Site 28 Technical Memorandum (submitted by Bristol following the 2011 project) and a Site 28 Phase I Sediment Removal Report.

5.0 PROJECT ORGANIZATION AND KEY PERSONNEL

This section identifies key personnel for this project. Resumes and training certifications can be found in Appendix G.

5.1 KEY HOME OFFICE PERSONNEL

5.1.1 Project Managers, Molly Welker and Greg Jarrell

Molly Welker, PM, is responsible for ensuring that 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.

Greg Jarrell will assume the role of PM in mid-August 2012 and will be responsible for all tasks listed above.

5.1.2 Safety and Health Manager, Clark Roberts, CIH

Clark Roberts, Certified Industrial Hygienist (CIH), will review Bristol's Safety and Health Program for this project. As the Health and Safety Manager (HSM), he will monitor project compliance with Bristol's Corporate Safety and Health Program. Mr. Roberts works with Bristol's SSHOs assigned to individual projects to develop and implement effective APPs and SSHPs. He is based in Bristol's San Antonio, Texas, office. For this project, Mr. Roberts will be responsible for the following:

- Reviewing and editing the APP and SSHP
- Being available for emergencies
- Providing consultation as needed to ensure that the APP and SSHP are fully implemented
- Coordinating any modification to the APP and SSHP with the Site Superintendent (SS), SSHO, and USACE CO

The HSM qualification requirements and summary information for Mr. Roberts are provided in Table 5-1.

Table 5-1 Health and Safety Manager Qualifications Summary

USACE HSM Requirement	Experience and Qualifications
Minimum of 4 years' experience in developing and implementing safety and health programs at hazardous waste sites and asbestos abatement sites. At least one field season of on-site work in remote Alaska.	More than 20 years of safety and health program experience involving hazardous waste sites, asbestos abatement, demolition, and remedial actions. Occupational Safety and Health Administration (OSHA) HAZWOPER Worker (40-hour) and Supervisor (8-hour) since 1991. • HSM for White Alice Removal Action (2003 & 2005), St. Lawrence Island, Alaska • HSM for Remediating Leaking Underground Storage Tanks in Indian Country for the U.S. Environmental Protection Agency • HSM for Adak, Alaska, Naval Air Station (NAS) Building Demolition and Asbestos Abatement • HSM for Whidbey Island NAS Underground Storage Tank (UST) Removals
Documented experience in supervising professional and technician level personnel.	• Industrial Hygiene Group Leader for U.S. Department of Energy (DOE) – Pacific Northwest National Laboratory • Western Regional HSM for McCrone Environmental Services • Industrial Hygiene Supervisor – OSHA
Documented experience in developing worker exposure assessment programs and air monitoring programs and techniques.	Extensive experience in developing exposure assessment plans involving hazardous, toxic, and radioactive mixed wastes. Very experienced in use and application of direct and indirect monitoring techniques and equipment for asbestos abatement, confined space operations, UST removals, and removal actions.
Documented experience in the development of personal protective equipment (PPE) programs, including programs for working in and around potentially toxic, flammable, and combustible atmospheres and confined spaces.	Developed PPE programs for Pacific Northwest National Laboratory, Lockheed-Martin Corporation, SOHIO, and Allied-Signal. Consultant to OSHA/DOE Voluntary Protection Program (VPP) for assessment of PPE program elements during on-site reviews for VPP candidate status determination.
Working knowledge of state and federal occupational safety and health regulations.	Former OSHA Compliance Officer and Supervisor. Provided consultation to clients for occupational safety and health regulations in Alaska, California, Washington, Texas, Illinois, Ohio, and Arizona.

Notes:
HAZWOPER = Hazardous Waste Operations and Emergency Response
HSM = Health and Safety Manager
USACE = US Army Corps of Engineers

5.1.3 Regulatory Compliance Manager / Transportation and Disposal (T&D) Coordinator, Tyler Ellingboe

Tyler Ellingboe will serve as the Regulatory Compliance Manager and will oversee all activities related to collecting, manifesting, transporting, and disposing of hazardous materials and wastes for Bristol. He will work closely with the Bristol environmental field crew to ensure wastes are properly identified.

Mr. Ellingboe will also serve as the T&D Coordinator and will be responsible for ensuring proper manifesting, placarding, and tracking of waste streams.

5.1.4 Occupational Physician, Alexander T. Baskous

The Occupational Physician designated by Bristol for the NE Cape HTRW Remedial Actions project is Alexander T. Baskous. Dr. Baskous has been briefed about the project hazards and the project scope. He will determine medical surveillance protocols and review examination/test results performed in compliance with 29 CFR 1910.120(f) and 29 CFR 1926.65(f), Medical Surveillance. Dr. Baskous is board certified in Occupational Medicine, with an M.D. and Master of Public Health from Harvard University. He is the Director of the Northwest Segment of the American College of Occupational and Environmental Medicine, a Diplomate of the American Board of Family Practice, and is on the active staff of both Providence Alaska Medical Center and Alaska Regional Hospital in Anchorage, Alaska.

5.2 KEY FIELD PERSONNEL

5.2.1 Site Superintendent and SSHO, Charles (Chuck) Croley

Chuck Croley is responsible for management of scheduling, coordination, and execution of Bristol's on-site activities in accordance with the contract specifications. He will report directly to the PM.

As the SSHO, Mr. Croley will be responsible for overall planning and compliance with safety and health requirements. He will conduct daily safety meetings and address worker safety concerns. The SSHO will be responsible for communicating safety issues and concerns and reporting safety incidents to the PM. The SSHO will be responsible for the following:

- Being present on site on a full-time basis for the duration of field activities
- Assisting with on-site training and representing the HSM during the day-to-day on-site implementation and enforcement of the APP and the SSHP
- Performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log
- Ensuring site compliance with specified safety and health requirements; federal, state, USACE EM 385-1-1, and Occupational Safety & Health Administration (OSHA) regulations; and all aspects of the APP and SSHP, including but not limited to Activity Hazard Analysis, air monitoring, use of PPE, decontamination, site control, SOPs used to minimize hazards, safe use of engineering controls, the Emergency Response Plan, confined space entry procedures, the spill containment program, and preparation of records
- Stopping work if unacceptable health or safety conditions exist, and taking necessary action to reestablish and maintain safe working conditions
- Consulting with and coordinating any modifications to the APP and SSHP with the HSM, the SS, and the CO
- Serving as a member of Bristol's quality control staff on matters relating to safety and health, conducting accident investigations, and preparing accident reports
- Reviewing results of daily QC inspections and documenting safety and health findings in the Daily Safety Inspection Log
- Recommending corrective actions for identified deficiencies, in coordination with site management and the HSM, and overseeing the corrective actions

5.2.2 Contractor Quality Control System Manager, Russell James

Russell James is responsible for management of Contractor Quality Control (CQC) and will have the authority to act in all CQC matters for the project. He will work with the PM to implement the CQCP to ensure that project quality objectives are met. A Letter of

Authority granting Mr. James the authority to serve as the Contractor Quality Control Systems Manager (CQCSM) for this project is provided in Appendix B. Mr. James will be the primary point of contact for environmental and regulatory matters in the field and will be the liaison with the QAR.

5.2.3 Project Chemist, Marty Hannah

Marty Hannah has the responsibility for project-related quality aspects related to the collection and chemical analysis of all samples, as delegated by the PM. His primary role in the office is to provide oversight to the data development and review process and oversight of all subcontracting laboratories. In the field, Mr. Hannah will set up the field-screening laboratory.

5.2.4 Laboratory Analysts

Two laboratory analysts will be on site at all times in the field lab. Their resumes are included in Appendix G. They will be responsible for operating the gas chromatographs and overseeing soil extractions.

5.2.5 ADEC-Qualified Sampler, Eric Barnhill

Eric Barnhill will be the ADEC-Certified Environmental Sampler for collection and processing of environmental samples. Mr. Barnhill will also be the Certified Erosion and Sediment Control Lead.

5.2.6 First-Aid/Cardiopulmonary Resuscitation (CPR) Personnel

All Bristol full-time employees who perform fieldwork are required to maintain certification in first aid/CPR. These personnel have received training in universal precautions and the use of PPE, as required by the OSHA bloodborne pathogen standard 29 CFR 1910.1030. At least two of these staff members will always be available to render first aid, if required, at the NE Cape site.

5.2.7 Site Workers

All site workers, including subcontractors and craft labor, have the responsibility to report any unsafe or potentially hazardous situations to the SSHO/SS. Site workers will maintain knowledge of the information, instructions, and emergency response actions contained in the APP and SSHP. All site workers will comply with the rules, regulations, and procedures set forth in the APP and SSHP.

6.0 SPILL PREVENTION AND RESPONSE

6.1 GENERAL PROVISIONS

All NE Cape site personnel will be properly trained and supervised in protocols for hazardous waste operations and emergency spill response. Proper equipment, procedures, and safeguards will be used when handling waste materials. To minimize the frequency of spills, personnel will be instructed during safety briefings on the proper methods for transferring and handling hazardous materials. Refer to the SPCC Plan (Appendix E) for complete details on spill prevention and control for the temporary fuel storage area. The sections below detail spill prevention and control for areas other than the temporary fuel storage area.

6.2 LIKELY SPILL SCENARIOS

Activities that could result in a spill include the general fueling, lubricating, and operating activities associated with equipment use. The potential exists for spills along Cargo Beach Road during transportation of fuels and materials between the barge landing area and their respective staging areas. The risk of a spill also exists in areas where liquids will be staged, including the fuel storage containment area, the HWAP, and the Cargo Beach barge landing area. These storage areas will be managed in such a way that releases to the surrounding environment are prevented.

Any petroleum spill in excess of 55 gallons will be reported to ADEC immediately. Spills between 10 and 55 gallons will be reported within 48 hours, and a spill less than 10 gallons will be reported on a monthly basis by the SS.

6.3 SPILL RESPONSE EQUIPMENT

To minimize the impact of spilled material by quick response, Bristol will maintain emergency spill response kits on site. These supplies will include absorbent materials (oil sorbent pads and booms) and PPE (safety glasses or goggles, chemical-resistant gloves, Tyvek® suit and booties, etc.). Personnel on site will be familiar with the contents and use of all emergency response supplies. There will be a spill kit located at the fuel storage containment that will contain absorbents and spill booms. Supplies will be located at Site 6, the construction camp and the mechanic's shop pad. These supplies will be stored in containers in their original packing. Each vehicle on site will carry oil-sorbent pads. Additionally, each vehicle will be equipped with a tote that contains spill containment and control (SPC) Attack Pac™, as well as the usual USACE-required fire extinguisher, first-aid kit, and other safety-related items.

6.4 Spill Response Procedures

Bristol will immediately contain any spill. Work will be stopped in areas of release if there is any reason to believe the spill represents a safety concern. The following procedures will apply in the event of a spill.

Spill Response Procedures	
1.	Protect project personnel and notify the Site Superintendent.
2.	Identify contaminant spilled, source of release, volume of release, and any associated contaminated media (such as soil).
3.	Take necessary personal precautions; isolate or segregate contaminated material from human contact (using temporary berms, absorbents, and shutoff valves, as necessary).
4.	Keep nonessential personnel away; isolate hazardous areas and deny entry.
5.	Take immediate measures, using properly protected personnel, to control the discharge at its source and contain the release.
6.	Stay upwind and keep out of low areas.
7.	Keep combustibles and ignition sources away from spilled materials.
8.	Use water or vapor suppression foams or sprays to reduce vapors, as needed.
9.	Take additional actions and request outside assistance, as required.
10.	Report spills as indicated in Section 8.4 of the Spill Prevention, Control, and Countermeasures Plan (Appendix E).

These procedures for responding to spills and releases will be reviewed weekly as part of the on-site health and safety meetings.

7.0 PROJECT SCHEDULE

The project schedule and work sequence are summarized as follows:

- Planning documents will be finalized and all necessary permits will be in place by July 2012.
- Essential camp setup personnel will mobilize to the site in mid-June 2012.
- The mobilization barge will arrive at NE Cape by early July 2012.
- The camp will be set up and mobilization complete by mid-July 2012.
- Base and relevant optional tasks from the SOW will be conducted from mid-June to October 2012.
- All fieldwork for 2012 will be completed by mid-October 2012. The camp, equipment, and supplies will be overwintered on a concrete pad at the MOC and on a gravel turnout area on the southwestern end of the airstrip. Only the bulk bags filled with contaminated soil, some equipment, and empty ISO tanks will be demobilized in 2012.
- The 2013 mobilization and fieldwork will occur in June 2013. RI activities in 2013 will be completed by September 2013, and demobilization will be completed by October 2013.
- The Draft Site 28 Technical Memorandum addendum will be submitted to USACE in August 2012.
- The Draft 2012 RA Report and the Final Site 28 Technical Memorandum will be submitted to the USACE in December 2012.
- The Draft Phase 1 Sediment Removal Report will be submitted to the USACE in January 2013.
- The Final 2012 RA Report will be submitted to the USACE in May 2013.
- The final HTRW Report will be submitted to the USACE in March 2014.
- Contract closeout will be completed by April 30, 2014.

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8.0 APPLICABLE LAWS AND REGULATIONS

The following laws, regulations, and permits are potentially applicable to project activities.

8.1 LIST OF APPLICABLE LAWS AND REGULATIONS

8.1.1 Federal Laws and Regulations

- Safe Drinking Water Act
  - EPA Drinking Water Standards and Health Advisories, EPA 822-B-00-001, summer 2000
- Clean Water Act, Title 33 U.S. Code (U.S.C.), Sections 1251–1376 (33 U.S.C. 1251–1376)
  - Criteria and Standards for the National Pollutant Discharge Elimination System (NPDES), 40 CFR 125
  - Water Quality Standards, 40 CFR 131
  - EPA-administered Permit Program for the NPDES, 40 CFR 122
- Resource Conservation and Recovery Act
  - Identification and Listing of Hazardous Waste, 40 CFR 261
  - Release of Hazardous Substances to the Environment, 40 CFR 300 and 302
  - Management of Used Oil, 40 CFR 279
  - Protection of Wetlands, Executive Order (E.O.) 11990
- Toxic Substances Control Act, 40 CFR 761
- Endangered Species Act
- Fish and Wildlife Coordination Act
- National Historic Preservation Act
- Coastal Zone Management Act
- Marine Mammal Protection Act
- Migratory Bird Treaty Act
- St. Lawrence Island FUDS, E.O. 12088, Public Law No. 98-212
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- National Oil and Hazardous Substance Pollution Contingency Plan

- U.S. Department of Transportation, Transportation of Hazardous Materials, 49 CFR 171–178
- Disposal of Waste Material, Including Asbestos-Containing Material and PCB, 40 CFR 60, 257, 261, 262, 263, 268, 279, 761, and 763
- Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. 1801 et seq., and Essential Fish Habitat, 50 CFR 600.920
- National Environmental Policy Act

8.1.2 State Laws and Regulations

- Alaska Regulations for Storage, Labeling, Containerizing, and Disposal of Hazardous Waste, Title 18 Alaska Administrative Code, Chapter 62 (18 AAC 62)
- Solid Waste Management, 18 AAC 60
- Alaska Water Quality Standards, 18 AAC 70
- Wastewater Disposal, 18 AAC 72
- Oil and Hazardous Substances Pollution Control, 18 AAC 75
- Underground Storage Tanks, 18 AAC 78
- Alaska Drinking Water Regulations, 18 AAC 80
- Alaska Pollutant Discharge Elimination System, 18 AAC 83
- Alaska Department of Fish and Game (ADF&G), 5 AAC 95, Fish and Game Habitat
- Alaska Department of Natural Resources, 11 AAC 62.720, Tideland Permit
- Alaska Historic Preservation Act, Alaska Statute (AS) 41.35, January 1992
- Alaska Coastal Management Regulations, 11 AAC 110
- ADF&G Fish Habitat Permits, AS 16.05.841
- Temporary Water Use, 11 AAC 93.210-220

8.1.3 Guidance Documents

- Engineering and Design – Requirements for the Preparation of Sampling and Analysis Plans, EM 200-1-3
- Environmental Quality – Chemical Quality Assurance for HTRW Projects, EM 200-1-6
- Safety – Safety and Health Requirements, EM 385-1-1

8.1.4 Camp Regulations

- Alaska Food Code, 18 AAC 31
- Temporary Water Use, 11 AAC 93.210–220

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9.0 REFERENCES

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FIGURES

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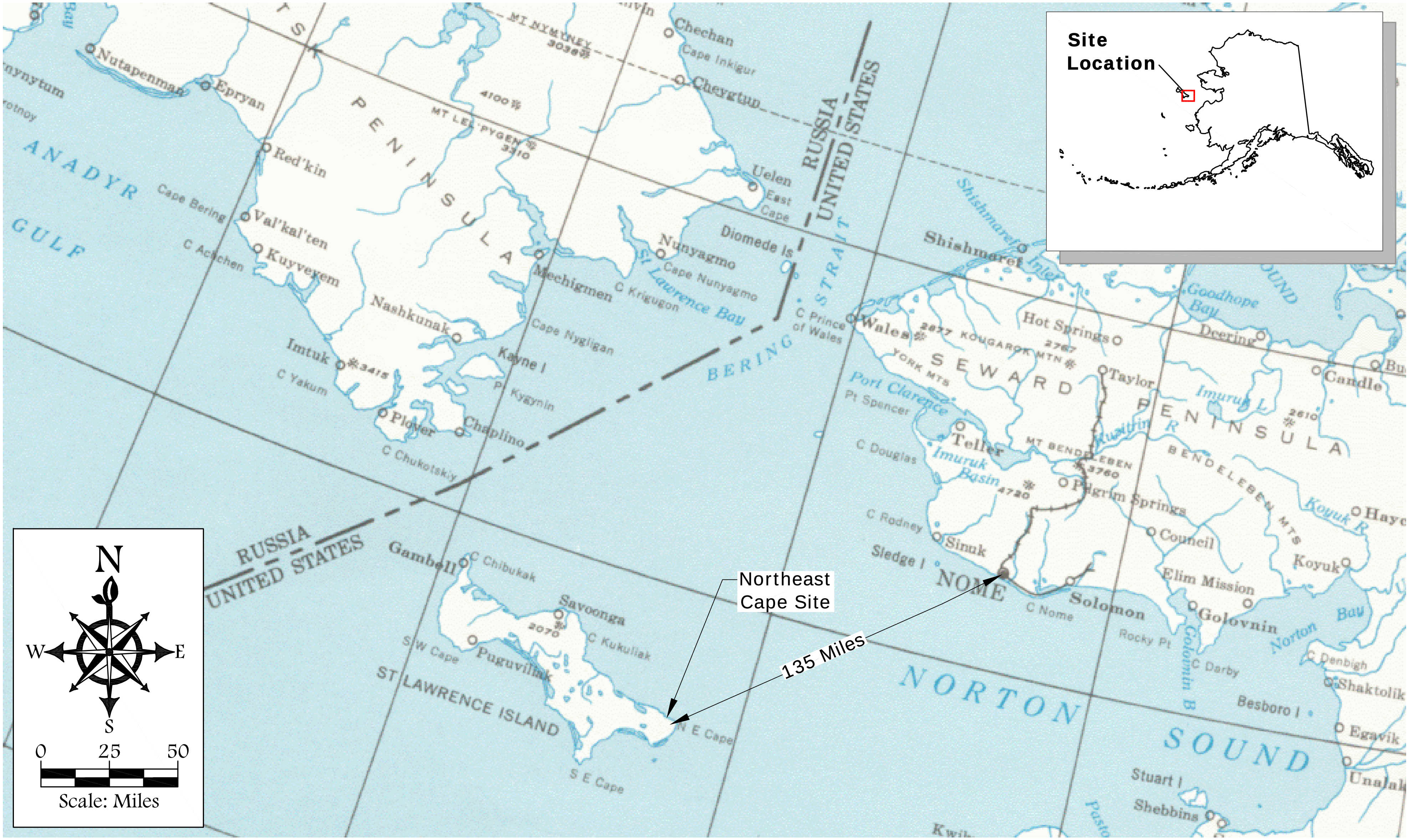

Source: USGS National Atlas Sheet Number 42-43

Legend:

HTRW Hazardous, Toxic, and Radioactive Waste

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

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Phone (907) 563-0013 Fax (907) 563-6713

DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 03/15/12
DWN. NAP
SCALE SHOWN
APPRVD. MW

Legend:

HTRW Hazardous, Toxic, and Radioactive Waste

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

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DATUM:	
NAD 83	DATE 06/25/12
PROJECTION:	DWN. NAP
STATE PLANE AK 9	SCALE SHOWN
Project No. 34110008	APPRVD. MW

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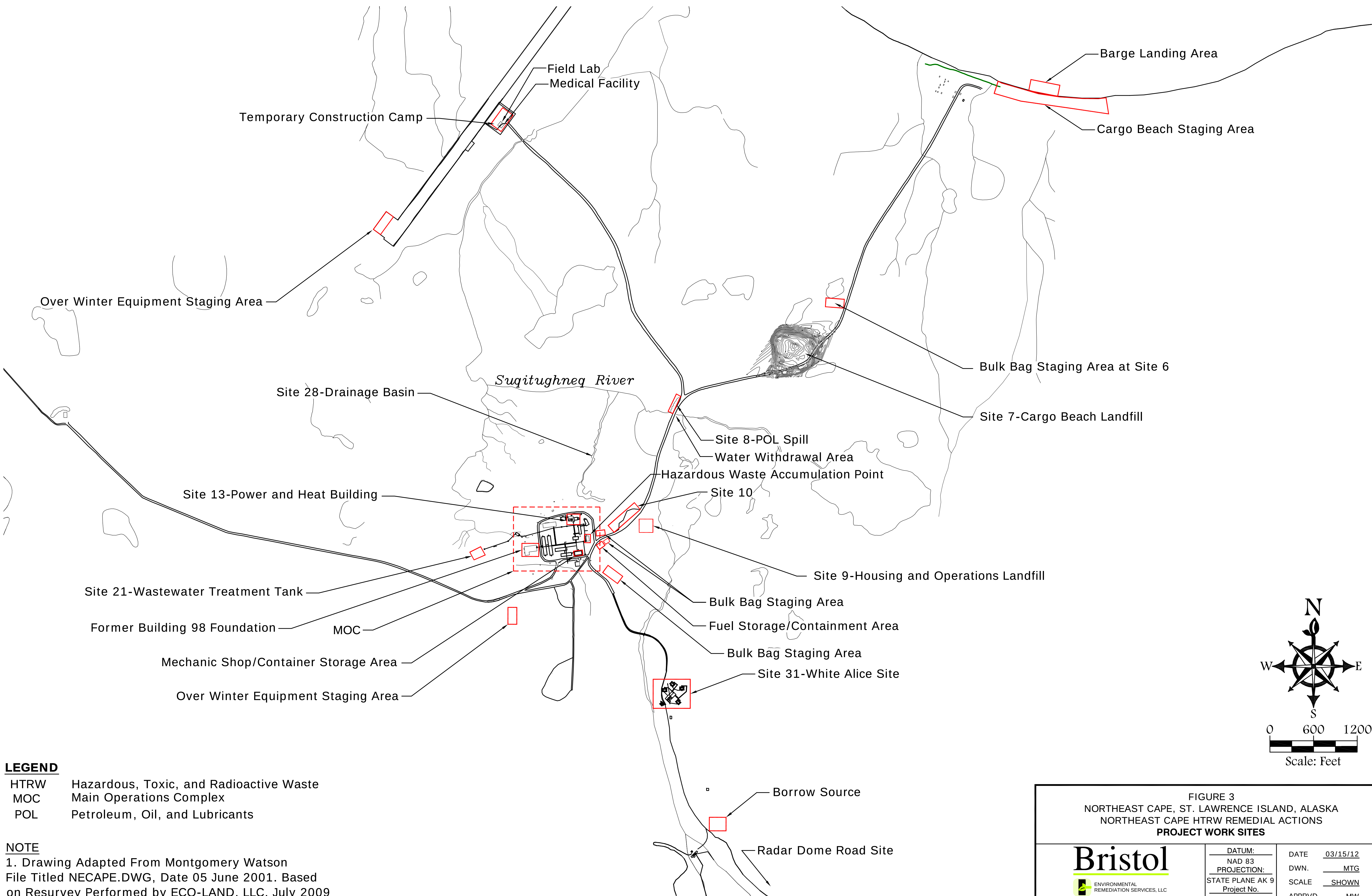

LEGEND

HTRW	Hazardous, Toxic, and Radioactive Waste
MOC	Main Operations Complex
POL	Petroleum, Oil, and Lubricants

NOTE

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

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

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DATUM:	NAD 83
PROJECTION:	STATE PLANE AK 9
Project No.	34110008
DATE	03/15/12
DWN.	MTG
SCALE	SHOWN
APPRVD.	MW

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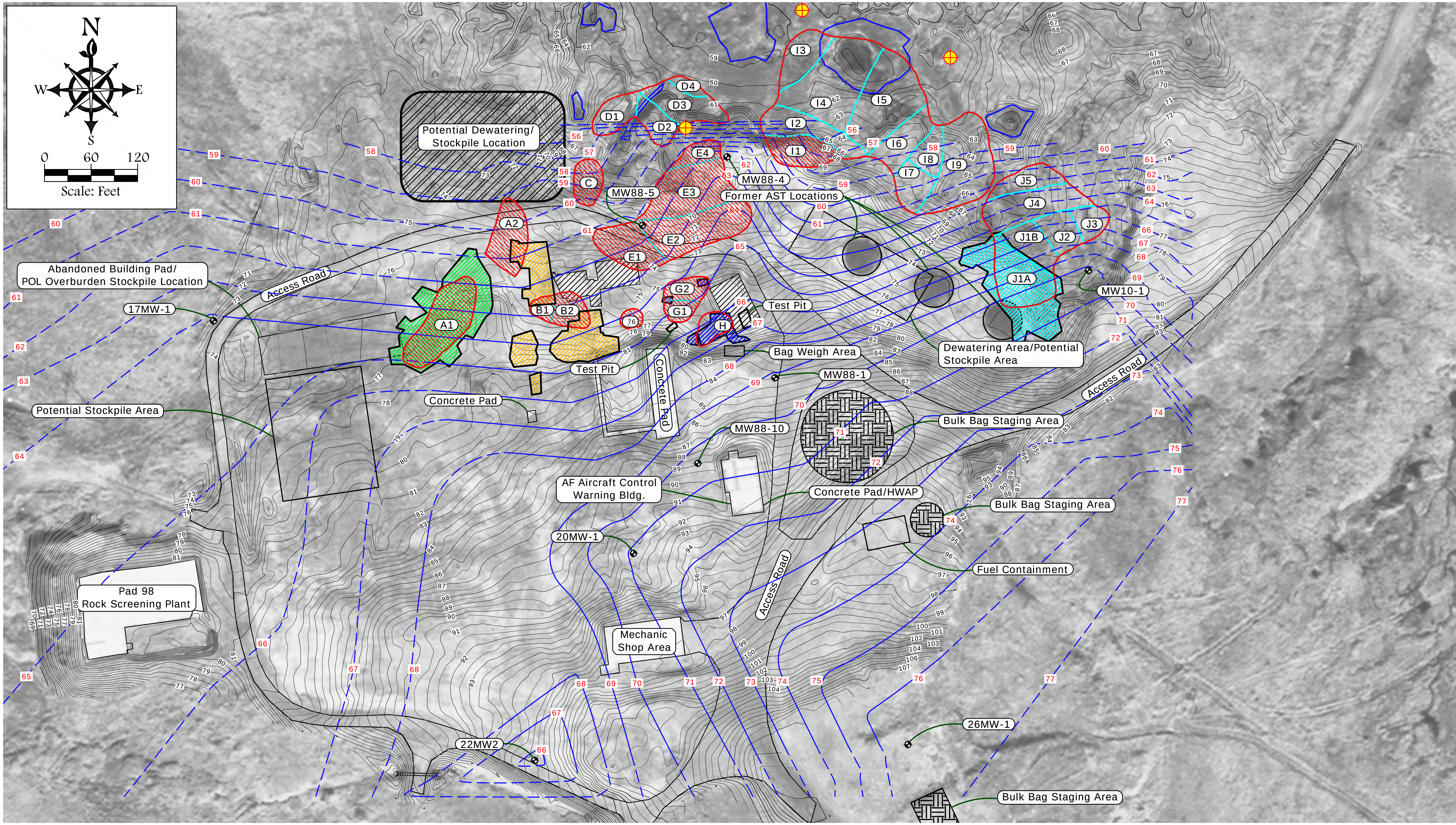

Legend

AST	Aboveground Storage Tank
HTRW	Hazardous, Toxic, and Radioactive Waste
HWAP	Hazardous Waste Accumulation Point
POL	Petroleum, Oil, and Lubricants

Surface Water
Concrete Pad (Removed 2011)
A1 Excavation (2011)
G/H Excavation (2011)
J1A Excavation (2011)
Site 13 Excavation (2011)
Proposed Excavation Area (2012)
Proposed Surface Water Sample Location
Monitoring Well
Plume Identified off MOC Pad in Wetland
A1 Plume Identification
67 Ground Water Contour and Ground Water Elevation (Dashed where Estimated)
secondary topographic contours
73 primary topographic contours and ground elevation

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

FIGURE 4
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC DETAIL MAP AND PRE-CONSTRUCTION SURVEY TOPOGRAPHY

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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 06/25/12
DWN. NAP
SCALE SHOWN
APPRVD. MW

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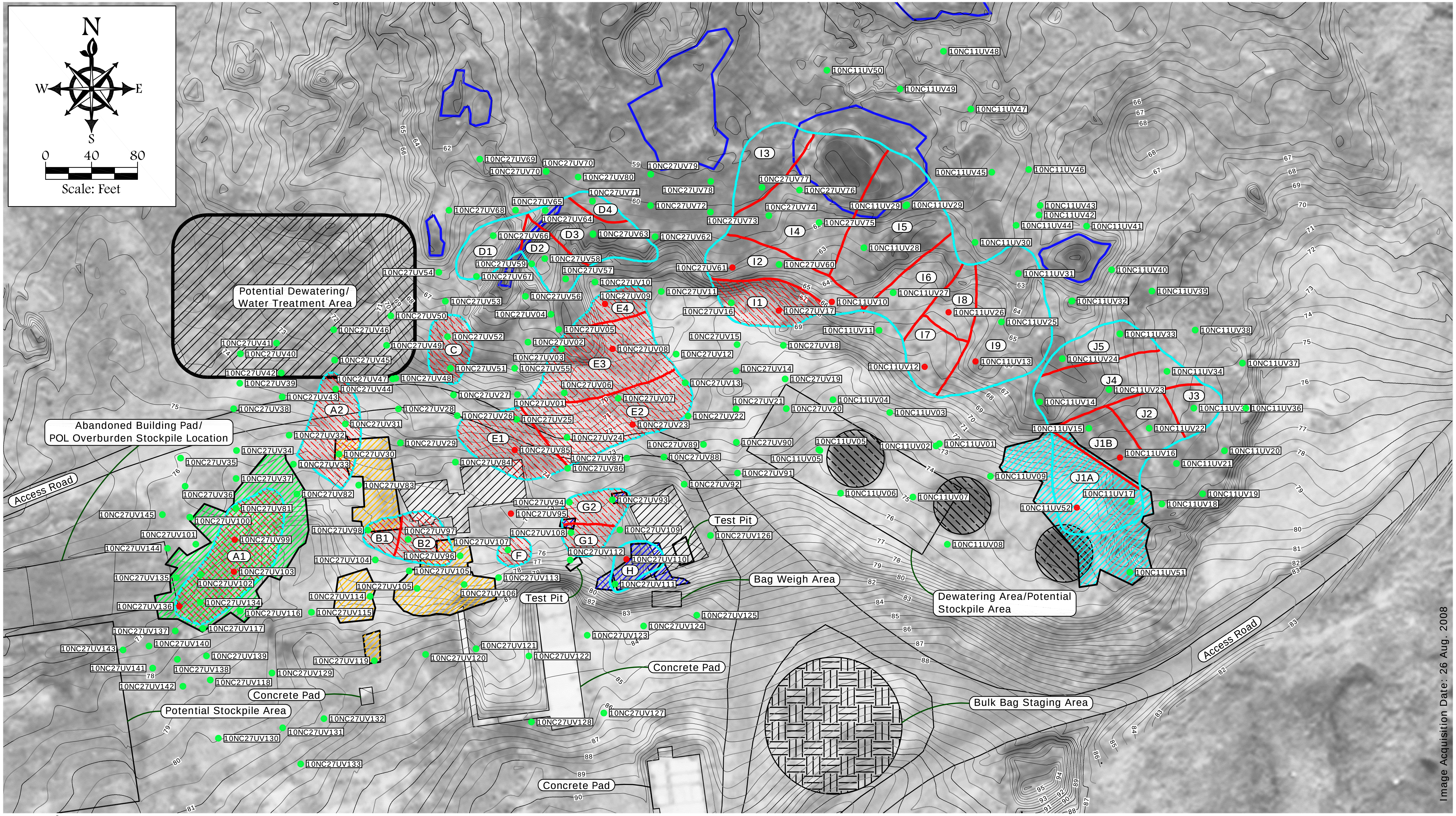

Legend

AST	Aboveground Storage Tank
HTRW	Hazardous, Toxic, and Radioactive Waste
POL	Petroleum, Oil, and Lubricants
UVOST	Ultraviolet Optical Screening Tool

Surface Water
Concrete Pad (Removed 2011)
A1 Excavation Area (2011)
Site 13 Excavation Area (2011)
Proposed Excavation Area (2012)
Former AST Location
G/H Excavation Area (2011)
J1A Excavation Area (2011)
UVOST Probe location
UVOST Correlation Location
Plume Identified off MOC Plan in Wetland
A1 Plume Identification
secondary topographic contours
73 primary topographic contours and ground elevation

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

FIGURE 5
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
2010 UVOST LOCATIONS AT THE MOC

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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 06/25/12
DWN. NAP
SCALE SHOWN
APPRVD. MW

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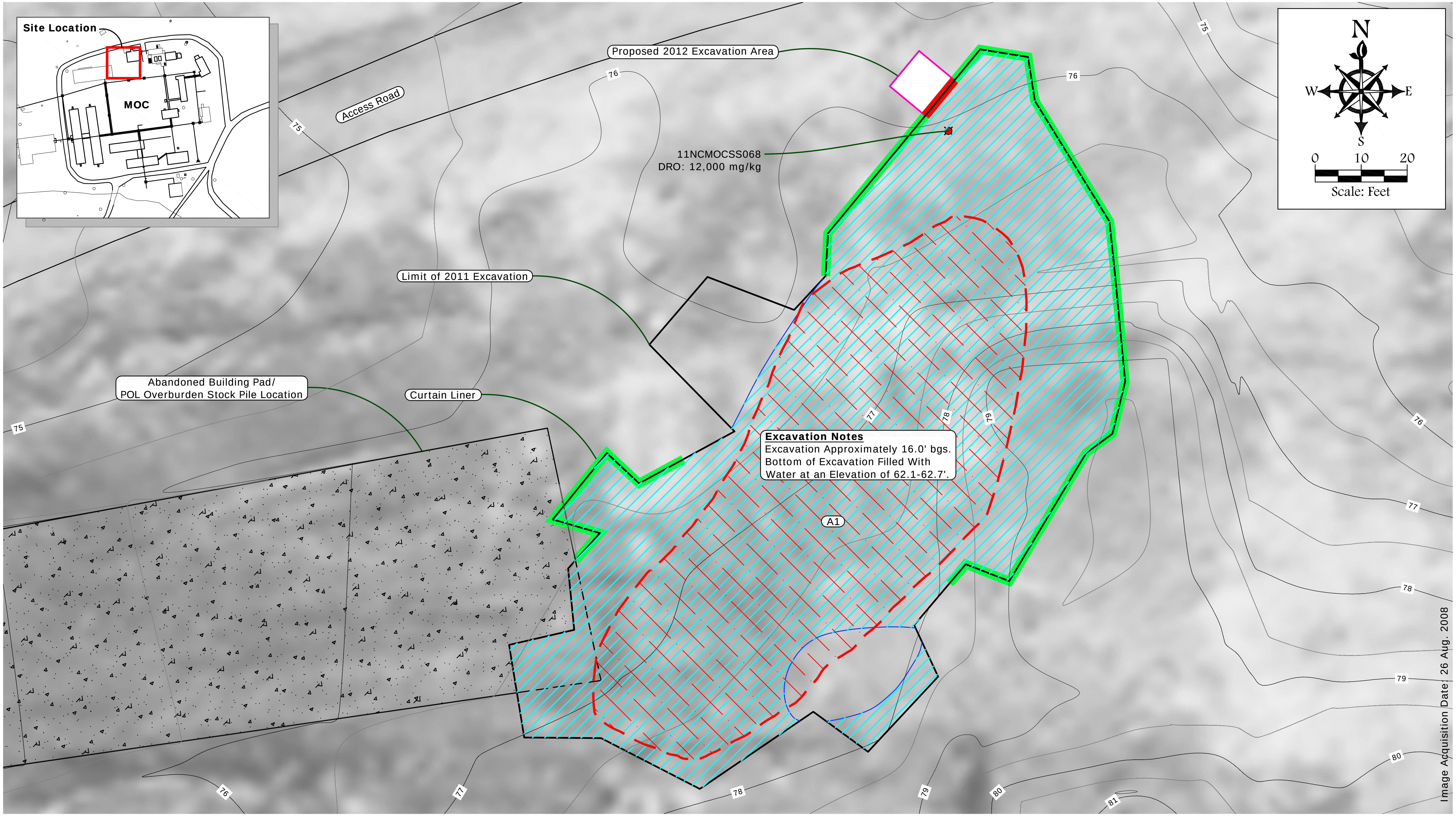

Note:
Sample 11NCMOCSS068 shows area where excavation will continue in 2012.
Topo units are in feet, elevations are based on the North American Vertical Datum of 1988
mg/kg = milligrams per kilogram
DRO = diesel range organics

Legend

'	Foot/Feet
bgs	Below Ground Surface
HTRW	Hazardous, Toxic, and Radioactive Waste
MOC	Main Operations Complex
POL	Petroleum, Oil, and Lubricants
●	Sample Location Exceeding Cleanup Level

Original UVOST Plume Delineation 2010
Water in Excavation
Curtain Liner Adjacent to Sample Greater than Cleanup Level (Placed on sidewall between in-situ soil and backfill 2011)
Curtain Liner Adjacent to Clean Sample (Placed on sidewall between in-situ soil and backfill 2011)
Proposed Excavation (2012)
secondary topographic contours
73 primary topographic contours and ground elevation

FIGURE 6
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC POL EXCAVATION A1

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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

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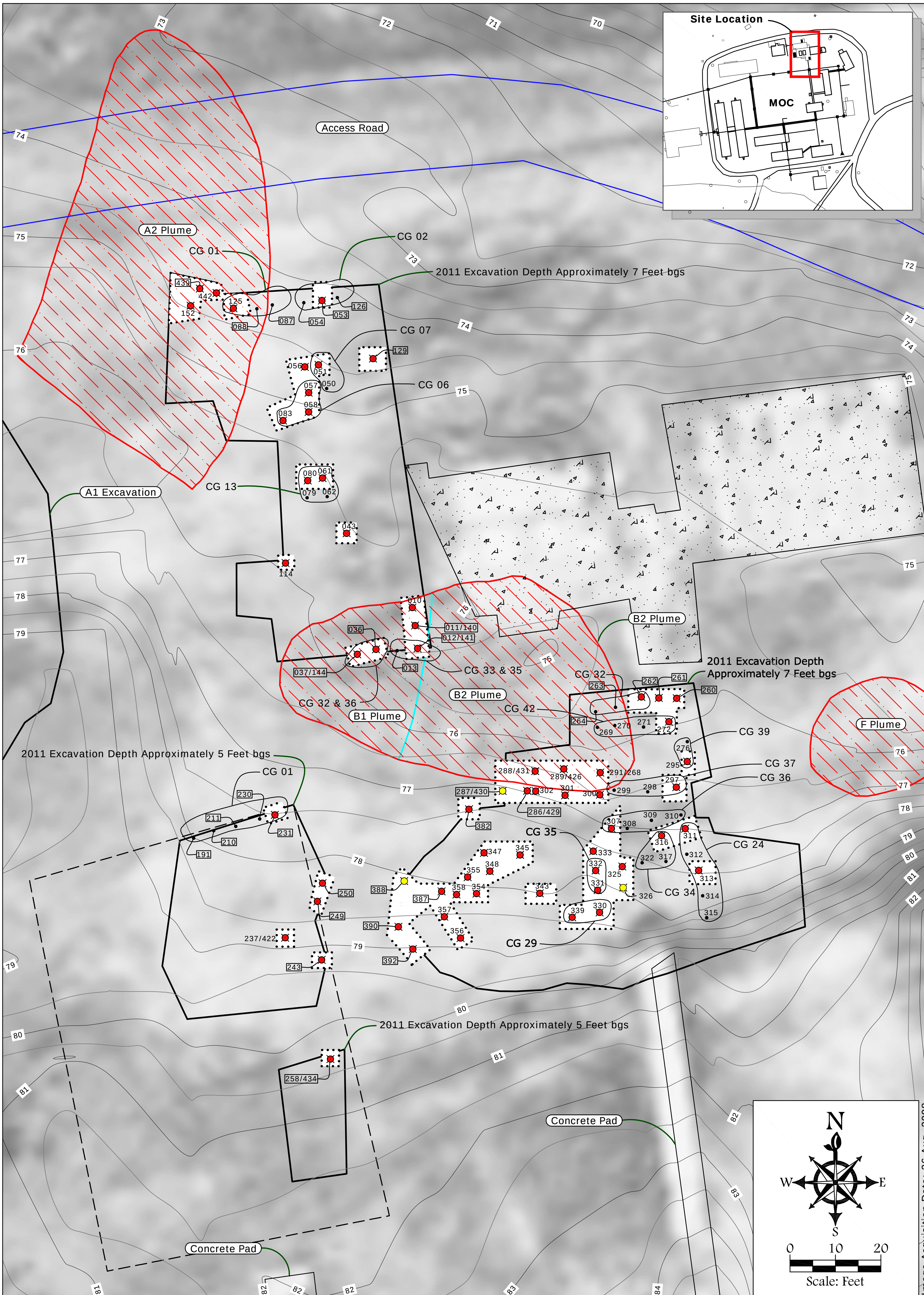

Note:
Soil sample IDs are preceded by 11NC13SS.
All excavations were lined in 2011.
mg/kg = milligrams per kilogram
Topo units are in feet, elevations are based on the North American Vertical Datum of 1988

Legend

CG	Composite Group
bgs	Below Ground Surface
HTRW	Hazardous, Toxic, and Radioactive Waste
MOC	Main Operations Complex
●	2011 Soil Sample Location below Cleanup Level
	2011 Soil Sample PCB Concentrations Exceed 1 mg/kg
	2011 Soil Sample PCB Concentrations Exceed 50 mg/kg
	Original 2010 UVOST Plume Delineation
	Excavation Area (2011)
388	Side Wall Soil Sample Location
	Concrete Pad (Removed 2011)
	Stockpile Area (2011)
	Proposed Excavation (2011)
	secondary topographic contours
73	primary topographic contours and ground elevation

FIGURE 7
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
SITE 13 PCB EXCAVATION AREA

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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 06/25/12
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APPRVD. MW

Legend

●	2011 Soil Sample Location below Cleanup Level
● (red)	2011 Soil Sample PCB Concentrations Exceed 1 mg/kg
● (yellow)	2011 Soil Sample PCB Concentrations Exceed 50 mg/kg
170	Side Wall Soil Sample Location
bgs	Below Ground Surface
CG	Composite Group
HTRW	Hazardous, Toxic, and Radioactive Waste
MOC	Main Operations Complex
PCB	polychlorinated biphenyls

Stockpile Area (2011)
Proposed Excavation (2012)
Excavation Area (2011)
Concrete Pad

Note:
Soil sample IDs are preceded by 11NC13SS.
mg/kg = milligrams per kilogram

FIGURE 8
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
SITE 31 PCB EXCAVATION AREA

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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 06/25/12
DWN. NAP
SCALE SHOWN
APPRVD. MW

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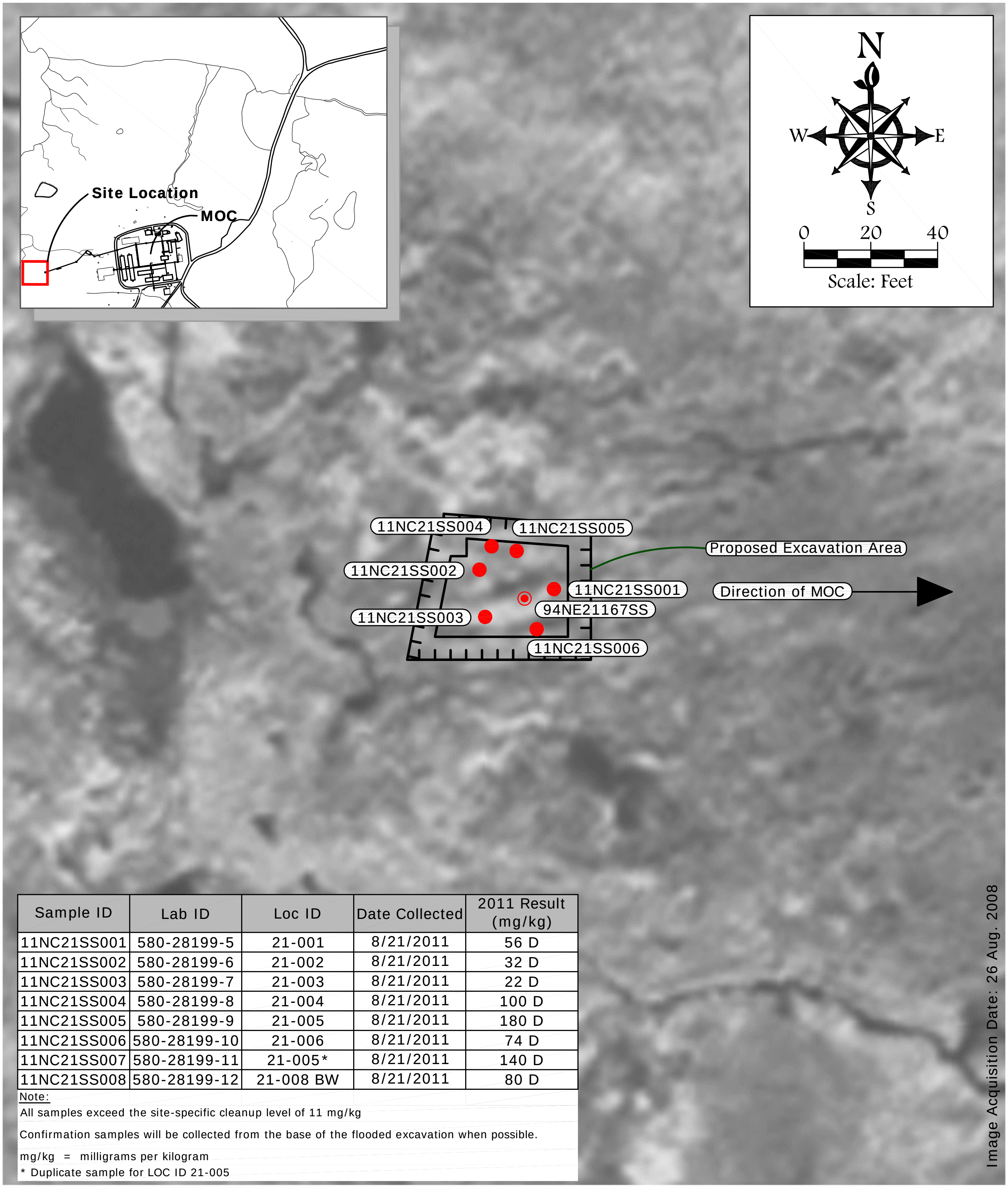

Sample ID	Lab ID	Loc ID	Date Collected	2011 Result (mg/kg)
11NC21SS001	580-28199-5	21-001	8/21/2011	56 D
11NC21SS002	580-28199-6	21-002	8/21/2011	32 D
11NC21SS003	580-28199-7	21-003	8/21/2011	22 D
11NC21SS004	580-28199-8	21-004	8/21/2011	100 D
11NC21SS005	580-28199-9	21-005	8/21/2011	180 D
11NC21SS006	580-28199-10	21-006	8/21/2011	74 D
11NC21SS007	580-28199-11	21-005*	8/21/2011	140 D
11NC21SS008	580-28199-12	21-008 BW	8/21/2011	80 D

Note:

All samples exceed the site-specific cleanup level of 11 mg/kg

Confirmation samples will be collected from the base of the flooded excavation when possible.

mg/kg = milligrams per kilogram

* Duplicate sample for LOC ID 21-005

Legend

BW	Bulk Waste Sample
D	Sample was Analyzed at a Dilution
HTRW	Hazardous, Toxic, and Radioactive Waste
MOC	Main Operations Complex
●	2011 Sample Location (post excavation)
◉	1994 Sample Location
▭	Excavation Boundary (2011)
▭	Proposed Excavation Area (2012)

FIGURE 9
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
SITE 21 ARSENIC EXCAVATION

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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 03/15/12
DWN. NAP
SCALE SHOWN
APPRVD. MW

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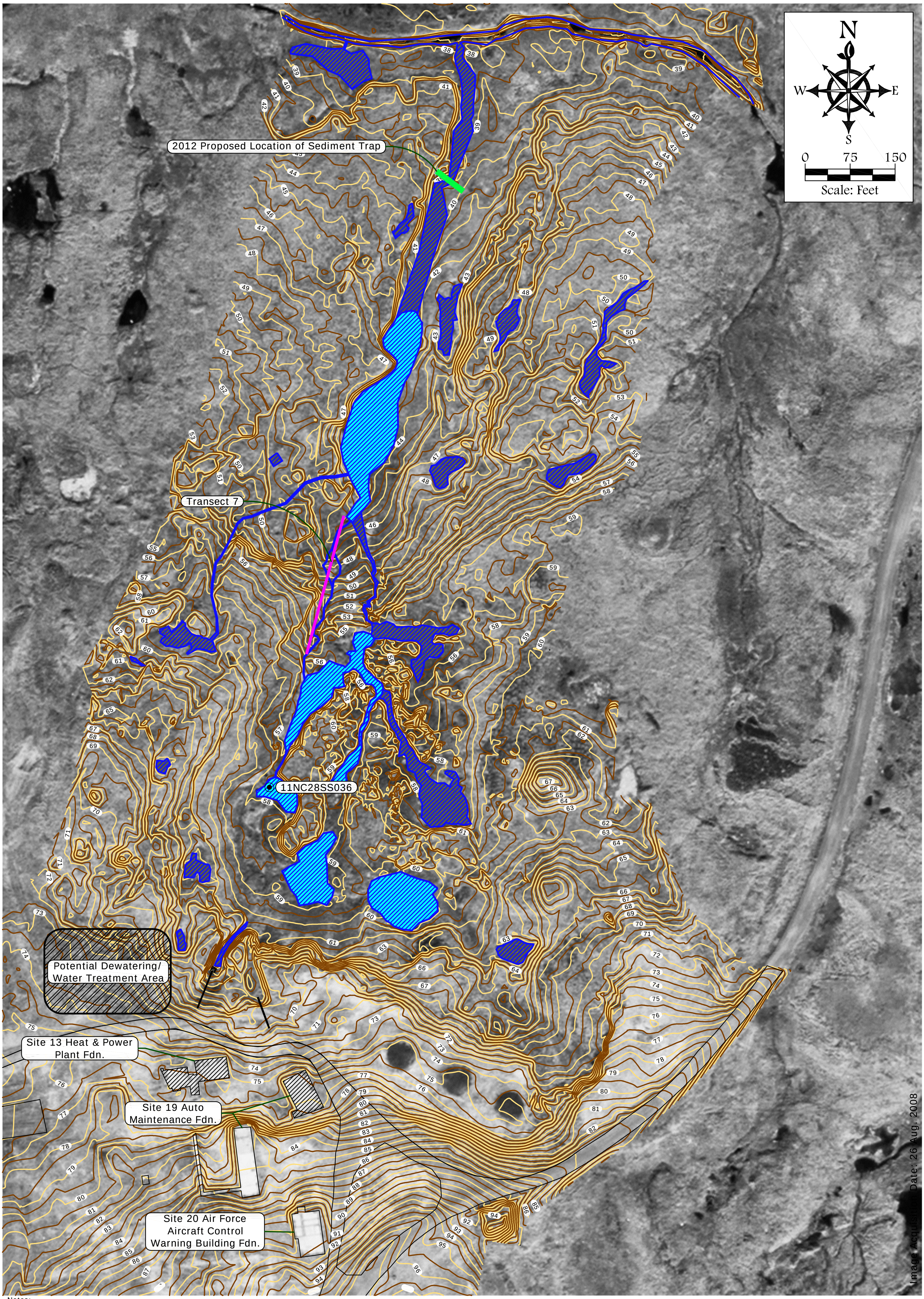

Notes:
- Topo units are in feet, elevations are based on the North American Vertical Datum of 1988
- Sediment trap location will be adjusted based on field conditions and on the final selected removal location.

Legend

	Water Ponding (2011)		Sediment Trap
	Sediment Areas Delineated in 2011		2011 Sampling Transect
	Surface Water (2011)	HTRW	Hazardous, Toxic, and Radioactive Waste
	Secondary Topographic Contours		Concrete Pad (Removed 2011)
	Primary Topographic Contours	Fdn.	Foundation
	2011 Sample Location		

FIGURE 10
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
SITE 28 SEDIMENT MAPPING AREA AND PHASE I SEDIMENT REMOVAL AREA

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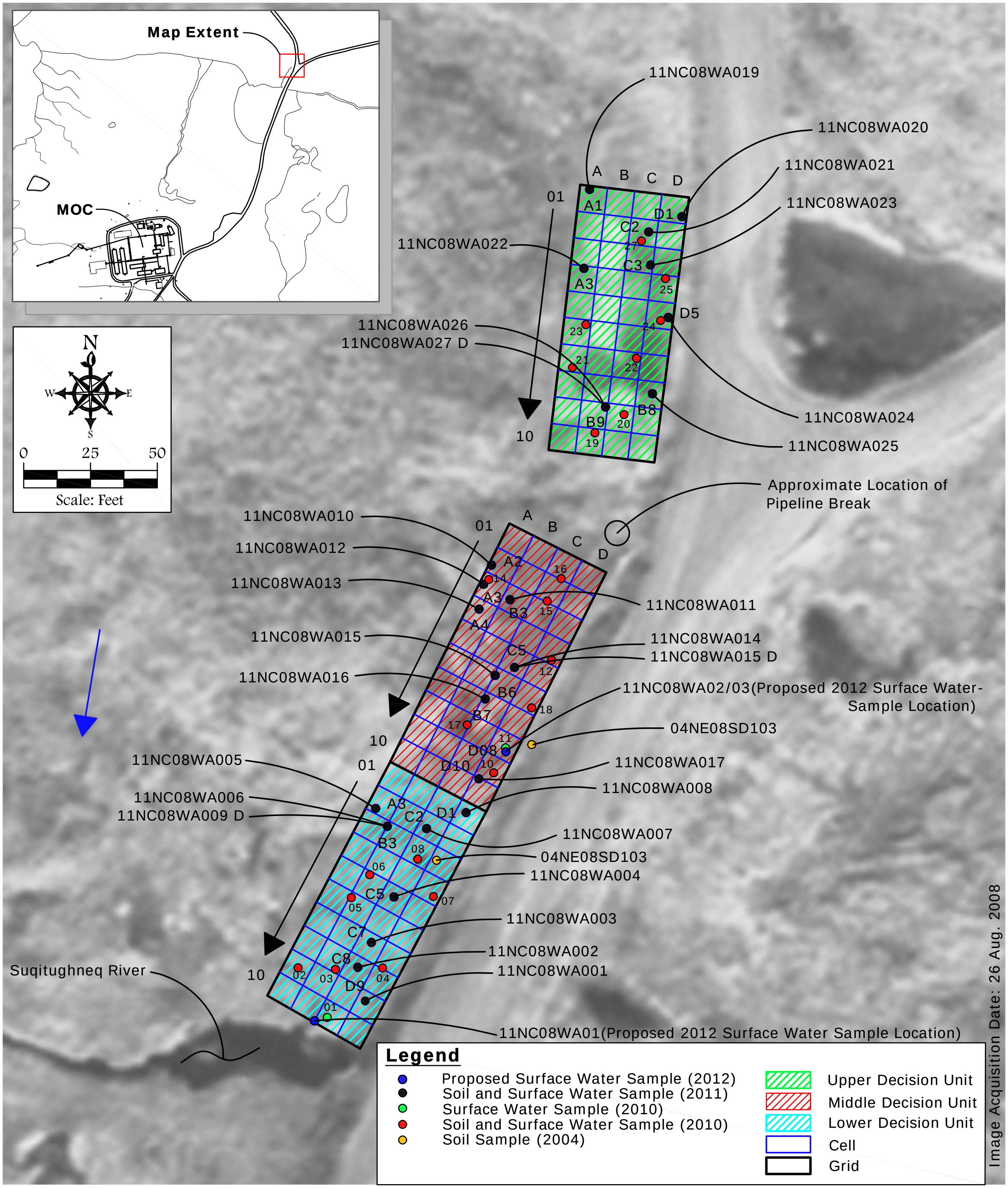
DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 06/25/12
DWN. NAP
SCALE SHOWN
APPRVD. MW



Note:
2012 Sampling Grids will be Determined by a Random Number Generator
Grid size = 40' x 100'
Cell size = 10' x 10'
D = duplicate
MOC = Main Operations Complex
HTRW = Hazardous, Toxic, and Radioactive Waste
= Grid Row Unit
= Down Gradient Direction

FIGURE 11
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
SITE 8 NATURAL ATTENUATION MONITORING AREA

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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE	06/25/12
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SCALE	SHOWN
APPRVD.	MW

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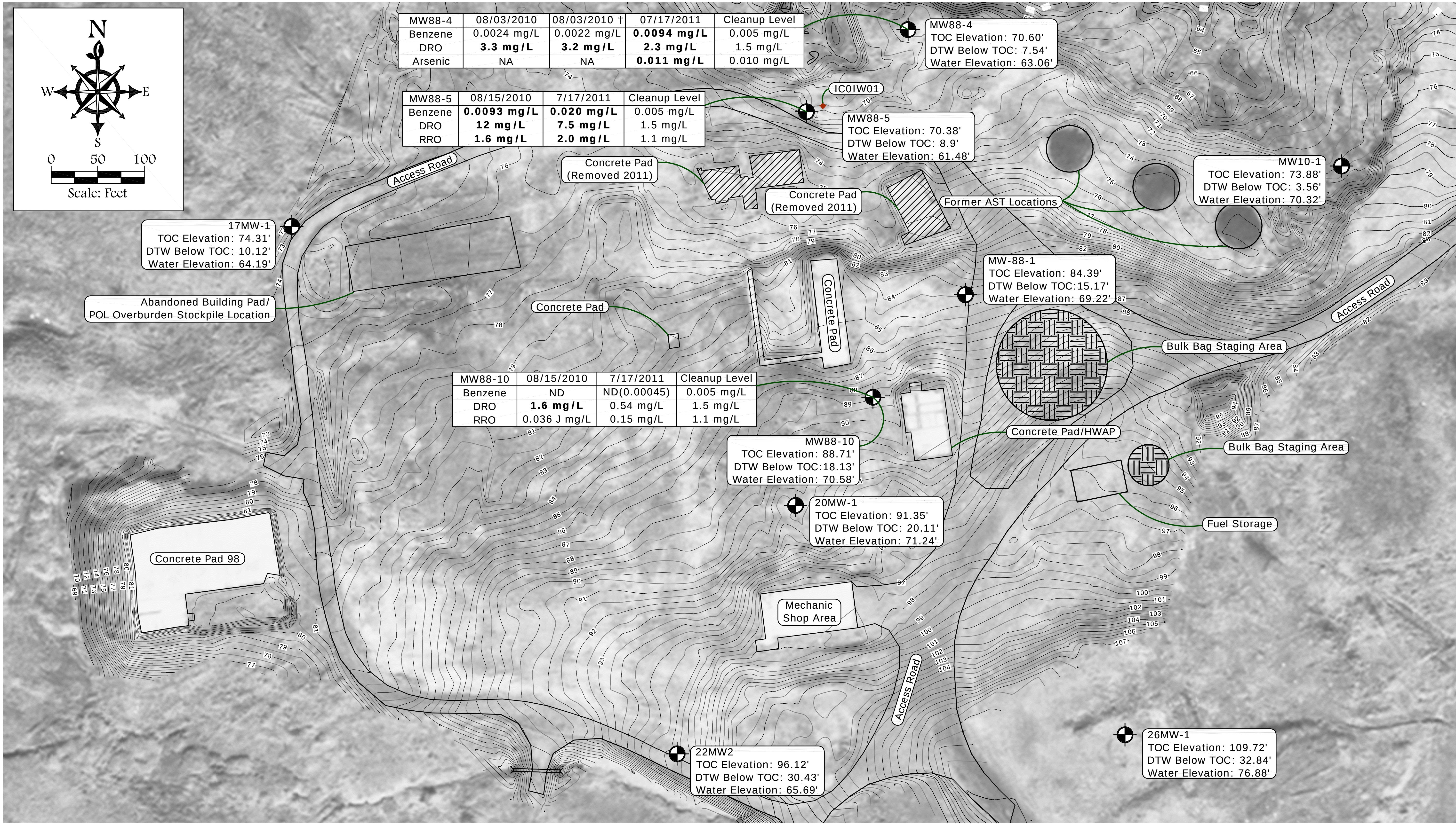

MW88-4	08/03/2010	08/03/2010 †	07/17/2011	Cleanup Level
Benzene	0.0024 mg/L	0.0022 mg/L	**0.0094 mg/L**	0.005 mg/L
DRO	**3.3 mg/L**	**3.2 mg/L**	**2.3 mg/L**	1.5 mg/L
Arsenic	NA	NA	**0.011 mg/L**	0.010 mg/L

MW88-5	08/15/2010	7/17/2011	Cleanup Level
Benzene	**0.0093 mg/L**	**0.020 mg/L**	0.005 mg/L
DRO	**12 mg/L**	**7.5 mg/L**	1.5 mg/L
RRO	**1.6 mg/L**	**2.0 mg/L**	1.1 mg/L

MW88-10	08/15/2010	7/17/2011	Cleanup Level
Benzene	ND	ND(0.00045)	0.005 mg/L
DRO	**1.6 mg/L**	0.54 mg/L	1.5 mg/L
RRO	0.036 J mg/L	0.15 mg/L	1.1 mg/L

Legend

'	Foot/Feet
AST	Aboveground Storage Tank
HTRW	Hazardous, Toxic, and Radioactive Waste
POL	Petroleum, Oil, and Lubricants
	Monitoring Well Location
	secondary topographic contours
73	primary topographic contours and ground elevation
	Injection well for 2012 in-situ chemical oxidation study

Note:
Water elevations are from 2011
Topo units are in feet, elevations are based on the North American Vertical Datum of 1988

mg/L	milligrams per liter
DRO	diesel range organics
DTW	depth of water
J	the analyte was identified; the quantitation is an estimate
NA	not analyzed
ND	not detected
RRO	residual range organics
TOC	top of casing

FIGURE 12
Northeast Cape, St. Lawrence Island, Alaska
Northeast Cape HTRW Remedial Actions
MOC MONITORING WELL LOCATIONS AND SAMPLE EXCEEDANCE RESULTS

Bristol
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DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 06/25/12
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SCALE SHOWN
APPRVD. MW

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APPENDIX A

Waste Management Plan

TABLE OF CONTENTS

SECTION **PAGE**

TABLES

ATTACHMENT

ACRONYMS AND ABBREVIATIONS

Bristol	Bristol Environmental Remediation Services, LLC
CFR	Code of Federal Regulations
CO	Contracting Officer
CON-HTW	containerized hazardous and toxic waste
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
HTRW	hazardous, toxic, and radioactive waste
HWAP	hazardous waste accumulation point
LDR	land disposal restriction
NE Cape	Northeast Cape
PCB	polychlorinated biphenyl
QAR	Quality Assurance Representative
RCRA	Resource Conservation and Recovery Act
TDC	Transportation and Disposal Coordinator
TSDF	treatment, storage, and disposal facility
UN	United Nations
USACE	US Army Corps of Engineers

1.0 WASTE MANAGEMENT PLAN

1.1 REGULATORY REQUIREMENTS

The handling of wastes will be performed in accordance with the following regulations:

- Title 18 Alaska Administrative Code:
  - Chapter 60 – Solid Waste Management
  - Chapter 62 –Hazardous Waste
  - Chapter 75 – Oil and Other Hazardous Substances Pollution Control
  - Chapter 78 –Underground Storage Tanks
- Title 29 Code of Federal Regulations (CFR):
  - Part 1910 – Occupational Safety and Health Standards (29 CFR 1910)
  - Part 1926 – Safety and Health Regulations for Construction (29 CFR 1926)
- 33 CFR 138 – Financial Responsibility for Water Pollution
- 40 CFR (U.S. Environmental Protection Agency [EPA]):
  - Part 60 – Standards of Performance for New Stationary Sources
  - Part 61 – National Emission Standards for Hazardous Air Pollutants
  - Parts 260–270 – Hazardous Waste Management System: General; Identification and Listing of Hazardous Waste; Standards Applicable to Generators of Hazardous Waste; Standards Applicable to Transporters of Hazardous Waste; Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities; Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities; Standards for Owners and Operators of Hazardous Waste Facilities Operating under a Standardized Permit; Land Disposal Restrictions; EPA Administered Permit Programs: the Hazardous Waste Permit Program
  - Part 279 – Standards for the Management of Used Oil
  - Part 300–303 – National Oil and Hazardous Substances Pollution Contingency Plan; Designation, Reportable Quantities, and Notification; Citizen Awards For Information on Criminal Violations under Superfund
  - Part 761 – Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions

- 46 CFR 150, 151, and 153 – Compatibility of Cargoes ; Barges Carrying Bulk Liquid Hazardous Material Cargoes; Ships Carrying Bulk Liquid, Liquefied Gas, or Compressed Gas Hazardous Materials
- 49 CFR 171–178 – Hazardous Materials Regulations

1.2 WASTE MINIMIZATION

Bristol Environmental Remediation Services, LLC (Bristol), will take all precautions to avoid mixing clean and contaminated material and will not mix waste streams. When possible, items will be recycled or reclaimed per the requirements of 40 CFR 266, 40 CFR 279, and applicable state requirements.

1.3 ANTICIPATED WASTE STREAMS

Estimates of waste types, estimates of respective waste quantities, and associated shipping container types to be used during the removal project are listed in Table 1-1. Contaminated personal protective equipment generated during waste-handling activities will be added to the appropriate waste stream for disposal.

1.3.1 Laboratory-Derived Waste

The field-screening laboratory will generate small quantities of waste that will require proper handling and disposal. Anticipated wastes and their estimated volumes are listed in Table 1-1. The quantities listed represent a combination of base contract items and optional contract items. Soil samples will be extracted using hexane, acetone, and methylene chloride solvents. The solvent streams will be segregated as chlorinated and non-chlorinated solvents in United Nations- (UN-) approved drums and disposed of. Extracted and un-extracted soil samples will be added to the appropriate containerized waste soil for disposal. Spent diatomaceous earth, sodium sulfate, and silica gel will be disposed of with the soil samples. Used disposable glassware will be included in the camp waste stream.

Table 1-1 Estimated Waste Types, Quantities, and Containers

Waste Stream Item No.	Waste Type	Estimated Waste Quantities	Unit/Container Types
1	POL-Contaminated Soil, Non-RCRA	10,837.8	tons, 8 cy bulk bags
2	PCB-Contaminated Soil, <50 ppm PCBs	3,850	tons, 8 cy bulk bags
3	PCB-Contaminated Soil, >50 ppm PCBs	150	tons, 8 cy bulk bags
4	Arsenic-Contaminated Soil	100	tons, 8 cy bulk bags
5	POL-, PCB- or other-contaminated sediment	250	tons, 8 cy bulk bags
6	POL Liquids <1,000 ppm	100	gallons, 55-gallon drum
7	POL Liquids	1	gallons, 55-gallon drum
8	Antifreeze, from equipment, non-RCRA	1	55-gallon drum
9	Antifreeze, from equipment, RCRA	1	55-gallon drum
10	Water Scrubbing Pillows, Absorbents, spent, Non-RCRA	2	55-gallon drum
11	Water Scrubbing Pillows, spent, RCRA, Benzene	1	55-gallon drum
12	Used PPE (Tyvek®, booties, and gloves)	2	55-gallon drum
13	Oily PPE/Absorbents, non-RCRA	1	55-gallon drum
14	Ash, Smart Ash Burner, non-RCRA	2	55-gallon drum
15	Miscellaneous Metal Drums	3	tons, 20’ intermodal
16	Miscellaneous Metal Debris	35	tons, 20’ intermodal
17	Wooden Poles	100	poles, 20’ intermodal
18	Used Acetone and Hexane Solvent	1	55-gallon drum
19	Used Sulfuric Acid	1	5-gallon drum
20	Methylene Chloride	1	55-gallon drum

Notes:

´	=	foot	POL	=	petroleum, oil, and lubricants
>	=	greater than	PPE	=	personal protective equipment
<	=	less than	ppm	=	parts per million
cy	=	cubic yard	RCRA	=	Resource Conservation and Recovery Act
PCB	=	polychlorinated biphenyl			

1.4 Hazardous Waste Management and Transportation

1.4.1 Waste Classification

To ensure proper disposal, wastes will be classified in accordance with 40 CFR 261; 40 CFR 761; and 40 CFR 61, Subpart M. Each hazardous waste will be evaluated to identify all applicable treatment standards in 40 CFR 268, Land Disposal Restrictions. This site is currently listed as a Conditionally Exempt Small Quantity Generator (CESQG) for Resource Conservation and Recovery Act (RCRA) purposes. If sufficient quantities of RCRA waste are generated to warrant a change in generator status, the US Army Corps of Engineers (USACE) Quality Assurance Representative (QAR) will be notified, and this should not impact the work schedule.

1.4.2 Accumulation

The containerized hazardous and toxic waste (CON-HTW) items (if necessary) will be collected and consolidated at a hazardous waste accumulation point (HWAP) that will be located on a Main Operations Complex concrete foundation pad. The waste materials will be segregated and consolidated into drums with like materials. The CON-HTW and nonhazardous waste materials will be packaged, labeled, and manifested in accordance with DOT (49 CFR 172–178) and RCRA (40 CFR 260–268) requirements.

For each container stored at the HWAP, a record will be maintained in the field notebook or the appropriate HWAP record sheet. The Waste Tracking Summary Spreadsheet (Attachment 1) will include a running tally of the waste received by date, volume, and type. The Waste Tracking Summary Spreadsheet will also document field-screening results and any additional comments pertaining to each waste type accumulated and stored at the HWAP.

Bulk solid waste will be placed directly into containers and stored at a container storage area. All containers to be shipped off site will be weighed, marked, and labeled for transportation.

1.4.3 Packaging

Hazardous waste liquids will be stored in liquid-tight containers, and incompatibles will be separated. 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.

1.4.4 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 date of sampling and suspected hazards. Labels will be added as required by the Hazardous Materials Table in 49 CFR 172.101. All containers of hazardous waste will be marked with the following label and will include the information listed below:

- U.S. Army USACE Northeast Cape, Kangukhsam Mt 52.25 Mi ESE of Savoonga, Savoonga, AK 99769, 907-753-2689
- EPA ID number (AK0000228395)
- Manifest document number
- Accumulation start date
- EPA waste number
- Proper shipping name, as determined in 49 CFR 172.101

Containers of polychlorinated biphenyl (PCB) wastes will be marked with the following label and will include the information below:

- Chemtrec 800-424-9300

If applicable, containers of nonhazardous waste will be marked with the following label and will include the information listed below:

- U.S. Army USACE Northeast Cape, Kangukhsam Mt 52.25 Mi ESE of Savoonga, Savoonga, AK 99769, 907-753-2689
- Proper shipping name, as determined in 49 CFR 172.101
- UN or North American number
- Contents

1.4.5 Off-Site Materials Management

All hazardous wastes will be transported in accordance with DOT regulations (49 CFR) and Environment Canada regulations for transit of hazardous wastes. All forms discussed in this section may be reviewed in Attachment 1.

1.4.5.1 Placarding

Hazardous materials and wastes shipped off-island will be placarded in accordance with 49 CFR 172, Subpart F. Any quantity of material listed in Table 1-2 (below) must be placarded. If a placard is required, it will be affixed on each of the four sides of the container.

Table 1-2 Placard Required for Any Quantity

Category of Material (Hazard Class or Division Number and Additional Description, as Appropriate)	Placard Name	CFR Placard Design Section Reference (Section)
2.1	Flammable Gas	172.532
2.2	Non-Flammable Gas	172.528
3	Flammable Liquid	172.542
Combustible liquid	Combustible	172.544
4.1	Flammable Solid	172.546
4.2	Spontaneously Combustible	172.547
4.3	Dangerous When Wet	172.548
6.2	None	--
8	Corrosive	172.558
9	Class 9 (see Section 172.504[f][9])	172.560
ORM-D	None	--

Notes:
CFR = Code of Federal Regulations
ORM-D = Other Regulated Materials-Domestic

1.4.5.2 U.S. Documentation

Bristol, in accordance with the requirements of 40 CFR 262, will prepare a Uniform Hazardous Waste Manifest, EPA Form 8700-22, for all hazardous wastes (as defined in 40 CFR 262) that are transported for off-site treatment, storage, or disposal. For each waste type, the following information will be provided:

- Proper shipping names, as determined by 49 CFR 172, Section 101

- Hazard class or division
- ID number
- Packaging group
- Total quantity
- Technical and chemical group names
- Emergency Response Guidebook numbers

Also included on each manifest will be the following:

- The Generator's EPA ID number
- Transporter names and associated transporter EPA ID numbers
- A 24-hour emergency response number (Chemtrec at 800-424-9300)
- Generator and transporter signatures
- Shipper's certification

A government representative of USACE will sign the manifests.

Bristol will prepare chain of custody forms and shipper's declarations, if required, for laboratory samples.

Bills of lading will be prepared documenting shipping containers to be shipped off site. Hazardous and nonhazardous manifest numbers will be referenced on the bills of lading. Bills of lading requiring shipper's certifications will be signed by the QAR or, if the QAR is not available, the Transportation and Disposal Coordinator (TDC).

Nonhazardous waste items scheduled for disposal at a permitted landfill or recycling center will be tracked with a nonhazardous waste manifest. For each waste type, the following information will be provided:

- Proper shipping names, as determined by 49 CFR 172, Section 101
- Hazard class or division
- ID number
- Packaging group
- Total quantity

- Technical and chemical group names
- Emergency Response Guidebook numbers

Also included on each manifest will be the following:

- The proper EPA ID number
- Transporters
- A 24-hour emergency response number (Chemtrec at 800-424-9300)
- Generator and transporter signatures
- Shipper's certification

A land disposal restriction (LDR) notification will be prepared as required by 40 CFR 268. A USACE government representative will sign the LDR notification.

1.4.5.3 Canadian Documentation

The Basel Convention, which Canada ratified in August 1992, prohibits the shipment of hazardous wastes across international borders without prior notification and approval. International shipments of hazardous waste that pass into, through, or out of Canada are subject to the requirements of the Export and Import of Hazardous Wastes regulations.

Hazardous wastes shipped from Northeast Cape (NE Cape) to Washington by barge will pass in transit through Canadian waters. A Canadian Transit Notice will be completed and sent to the appropriate Canadian authority before shipment of hazardous waste through Canadian waters. The Canadian Confirmation Letter will be provided to the Contracting Officer (CO) upon its receipt. In addition, Canadian manifest forms will be completed for all hazardous waste streams, in the event that these wastes may land on Canadian soil.

The contractor will sign the Canadian manifests.

1.4.5.4 Manifest Document Review

A complete manifest packet for the off-site shipment at the end of the field season will be generated prior to shipment. The packet will include all of the following:

- Hazardous waste manifests

- Nonhazardous waste manifests
- Canadian documentation
- Waste profiles
- Waste Shipment Records and LDRs
- Analytical results, where applicable
- Material Safety Data Sheets, when available
- Generator's Certification Statement regarding packaging, marking, labeling, and placarding
- A certification signed by the TDC that the packet is correct

Disapproved documents will be returned for revision. Approved documents will be provided to the TDC prior to shipment.

1.4.5.5 Manifest Copy Distribution

Final copies of the manifests and transportation documents will be included as an appendix in the final Hazardous, Toxic, and Radioactive Waste (HTRW) Report.

1.5 TRANSPORTATION

Wastes scheduled for off-island disposal will be sent as one waste shipment at the end of the 2012 field season. Wastes will be transported by barge from NE Cape to Seattle, Washington (intermediate stops are anticipated), and then sent by truck and/or rail to their respective disposal/recycling facilities.

1.6 TREATMENT, RECYCLING, AND DISPOSAL

Hazardous materials, hazardous wastes, and solid wastes removed from the site and generated during removal activities will be treated, recycled, or disposed of as listed in Table 1-3.

Table 1-3 Waste Types and Disposition

Waste Stream Code	Waste Type	Final Treatment / Disposal	Treatment Facility / Location
1	POL-Contaminated Soil or Sediment, non-RCRA	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill - Arlington, OR
2	PCB-Contaminated Soil or Sediment, <50 ppm PCBs	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill - Arlington, OR
3	PCB-Contaminated Soil or Sediment, TSCA, >50 ppm PCBs	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest - Arlington, OR
4	Arsenic-Contaminated Soil, non-RCRA	Disposal in Subtitle D Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
5	Miscellaneous Metal Debris or Drums	Disposal in Subtitle D Landfill	Emerald Services, Inc. - Tacoma, WA
6	Wooden Poles	Disposal in Subtitle D Landfill	Columbia Ridge Recycling & Landfill - Arlington, OR
7	Hazardous Soil or Sediment, RCRA	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest - Arlington, OR
8	Water Scrubbing Pillows, spent, nonRCRA	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest - Arlington, OR
9	Off-specification Used Oil, non-RCRA	Energy Recovery/Fuel Blending	Chemical Waste Management of the Northwest - Arlington, OR
10	Oily PPE/Absorbents, non-RCRA	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest - Arlington, OR
11	Antifreeze, from equipment, non-RCRA	Recycling	Chemical Waste Management of the Northwest - Arlington, OR
12	Antifreeze, from equipment, RCRA	Recycling	Chemical Waste Management of the Northwest - Arlington, OR
13	Water Scrubbing Pillows, spent, RCRA, Benzene	Disposal in Subtitle C Landfill	Chemical Waste Management of the Northwest - Arlington, OR
14	Ash, Smart Ash Burner, non-RCRA	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID

Table 1-3 Waste Types and Disposition (continued)

Waste Stream Code	Waste Type	Final Treatment / Disposal	Treatment Facility / Location
15	Used Acetone and Hexane Solvent	Fuel Blending	U.S. Ecology Idaho, Inc. - Grand View, ID
16	Used Sulfuric Acid	Disposal in Subtitle C Landfill	U.S. Ecology Idaho, Inc. - Grand View, ID
17	Methylene Chloride	Recycling/Incineration	U.S. Ecology Idaho, Inc. - Grand View, ID

Notes:

< = less than
> = greater than
ID = Idaho
PCB = polychlorinated biphenyl
POL = petroleum, oil, and lubricants
PPE = personal protective equipment
ppm = parts per million
RCRA = Resource Conservation Recovery Act
OR Oregon
TSCA = Toxic Substances Control Act
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 1-4.

Table 1-4 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
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	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

1.7 DOCUMENTATION AND REPORTING

1.7.1 Waste Tracking Requirements

Bristol's TDC will track all off-site shipments on a Waste Tracking Summary Spreadsheet, as shown in Attachment 1. A copy of the final Waste Tracking Summary Spreadsheet will be included in the final Remedial Action Report.

1.7.2 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. A copy of the report will be provided to the CO for approval prior to submittal to EPA Region 10 no later than the 42nd day after the transportation ship date.

1.7.3 Violations and Discrepancies

In the event that notices of noncompliance or notices of violations are issued to the contractor, they will be submitted to the CO immediately. All relevant documentation regarding the incident will be provided to the CO, and any response will be coordinated through the CO. Bristol will provide all documentation related to this issue to the CO 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 to the CO 5 days before it is required by the EPA.

1.7.4 Transportation and Disposal Appendix

To document all wastes generated and managed during this project, all transportation and disposal documentation will be tracked and provided to USACE with the final HTRW 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
- Nonhazardous 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.

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ATTACHMENT 1

Waste Management Forms

Certification Statement

Exception Report

Canadian Movement Document

Canadian Transit Notice

Container Tracking Spreadsheet

Land Disposal Restriction (LDR) Notification and Certification Form (Waste Management)

Contaminated Soils LDR Notification and Certification Form (Waste Management)

LDR Notification Form - Emerald Services

Identification of COCs and Underlying Hazardous Constituents (Waste Management)

Nonhazardous Waste Manifest

PCB Control Sheet

Uniform Hazardous Waste Manifest

Waste Tracking Summary Spreadsheet

Profile Amendment Request Form

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

111 W. 16th Avenue, Third Floor
Anchorage, AK 99501-5169
phone (907) 563-0013
fax (907) 563-6713
www.bristol-companies.com

CERTIFICATION STATEMENT

This is to certify that the NE Cape generated wastes to be shipped from NE Cape, St. Lawrence Island, Alaska during the month of October 2012 under the Uniform Hazardous Waste Manifest Documents No. ____________, ____________, and ____________ were properly classified, described, packaged, marked, and labeled and were in proper condition for transportation according to the applicable regulations of DOT, EPA, and Washington State laws and regulations.

Printed Name/Title

Signature/Date

EXAMPLE

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

111 W. 16th Avenue, Third Floor
Anchorage, AK 99501-5169
phone (907) 563-0013
fax (907) 563-6713
www.bristol-companies.com

October 21, 2012

Xiang-Yu Ge
U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue (S.O. 141)
Seattle, Washington 98101

Subject: Exception Report for NE Cape, St. Lawrence Island, Alaska
Uniform Hazardous Waste Manifest

Xiang-Yu Ge,

Attached is a copy of uniform hazardous waste manifest _______________, for hazardous wastes shipped from the NE Cape location on St. Lawrence Island, Alaska. The Treatment, Storage, and Disposal Facility (TSDF) signed copy has not been received by the generator as of ________________. It has been determined that the materials are currently in transit from ___________________________ to ___________________________. The wastes are estimated to arrive on ________________.

If you need further information or have questions relating to this issue, please contact me.

Sincerely,

Bristol Environmental
Remediation Services, LLC

Tyler Ellingboe
Project Manager/Sr. Waste Specialist

EXAMPLE

EXAMPLE ONLY

~~9223060-6~~

MOVEMENT DOCUMENT / MANIFEST
DOCUMENT DE MOUVEMENT / MANIFESTE

This Movement document/manifest conforms to all federal and provincial transport and environmental legislation.
Ce document de mouvement/manifeste est conforme aux législations fédérale et provinciale sur l'environnement et le transport.

Movement Document / Manifest Reference No.
N° de référence du document de mouvement/manifeste

A Generator / consignor — Producteur / expéditeur

Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial 1

Company name / Nom de l'entreprise

Mailing address / Adresse postale | City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Shipping site address / Adresse de lieu de l'expédition

City / Ville | Province | Postal code / Code postal

Intended Receiver / consignee — Réceptionnaire / destinataire prévu 2 | Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial

Mailing address / Adresse postale | City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Receiving site address / Addresse de lieu de l'expédition

City / Ville | Province | Postal code / Code postal

B Carrier — Transporteur

Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial 23

Company name / Nom de l'entreprise

Mailing address / Adresse postale | City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Vehicle / Véhicule	Registration No. / N° d'immatriculation	Prov. 24
Trailer - Rail car No. 1 / 1^er remorque - wagon		
Trailer - Rail car No. 2 / 2^e remorque - wagon		

Port of entry / Point d'entrée — International use only | Port of exit / Point de sortie — International use only 25

Carrier Certification : I certify that I have received waste or recyclable material from the generator / consignor for delivery to the receiver / consignee as set out in Part A and that the information contained in Part B is complete and correct. 26
Attestation du transporteur : J'atteste avoir reçu les déchets ou matières recyclables du producteur / expéditeur en vue de leur livraison au réceptionnaire / destinataire, tels qu'ils figurent à la partie A et que les renseignements inscrits à la partie B sont exacts et complets.

Name of authorized person (print): / Nom de l'agent autoriré (caractères d'imprimerie) : | Tel. No. / N° de tél. ( )

Year / Année | Month / Mois | Day / Jour | Signature :

Reference Nos. of other movement document(s)/manifest(s) used / N° de référence des autres documents de mouvement/manifestes utilisés

C Receiver / consignee — Réceptionnaire / destinataire

Registration No. / Provincial ID No. — N° d'immatriculation - d'id. provincial

Receiver / consignee information same as in Part A
Les renseignements du réceptionnaire / destinataire est la même qu'à la Partie A
☐ Yes / Oui ☐ No, complete the box below / Non, remplir la case ci-dessous

Company name / Nom de l'entreprise

Mailing address / Adresse postale

City / Ville | Province | Postal code / Code postal

E-mail / Courrier électronique | Tel. No. / N° de tél. ( )

Receiving site address / Addresse de lieu de destination

Date received / Date de réception: Year / Année | Month / Mois | Day / Jour — Time / Heure ☐ A.M. ☐ P.M. 29

If waste or recyclable material to be transferred, specify intended company name/ Si les dechets ou matières recyclables doivent être transférés, préciser le nom du destinataire 30 | Registration No./Provincial ID No. / N° d'immatriculation/d'id provincial

	Prov. code / Code prov. 3	Shipping name / Appellation réglementaire 4	Class / Classe / Sub. class(es) / Classe(s) sub. 5	UN No. / N°NU 6	Packing / risk gr. / Gr. d'emballage/ de risque 7	Quantity shipped / Quantitée expédiée	Units L or / ou Kg / Unités 8	Packaging/Contenant No. / N°	Codes Int.– ext. 9	Phys. state / État phys. 10	Quantity received / Quantité reçue	Units L or / ou kg / Unités 31	Comments / Commentaires 32	Handling Code / Code de manutention 33	Shipment / Envoi Accepted / Accepté 34	Refused / Refusé	Decont. Pack. / Cont.	Ve[illegible]
(i)																		
(ii)																		
(iii)																		
(iv)																		

	Notice No. / N° de notification 11	Notice Line No / N° de ligne de la notification	Shipment / Envoi 12	Of / De	D or R code / Code É ou R 13	C code / Code C 14	Basel Annex VIII or OECD Code / Annexe VIII de Bâle ou Code OCDE 15	H code / Code H 16	Y code / Code Y 17	National code in country of / Code du pays: Export / Exportation 18	Import / Importation	Customs code(s) / Code(s) de douanes 19
(i)												
(ii)												
(iii)												
(iv)												

International use only

Generator / consignor certification: I certify that the information contained in Part A is correct and complete.
Attestation du producteur / expéditeur: J'atteste que tous les renseignements à la partie A sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie) | Signature | Tel. No. / N° de tél. ( ) 20

If handling code "Other" (specify) / Si code de manutention « autre » (spécifier)

Receiver / consignee certification : I certify that the information contained in Part C is correct and complete. / Attestation du réceptionnaire / destinataire : J'atteste que tous les renseignements à la partie C sont exacts et complets.

Name of authorized person (print) / Nom de l'agent autorisé (caractère d'imprimerie)

Signature | Tel. No. / N° de tél. ( )

Special handling / Manutention spéciale 2[illegible]
☐ Attached /Ci-joint: ☐ As follows/ Ci-contre :

21 Date shipped / Date d'expédition: Year / Année | Month / Mois | Day / Jour — Time / Heure ☐ A.M. ☐ P.M — Scheduled arrival date / Date d'arrivée prévue: Year / Année | Month / Mois | Day / Jour

MOE 04-1917 (06/05)

Instructions for completion and distribution on reverse / Instructions pour compléter et distribuer au verso

Copy / Copie 1 (white / blanche

Environment Canada / Environnement Canada

NOTICE – NOTIFICATION

Notice Reference No.: / Nº de référence de la notification :	Page : ____ of / de : ____

Administrative form for proposed movements of hazardous wastes or hazardous recyclable materials
Formulaire administratif en vue de projets d'envois de déchets dangereux et de matières recyclables dangereuses

1 OPTION Indicate the option that applies to this notice. / Indiquez l'option qui s'applique à cette notification.
☐ Disposal / Élimination ☐ Recycling / Recyclage ☐ Recycling, Pre-approved Facility / Recyclage, Installation approuvée au préalable

2 EXPORTER OR FOREIGN EXPORTER / EXPORTATEUR OU EXPÉDITEUR ÉTRANGER		3 FOREIGN RECEIVER OR IMPORTER / DESTINAIRE ÉTRANGER OU IMPORTATEUR	
Registration Number: / Nº d'immatriculation :		Registration Number: / Nº d'immatriculation :	
Name: / Nom : Address: / Adresse : Shipping Site Address: / Adresse du site d'envoi :		Name: / Nom : Address: / Adresse : Receiving Site Address: / Adresse du site de réception :	
Tel. No.: / Nº de tél. : ( )	Fax No.: / Nº de téléc. : ( )	Tel. No.: / Nº de tél. : ( )	Fax No.: / Nº de téléc. : ( )
E-mail address: / Adresse électronique :	Contact person: / Personne ressource :	E-mail address: / Adresse électronique :	Contact Person: / Personne ressource :
Name of Insurance Company: / Nom de l'assureur :	Policy No.: / Nº de Police :	Name of Insurance Company: / Nom de l'assureur :	Policy No.: / Nº de Police :

4 AUTHORIZED CARRIER / TRANSPORTEUR AGRÉÉ		5 AUTHORIZED FACILITY (IF OPERATION D13, D14, D17, R12 R13, R16) / INSTALLATION AGRÉÉE (DANS LE CAS DES OPÉRATIONS D13, D14, D17, R12, R13 OU R16)	
Registration Number: / Nº d'immatriculation :		Registration Number: / Nº d'immatriculation :	
Name: / Nom : Address: / Addresse :	Modes of Transport: Moyens de transport : ☐ Road/Route ☐ Rail/Rail ☐ Marine/Mer ☐ Air/Air If other authorized carriers used, attach a list. S'il y a d'autres transporteurs agréés, annexez une liste. ☐ Attached / ci-joint	Name: / Nom : Address: / Adresse :	Receiving Site Address: / Adresse du site de réception : ☐ Attached / ci-joint
Tel. No.: / Nº de tél. : ( )	Fax No.: / Nº de téléc. : ( )	Line No.: / Nº de la ligne. :	D/R code: / Code D/R :
E-mail address: / Adresse électronique :	Contact person: / Personne ressource :	Tel. No.: / Nº de tél. : ( )	Fax No.: / Nº de téléc. : ( )
Name of Insurance Company: / Nom de l'assureur :	Policy No.: / Nº de Police :	E-mail address: / Adresse électronique :	Contact person: / Personne ressource :

SHIPPING DETAILS – DÉTAILS SUR LES ENVOIS

6 NUMBER OF SHIPMENTS: / NOMBRE D'ENVOIS :

7 PORT OF EXIT / ENTRY OR CUSTOMS OFFICE(S): / BUREAU(X) DE DOUANE OU POINT DE SORTIE/D'ENTRÉE : ☐ Attached / ci-joint

8 FIRST AND LAST SHIPMENTS : / PREMIER ET DERNIER ENVOIS : First / Premier Y - A | M - M | D - J Last / Dernier Y - A | M - M | D - J

9 TRANSIT COUNTRY(IES) / PAYS DE TRANSIT Country: / Pays : Length of Stay: / Durée du transit : ☐ Attached / ci-joint

10 HAZARDOUS INFORMATION / RENSEIGNEMENTS DANGEREUX - (For additional hazardous information please see Appendix to the Notice. / Veuillez consulter l'annexe à la notification pour des renseignements dangereux supplémentaires.)

International Waste Identification Code (IWIC) / Code international d'identification des déchets (CIID)	Basel Annex VIII or OECD App. 4 Code / Annexe VIII de Bâle ou App. 4 Code OCDE	TDGR PIN / NIP du RTMD	Class / Classe	Quantity / Quantité	Packing / Risk Group / Groupe d'emballage/ risque
1)				☐ kg ☐ L	

Customs Code / Code de douane	ID No & Description of Sch. 3-7 / Nº d'id. et description de l'Ann. 3 à 7	POP name, quant. & conc. / POP nom, quant. et conc.	Description(s) of the D/R process(es) to be used / Description(s) du (des) processus D/R mis en oeuvre

11 EXPORTS OF HAZARDOUS WASTE: Options considered for reducing or phasing out of the waste and the reason the disposal is happening outside of Canada
EXPORTATION DE DÉCHETS DANGEREUX : Solutions envisagées pour réduire ou pour supprimer les déchets et les raisons pour l'élimination en lieu étranger

12 STATEMENT OF PERSON SUBMITTING THE NOTICE. In the case of an export or import, the contract(s) referred to in paragraphs 9(f) or 16(e) is/are in force and if the waste or material cannot be disposed of or recycled in accordance with the export or import permit, the exporter or importer will undertake alternative arrangements required under the Regulations or will return the waste or material to the facility from which it was imported in accordance with s. 34 or 35. In the case of an export, import or transit, the insurance policy will cover the period specified by the Regulations and the information in the notice is complete and correct.

DÉCLARATION PAR L'AUTEUR DE LA NOTIFICATION : Dans le cas d'une exportation ou d'une importation, le(s) contrat(s) visé(s) aux alinéas 9f) ou 16e) est (sont) en vigueur et si les déchets ou les matières ne peuvent être éliminés ou recyclés conformément au permis d'exportation ou d'importation, l'exportateur ou l'importateur mettra en oeuvre les mesures d'arrangements alternatifs prévues au Règlement ou à les ramener à l'installation d'origine conformément aux articles 34 ou 35. Dans le cas d'une exportation, d'une importation ou d'un transit, la police d'assurance sera en vigueur pour la période visée par le Règlement, et les renseignements figurant à la notification sont complets et exacts.

Name: / Nom :	Signature:	Date:	Tel. No.: / Nº de tél. :

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC

Container Tracking Spreadsheet

Date:

Container Number	Container Type	Container ID	Gross/ Tare/ Net Masses	Manifest/ Bill of Lading Code	Contents	Transportation Start Date	TSDF Destination	Current Location	Date Received at TSDF

LAND DISPOSAL RESTRICTION (LDR) NOTIFICATION AND CERTIFICATION FORM (PHASE IV)

Generator Name: ______________________________

Profile Number: ____________________ Manifest Number: ____________________

Ref. #	2. US EPA HAZARDOUS WASTE CODE(s)	3. SUBCATEGORY ENTER THE SUBCATEGORY DESCRIPTION (If not applicable, simply check NONE)		4. HOW MUST THE WASTE BE MANAGED? ENTER LETTER FROM BELOW
		DESCRIPTION	NONE	
1.				
2.				
3.				
4.				

1. Is this waste a non-wastewater or wastewater? (See 40 CFR 268.2) Check ONE: ❑ Non-Wastewater ❑ Wastewater
   For hazardous debris meeting the definition of debris and subject to the alternate treatment standards in 268.45, check here: ❑
2. In **column 2**, identify ALL USEPA hazardous waste codes that apply to this waste shipment, as defined by 40 CFR 261.
   - To list additional waste code(s) use Land Disposal Notification/Certification Supplemental Form (CWM-2005-D) and check here: ❑
3. In **column 3**, for each waste code, identify the subcategory if one applies, or check NONE if the waste code has no subcategory.
4. In **column 4**, enter the letter from the list below (A. – D.) that describes how the waste must be managed to comply with the land disposal restriction regulations in 40 CFR 268. Please note that if you enter B.1, B.3, B.6 or D, you are certifying that the waste meets all the Land Disposal Restrictions and may be landfilled without further treatment. If you enter B.4, you are certifying that the waste has been decharacterized, but still requires treatment for UHCs. (States authorized by EPA to manage the LDR program may have regulatory citations different from the 40 CFR citations listed on this form. Where these regulatory citations differ, your form will be deemed to refer to those state citations as well as 40 CFR.)
5. Constituents of concern for waste codes F001-F005 and F039 and underlying hazardous constituents (UHCs) for D001-D043, must be identified unless the treatment facility will monitor for all constituents. **If any of these codes apply, check appropriate box below**:
   - To identify constituents of concern for F001-F005, F039 and UHCs, use the Identification of Constituents of Concern Form (CWM-2007) and check here: ❑
   - If UHCs are applicable, but none are present at the point of generation, check here: ❑
   - If incineration facility will monitor for all constituents of concern (except dioxins), check here: ❑

MANAGEMENT METHODS

A RESTRICTED WASTE REQUIRES TREATMENT
This waste must be treated to the applicable treatment standards set forth in 40 CFR 268.40.

B.1 RESTRICTED WASTE TREATED TO PERFORMANCE STANDARDS
"I certify under penalty of law that I personally have examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the treatment process had been operated and maintained properly so as to comply with the treatment standards specified in 40 CFR 268.40 without impermissible dilution of the prohibited waste. I am aware there are significant penalties for submitting a false certification including the possibility of fine and imprisonment."

B.3 GOOD FAITH ANALYTICAL CERTIFICATION FOR INCINERATED ORGANICS
"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification. Based on my inquiry of those individuals immediately responsible for obtaining this information, I believe that the non-wastewater organic constituents have been treated by combustion units as specified in 268.42 Table 1. I have been unable to detect the non-wastewater organic constituents despite having used best faith efforts to analyze for such constituents. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

B.4 DECHARACTERIZED WASTE REQUIRES TREATMENT FOR UNDERLYING HAZARDOUS CONSTITUENTS
"I certify under penalty of law that the waste has been treated in accordance with the requirements of 40 CFR 268.40 or 268.49, to remove the hazardous characteristic. This de-characterized waste contains underlying hazardous constituents that require further treatment to meet treatment standards. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

B.6 RESTRICTED DEBRIS TREATED TO ALTERNATE PERFORMANCE STANDARDS
"I certify under penalty of law that the debris has been treated in accordance with the requirements of 40CFR 268.45. I am aware that there are significant penalties for making a false certification, including the possibility of fine and imprisonment."

C. RESTRICTED WASTE SUBJECT TO A VARIANCE
This waste is subject to a national capacity variance, a treatability variance, or a case-by-case extension. Enter the effective date of prohibition in column (4) above.

D. RESTRICTED WASTE CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT
"I certify under penalty of law I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR Part 268 Subpart D and LAC 33: V. 2223-2233. I believe that the information I submitted is true, accurate and complete. I am aware that there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

I hereby certify that all information submitted in this and all associated documents is complete and accurate to the best of my knowledge and information.

Name: (Print) ____________________ Title: ____________________

Signature: ____________________ Date: ____________________

WASTE MANAGEMENT

LAND DISPOSAL NOTIFICATION AND CERTIFICATION FORM (UTS) – (PHASE IV) Supplemental Page

Generator Name: ______________________ Manifest Doc. Number: ______________________

Profile Number ______________________

This form is a continuation from CWM-2005-C for a waste identified by more than four USEPA waste code/groups. This page by itself IS NOT an acceptable Land Disposal Notification and Certification Form!

Continue (from form CWM-2005-C) to identify ALL USEPA hazardous wastes that apply to this waste shipment (as defined by 40 CFR 261). For each waste code, identify the corresponding subcategory or check NONE if the waste does not have a subcategory. Also identify in column 4 how the waste must be managed. To identify constituents of concern for F001-F005 and F039 and UHCs, use the Identification of Constituents of Concern for Waste Codes F001-F005, F039 and Underlying Hazardous Constituents (UHCs) Form (CWM-2007) and check here: ❑

Ref. #	2. US EPA HAZARDOUS WASTE CODE(s)	3. SUBCATEGORY ENTER THE SUBCATEGORY DESCRIPTION (If not applicable, simply check none)		4. HOW MUST THE WASTE BE MANAGED? (ENTER LETTER FROM FIRST PAGE OF CWM-2005-C)
		DESCRIPTION	NONE	
5				
6				
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32				
To list additional USEPA waste code(s) and subcategories, use the supplemental sheet provided (CWM-2005-D) and check here: ❑				

I hereby certify that all information submitted in this and all associated documents is complete and accurate to the best of my knowledge and information.

Signature: ______________________ Title: ______________________ Date: ______________________

CONTAMINATED SOILS LAND DISPOSAL RESTRICTION (LDR) NOTIFICATION AND CERTIFICATION FORM (PHASE IV)

Generator Name: ____________________

CWM Profile Number ____________________ Manifest Number: ____________________

Ref. #	3. US EPA HAZARDOUS WASTE CODE(s)	4. HOW MUST THE WASTE BE MANAGED? ENTER LETTER FROM BELOW
1.		
2.		
3.		
4.		

1. This waste is a non-wastewater (See 40 CFR 268.2).

2. (Check One) This contaminated soil ❑ **does** ❑ **does not** contain listed hazardous waste and ❑ **does** ❑ **does not** exhibit a characteristic of hazardous waste and is ❑ **subject to** / ❑ **complies with** the soil treatment standards as provided by 40 CFR 268.49(c).

3. In **column 3**, identify ALL USEPA hazardous waste codes that apply to this waste shipment, as defined by 40 CFR 261.
   To list additional waste code(s) use Land Disposal Notification/Certification Supplemental Form (CMW 2005-F) and check here: ❑
   For low Mercury subcategory waste (contains less than 260 ppm total Mercury) check here: ❑

4. In **column 4**, enter the letter from the Management Method list below (A.1, B.5 or D.) that describes how the waste must be managed to comply with the land disposal restriction regulations in 40 CFR 268.49. Please note that if you enter B.5 or D, you are certifying that the waste meets all the Land Disposal Restrictions and may be landfilled without further treatment. (States authorized by EPA to manage the LDR program may have regulatory citations different from the 40 CFR citations listed on this form. Where these regulatory citations differ, your form will be deemed to refer to those state citations as well as 40 CFR.)

5. Underlying hazardous constituents (UHCs) if present must be identified. If any constituents apply, check appropriate box below:
   - To identify UHCs, use the Identification of Constituents of Concern Form (CWM-2007) and check here: ❑
   - If no UHCs (10x UTS) are present at the point of generation, check here: ❑

MANAGEMENT METHODS

A.1 RESTRICTED SOIL REQUIRES TREATMENT
"I certify under penalty of law that I personally have examined this contaminated soil and it ❑ **does** ❑ **does not** contain listed hazardous waste and ❑ **does** ❑ **does not** exhibit a characteristic of hazardous waste requires treatment to meet the soil treatment standards as provided by 40 CFR 268.49(c)."

B.5 RESTRICTED SOIL TREATED TO ALTERNATE PERFORMANCE STANDARDS
"I certify under penalty of law that I have personally examined and am familiar with the treatment technology and operation of the treatment process used to support this certification and believe that it has been maintained and operated properly so as to comply with treatment standards specified in 40 CFR 268.49(c) without impermissible dilution of the prohibited wastes. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

D. RESTRICTED SOIL CAN BE LAND DISPOSED WITHOUT FURTHER TREATMENT
"I certify under penalty of law that I personally have examined and am familiar with the waste through analysis and testing or through knowledge of the waste to support this certification that the waste complies with the treatment standards specified in 40 CFR 268 subpart D. I believe that the information I submitted is true, accurate, and complete. I am aware there are significant penalties for submitting a false certification, including the possibility of fine and imprisonment."

I hereby certify that all information submitted in this and all associated documents is complete and accurate to the best of my knowledge and information.

Name: (Print) ____________________ Title: ____________________

Signature: ____________________ Date: ____________________

CONTAMINATED SOILS LAND DISPOSAL NOTIFICATION AND CERTIFICATION FORM (UTS) – (PHASE IV)
Supplemental Page

Generator Name: ______________________ Manifest Doc. Number: ______________________

CWM Profile Number ______________________

This form is a continuation from CWM-2005-E for a waste identified by more than five USEPA waste code/groups. This page by itself IS NOT an acceptable Land Disposal Notification and Certification Form!

Continue (from form CWM-2005-E) to identify ALL USEPA hazardous wastes that apply to this waste shipment (as defined by 40 CFR 261). Identify in column 4 how the waste must be managed. To identify constituents of concern for F001-F005 and F039 and UHCs, use the Identification of Constituents of Concern for Waste Codes F001-F005, F039 and Underlying Hazardous Constituents (UHCs) Form (CWM-2007) and check here: ❑

Ref. #	3. US EPA HAZARDOUS WASTE CODE(s)	4. HOW MUST THE WASTE BE MANAGED? (ENTER LETTER FROM FIRST PAGE OF CWM-2005-E)
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To list additional USEPA waste code(s) and subcategories, use the supplemental sheet provided (CWM-2005-F) and check here: ❑

I hereby certify that all information submitted in this and all associated documents is complete and accurate to the best of my knowledge and information.

Signature: ______________________ Title: ______________________ Date: ______________________

Emerald Services RCRA Land Disposal Restriction Notification Form EZ

(This form is applicable to characteristic (D codes), listed waste (F, K, U and P codes), Contaminated Soil and Hazardous Debris)

Generator: U.S. E.P.A. I.D. #:
Profile #: Manifest #:

The wastes identified in this form are subject to the land disposal restrictions of 40CFR Part 268. The wastes do not meet the treatment standards specified in Part 268 , Subpart D or do not meet the applicable prohibition levels specified in 268.32 or RCRA Section 3004(d). Pursuant to 40CFR 256.7(a), the required information applicable to each waste is identified below *(check all boxes that apply):*

Treatability Group: ☐ Wastewater ■ Non-Wastewater

(Wastewaters containing less than 1% filterable solids and less than 1% Total Organic Carbon)

- ❑ **D001 Ignitable (except for high TOC) managed in non-CWA/non-CWA equivalent non-Class I SDWA systems** *(Complete Form U.C. Underlying hazardous constituents need not be addressed if the waste is to be combusted or recovered.)*
- ☐ D001 Ignitable (except for high TOC) managed in CWA/CWA-equivalent /Class I SDWA systems
- ☐ D001 High TOC Ignitable (Greater than 10% organic carbon)
- ☐ **D002 Corrosive managed in non-CWA/non-CWA-equivalent/non Class I SDWA systems** *(Complete Form U.C.)*
- ☐ D002 Corrosive managed in CWA/CWA-equivalent /Class I systems
- ☐ D003 Reactive Sulfides based on 261.23(a)(5)
- ☐ D003 Reactive Cyanides based on 261.23(a)(5)
- ☐ **D003 Water Reactives based on 261.23(a)(2), (3), and (4) managed in non-CWA/non-CWA-equivalent/non-Class I SDWA systems** *(Complete Form U.C.)*
- ☐ D003 Water Reactives based on 261.23(a)(2), (3) and (4) managed in CWA/CWA-equivalent /Class I SDWA systems
- ☐ D003 Other Reactives based on 261.23(a)(1)

If D004 – D043 boxes are checked, complete and attach Form U.C. to address underlying hazardous constituents (unless these wastes are to be managed in a CWA/CWA-equivalent/Class I SDWA system):

- ☐ D004 Arsenic
- ☐ D005 Barium
- ☐ D006 Cadmium
- ☐ D007 Chromium
- ☐ D008 Lead
- ☐ D009 Mercury
- ☐ D010 Selenium
- ☐ D011 Silver
- ☐ D012 Endrin
- ☐ D013 Lindane
- ☐ D014 Methoxychlor
- ☐ D015 Toxaphene
- ☐ D016 2,4-D
- ☐ D017 2,4,5-TP (Silvex)
- ☐ D018 Benzene
- ☐ D019 Carbon Tetrachloride
- ☐ D020 Chlordane
- ☐ D021 Chlorobenzene
- ☐ D022 Chloroform
- ☐ D023 *o*-Cresol
- ☐ D024 *m*-Cresol
- ☐ D025 *p*-Cresol
- ☐ D026 Cresols (Total)
- ☐ D027 *p*-Dichlorobenzene
- ☐ D028 1,2-Dichloroethane
- ☐ D029 1,1-Dichloroethylene
- ☐ D030 2,4-Dinitrotoluene
- ☐ D031 Heptachlor
- ☐ D032 Hexachlorobenzene
- ☐ D033 Hexachlorobutadiene
- ☐ D034 Hexachloroethane
- ☐ D035 Methyl Ethyl Ketone
- ☐ D036 Nitrobenzene
- ☐ D037 Pentachlorophenol
- ☐ D038 Pyridine
- ☐ D039 Tetrachloroethylene
- ☐ D040 Trichloroethylene
- ☐ D041 2,4,5-Trichlorophenol
- ☐ D042 2,4,6-Trichlorophenol
- ☐ D043 Vinyl Chloride

<u>In addition, the following wastes are included in this shipment:</u>

- ☐ F001 – F005 Spent Solvents. (If this box is checked, complete F001-F005 section on the back of this form. Check the hazardous number(s) that apply and identify the constituents likely to be present in the waste.)
- ☐ **F039 Multisource Leachate. If this box is checked, complete and attach Form U.C. to identify the individual constituents**.
- ☐ Contaminated Soil that meets the LDR standard found in 268 Subpart D (If this box is checked, complete the Contaminated Soil section on the back of this form.)
- ☐ Hazardous Debris (If this box is checked, complete the Hazardous Debris section on the back of this form.)

If this shipment carries additional waste codes that are not addressed above, identify them here:

EPA Waste Code	Subcategory (if any)	EPA Waste Code	Subcategory (if any)	EPA Waste Code	Subcategory (if any)
____________	____________	____________	____________	____________	____________
____________	____________	____________	____________	____________	____________

F001 – F005 Spent Solvents

Check the box (es) that apply. Identify the individual constituents likely to be present.

Hazardous Waste Description	Regulated Hazardous Constituents	
☐ F001 Spent Halogenated Solvents used in Degreasing	☐ Carbon Tetrachloride ☐ Tetrachloroethylene ☐ Trichloroethylene ☐ Trichloromonofluoromethane	☐ Methylene Chloride ☐ 1,1,1-Trichloroethane ☐ 1,1,2-Trichloro-1,2,2-trifluoroethane
☐ F002 Spent Halogenated Solvents	☐ Carbon Tetrachloride ☐ Tetrachloroethylene ☐ Trichloroethylene ☐ Trichloromonofluoromethane	☐ Methylene Chloride ☐ 1,1,1-Trichloroethane ☐ 1,1,2-Trichloro-1,2,2-trifluoroethane
☐ F003 Spent Non-Halogenated Solvents	☐ Acetone ☐ Cyclohexanone * ☐ Ethyl Benzene ☐ Methanol * ☐ Xylenes (Total)	☐ *n*-Butyl Alcohol ☐ Ethyl Acetate ☐ Ethyl Ether ☐ Methyl Isobutyl Ketone
☐ F004 Spent Non-Halogenated Solvents	☐ *m*-Cresol ☐ *p*-Cresol ☐ Nitrobenzene	☐ *o*-Cresol ☐ Cresol Mixed Isomers (Cresylic Acid)
☐ F005 Spent Non-Halogenated Solvents	☐ Benzene ☐ 2-Ethoxyethanol ☐ Methyl Ethyl Ketone ☐ Pyridine	☐ Carbon Disulfide * ☐ Isobutyl Alcohol ☐ 2-Nitropropane ☐ Toluene

** The treatment standards for carbon disulfide, cyclohexanone and methanol non-wastewaters are based on the TCLP and apply to spent solvent non-wastewaters containing only one, two or all three of these constituents. The treatment standards for these three constituents do no apply when any of the other F001-F005 constituents are present in the waste.*

Contaminated Soil Waste

- ☐ This shipment contain contaminated soil with listed hazardous waste and does not exhibit a characteristic of hazardous waste and is subject to the soil treatment standards as provided by 268.49(c) of the universal treatment standards.
- ☐ This shipment contains contaminated soil which does not contain hazardous waste and does not exhibit a characteristic of hazardous waste and complies with the soil treatment standards as provided by 268.49(c) of the universal treatment standards.

Hazardous Debris

The definition of "debris" and "hazardous debris" are in 40CFR 268.2. Per 268.45, hazardous debris must be treated for each "contaminant subject to treatment." To determine these, look up the waste code in 268.40 and list the regulated hazardous constituents for each code. Check the box that applies.

- ☐ This shipment contains hazardous debris that will be treated to comply with the alternative treatment standards of 268.45 (e.g. macroencapsulation or abrasive blasting).
- ☐ This shipment contains hazardous debris that will be treated to meet the 258.40 treatment standards for the waste(s) contaminating the debris.

The contaminants subject to treatment for this debris are identified below:

EPA Waste Code	Subcategory (if any)	Contaminants Subject to Treatment
______________	______________	______________________________
______________	______________	______________________________
______________	______________	______________________________

Emerald Services RCRA Land Disposal Restriction Notification Form UC

Generator: U.S. E.P.A. I.D. #:
Profile #: Manifest #:

In accordance with 40CFR 268.7(a), the underlying hazardous constituents must be addressed in the waste Per 268.2(l), "underlying hazardous constituents means any constituent listed in 268.48, Table UTS Universal Treatment Standards, except zinc, which can reasonably be expected to be present at the point of generation of the hazardous waste, at a concentration above the constituent-specific UTS treatment standard." Refer to Form EZ (attached) for the waste code(s), Treatability group, and Subcategory applicable to this waste. This form may also be used to identify F039 constituents.

Please check the appropriate box:

☐ This waste includes F039 multisource leachate. The individual constituents likely to be present are identified below:

____________________________ ____________________________
____________________________ ____________________________
____________________________ ____________________________

☐ This shipment includes D001[other than (1) High TOC ignitables or (2) other ignitables that will be combusted or recovered], D002, D003 [other than (1) Reactive Sulfides or (2) Reactive Cyanides or (3) Other Reactives] and/or D004-D043 Characteristic Wastes. The wastes will not be managed in CWA/CWA-equivalent/Class I SDWA Systems. The underlying hazardous constituents must be addressed for this waste.

In order to address underlying hazardous constituents in characteristic wastes, please check the appropriate box:

☐ I have reviewed the UTS list of 268.48 and 268.7(a), and I have determined that there are no underlying hazardous constituents reasonably expected to be present in this waste.

☐ I have reviewed the UTS list of 268.48 and 268.7(a), and I have determined that underlying hazardous constituents are present in this waste. The underlying hazardous constituents are identified as:

The determination of underlying hazardous constituents was based on:

☐ Generators Knowledge of the waste

☐ Analysis

Generator's Certification:

I certify that I have personally examined and am familiar with the waste through analysis and testing, or through knowledge of the waste to support this certification. I certify that as an authorized representative of the generator named above, all the information submitted in this notification is true and correct to the best of my knowledge.

Printed Name: ____________________________ Title ____________________________

Signature: ____________________________ Date ____________________________

Underlying Hazardous Waste Constituents (Form UC Page 2)

Circle or otherwise identify the underlying hazardous constituents (or F039 constituents) present in the waste:

Acenapthene
Acenaphthylene
Acetone
Acetonitrile
Acetophenone
2-Acetylaminofluorene
Acrolein
Acrylamide
Acrylonitrile
Aldrin
4-Aminobiphenyl
Aniline
Anthracene
Aramite
Alpha-BHC
Beta-BHC
Delta-BHC
Benz(a)anthracene
Benzal Chloride*
Benzene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(p,h,I)perylene
Bis(2-chloroethoxy)methane
Bis(2-chloroethyl)ether
Bis(2-chloroisopropyl)ether
Bis(2-ethylhexyl)phthalate
Bromodichloromethane
Bromomethane (Methyl Bromide)
4-Bromophenol Phenyl Ether
n-Butyl Alcohol
Butyl Benzyl Phthalate
2-*sec*-Butyl-4,6-dinitrophenol
(Dinoseb)
Carbon Disulfide
Carbon Tetrachloride
Chlordane
(alpha and gamma isomers)
p-Chloroaniline
Chlorobenzene
Chlorobenzilate
2-Chloro-1,3-butadiene
Chlorodibromomethane
Chloroethane
Chloroform
p-Chloro-*m*-cresol
2-Chloro Vinyl Ether
Chloromethane (Methyl Chloride)
2-Chloronaphthylene
2-Chlorophenol
3-Chloropropylene

Chrysene
o-Cresol
m-Cresol
p-Cresol
Cyclohexanone
o,p'-DDD
p,p'-DDD
o,p'-DDE
p,p'-DDE
o,p'-DDT
p,p'-DDT
Dibenz(a,b)anthracene
Dibenz(a,e) pyrene
1,2-Dibromo-3-chloropropane
1,2-Dibromoehtane
(Ethylene Dibromide)
Dibromomethane
m-Dichlorobenzene
o-Dichlorobenzene
p-Dichlorobenzene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene
trans-1,2-Dichloroethylene
2,4-Dichlorophenol
2,6-Dichlorophenol
2,4-Dichlorophenoxyacetic Acid
(2,4-D)
1,2-Dichloropropane
cis-1,3-Dichloropropylene
trans-1,3-Dichloropropylene
Dieldrin
Diethyl Phthalate
p-Dimethylaminoazaobenzene*
2,4-Dimethyl Phenol
Dimethyl Phthalate
Di-*n*-butyl Phthalate
1,4-Dinitrobenzene
2.4.6-Dinitro-*o*-cresol
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Di-*n*-octyl Phthalate
Di-*n*-propylnitrosamine
1,4-Dioxane
Diphenlyamine
Diphenylnitrosamine
1,2-Diphenly Hydrazine
Disulfoton
Endosulfan I
Endosulfan II

Endosulfan Sulfate
Endrin
Endrin Aldehyde
Ethyl Acetate
Ethyl Benzene
Ethyl Ether
Ethyl Methacrylate
Ethylene Oxide
Famphur
Fluoranthene
Fluorene
Heptachlor
Heptachlor Epoxide
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachlorodibenzo-*p*-dioxins
Hexachlorodibenzofurans
Hexachloroethane
Hexachloropropylene
Indeno(1,2,3-c,d)pyrene
Indomethane
Isobutyl Alcohol
Isodrin
Isosafrole
Kepone
Methacrylonitrile
Methanol
Methapyrilene
Methoxychlor
3-Methylcholanithrene
4,4-Methylene-bis(2-chloroaniline)
Methylene Chloride
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
Methyl Methacrylate
Methyl Methansulfonate
Methyl Parathion
Naphthalene
2-Naphthylamine
o-Nitroaniline*
p-Nitroaniline
Nitrobenzene
5-Nitro-*o*-toluidine
o-Nitrophenol
p-Nitrophenol
N-Nitrosodiethylamine
N-Nitrosodimethylamine
N-Nitrosodi-*n*-butylamine
N-Nitrosomethylethylamine
N-Nitrosmorpholine
N-Nitrosopiperidine

N-Nitrosopyrrolidine
Parathion
PCBs (Total)
Pentachlorobenzene
Pentachlorodibenzo-*p*-dioxins
Pentachlorodibenzofurans
Pentachloroethane*
Pentachloronitrobenzene
Pentacholorphenol
Phenacetin
Phenanthrene
Phenol
Phorate
Phthalic Acid*
Phthalic Anhydrice
Pronamide
Propanenitrile (Ethyl Cyanide)
Pyrene
Pyridine
Safrole
Silvex (2,4,5-TP)
1,2,4,5-Tetrachlorobenzene
Tetrachlorodibenzo-*p*-dioxins
Tetrachlorodibenzofurans
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroehtane
Tetrachloroethylene
2,3,4,6-Tetrachlorophenol
Toluene
Toxaphene
Tribromomethane (Bromoform)
1,2,4-Trichlorobenzene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Trichloromonofluoromethane
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4,5-Trichlorophenoxyacetic
Acid (2,4,5-T)
1,2,3-Trichloropropane
1,1,2-Trichloro-1,2,2-trifluoro-
ethane
Tris(2,3-dibromopropyl)
Phosphate
Vinyl Chloride
Xylenes (Total)

Antimony
Arsenic
Barium
Beryllium

Cadmium
Chromium (total)
Cyanide (total)
Cyanide (amenable)

Mercury (retort residues)*
Mercury (all others)
Fluoride
Lead

Nickel
Selenium
Silver
Sulfide

Thallium
Vanadium

Identification of Constituents of Concern for Waste Codes F001-F005, F039 and Underlying Hazardous Constituents (UHCs)

Generator Name: ______________________________ Manifest Number: ______________________________

Profile Number ______________________________

If D001-D043 requires treatment to 268.48 standards, then each underlying hazardous constituent present in the waste at the point of generation, and at a level above the UTS constituent specific treatment standard, must be listed. Write the letter (A, B.1, B.3, B.4, B.6, C or D which corresponds to the letter on form CWM-LC-2005C) beside each constituent present, to properly describe how the constituent(s) must be managed under 40 CFR 268.7. If contaminated soil requires treatment to the 268.49 standards, then each UHC in the waste at the point of generation, and at a level above 10 x the UTS must be listed. Write the letter (A.1 or B.5) which corresponds to the letter on form CWM-LC-2005-E beside each constituent present.

CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg	CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg
Acenaphthene		0.059	3.4	n- Butanol (butly alcohol)		5.6	2.6
Acenaphthylene		0.059	3.4	Butyl benzyl phthalate		0.017	28
Acetone		0.28	160	Butylate[2]		0.042	1.4
Acetonitrile		5.6	38[2]	2-sec-Butyl-4,6-dinitrophenol *(Dinoseb)*		0.066	2.5
Acetophenone		0.010	9.7	Carbaryl[2]		0.006	0.14
2-Acetylaminofluorene		0.059	140	Carbenzadim[2]		0.056	1.4
Acrolein		0.29	NA	Carbofuran[2]		0.006	0.14
Acrylamide[2]		19	23	Carbofuran phenol[2]		0.056	1.4
Acrylonitrile		0.24	84	Carbon disulfide (TCLP)		3.8	4.8[1,2]
Aldicarb sulfone[2]		0.056	0.28	Carbon tetrachloride		0.057	6.0
Aldrin		0.021	0.066	Carbosulfan[2]		0.028	1.4
4-Aminobiphenyl		0.13	NA	Chlordane (alpha & gamma)		0.0033	0.26
Aniline		0.81	14	p-Chloroaniline		0.46	16
o-Ansidine		0.010	0.66	Chlorobenzene		0.057	6.0
Anthracene		0.059	3.4	Chlorobenzilate		0.10	NA
Aramite		0.36	NA	2-chloro-1,3-butadiene		0.057	0.28[2]
Barban[2]		0.056	1.4	Chlorodibromomethane		0.057	15
Bendiocarb[2]		0.056	1.4	Chloroethane		0.27	6.0
Benomyl[2]		0.056	1.4	bis-(2-Chloroethoxy) methane		0.036	7.2
Benz (a) anthracene		0.059	3.4	bis-(2-Chloroethyl) ether		0.033	6.0
Benzal chloride[2]		0.055	6.0	2-Chloroethyl vinyl ether[2]		0.062	NA
Benzene		0.14	10	Chloroform		0.046	6.0
Benzo (b) flouranthene[4]		0.11	6.8	bis-(2-Chloroisopropyl) ether		0.055	7.2
Benzo (k) flouranthene[4]		0.11	6.8	p-Chloro-m-cresol		0.018	14
Benzo (g,h,i) perylene		0.0055	1.8	Chloromethane (methyl chloride)		0.19	30
Benzo (a) pyrene		0.061	3.4	2-Chloronaphthalene		0.055	5.6
alpha-BHC		0.00014	0.066	2-Chlorophenol		0.044	5.7
beta-BHC		0.00014	0.066	3-Chloropropylene		0.036	30
delta-BHC		0.023	0.066	Chrysene		0.059	3.4
gamma-BHC (Lindane)		0.0017	0.066	p- Cresidine		0.010	0.66
Bromodichloromethane		0.35	15	o-Cresol		0.11	5.6
Bromomethane (methyl bromide)		0.11	15	m-Cresol		0.77	5.6
4-Bromophenyl phenyl ether		0.055	15	p-Cresol		0.77	5.6

Identification of Constituents of Concern for Waste Codes F001-F005, F039 and Underlying Hazardous Constituents (UHCs)

CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg	CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg
m-Cumeyl methylcarbamate[2]		0.056	1.4	1,4-Dioxane		12	170
Cyclohexanone (TCLP)		0.36	0.75[1,2]	Diphenyl amine[4]		0.92	13[2]
o,p'-DDD		0.023	0.087	Diphenylnitrosoamine[4]		0.92	13[2]
p,p'-DDD		0.023	0.087	1,2-Diphenylhydrazine		0.087	NA
o,p'-DDE		0.031	0.087	Disulfoton		0.017	6.2
p,p'-DDE		0.031	0.087	Dithiocarbamates (total)[2,4]		0.028	28
o,p'-DDT		0.0039	0.087	Endosulfan I		0.023	0.066
p,p'-DDT		0.0039	0.087	Endosulfan II		0.029	0.13
Dibenz (a,h) anthracene		0.055	8.2	Endosulfan Sulfate		0.029	0.13
Dibenz (a,e) pyrene		0.061	NA	Endrin		0.0028	0.13
1,2-Dibromo-3-Chloropropane		0.11	15	Endrin aldehyde		0.025	0.13
1,2-Dibromoethane *(Ethylene dibromide)*		0.028	15	EPTC[2]		0.042	1.4
Dibromomethane		0.11	15	Ethyl acetate		0.34	33
m-Dichlorobenzene		0.036	6.0	Ethyl benzene		0.057	10
o-Dichlorobenzene		0.088	6.0	Ethyl cyanide (Propanenitrile)		0.24	360
p-Dichlorobenzene		0.090	6.0	Ethyl ether		0.12	160
Dichlorodifluoromethane		0.23	7.2	Ethyl methacrylate		0.14	160
1,1-Dichloroethane		0.059	6.0	Ethylene oxide		0.12	NA
1,2-Dichloroethane		0.21	6.0	bis-(2-Ethylyhexyl) phthalate		0.28	28
1,1-Dichloroethylene		0.025	6.0	Famphur		0.017	15
trans-1,2-Dichloroethylene		0.054	30	Fluoranthene		0.068	3.4
2,4-Dichlorophenol		0.044	14	Fluorene		0.059	3.4
2,6-Dichlorophenol		0.044	14	Formetanate hydrochloride[2]		0.056	1.4
2,4-Dichlorophenoxyacetic acid *(2,4-D)*		0.72	10	Heptachlor		0.0012	0.066
1,2-Dichloropropane		0.85	18	1,2,3,4,6,7,8-HpCDD		0.000035	0.0025
cis-1,3-Dichloropropylene		0.036	18	1,2,3,4,6,7,8-HpCDF		0.000035	0.0025
trans-1,3-Dichloropropylene		0.036	18	1,2,3,4,7,8,9-HpCDF		0.000035	0.0025
Dieldrin		0.017	0.13	Heptachlor epoxide		0.016	0.066
Diethyl phthalate		0.20	28	Hexachlorobenzene		0.055	10
p-Dimethylaminoazobenzene[2]		0.13[2]	NA	Hexachlorobutadiene		0.055	5.6
2,4-Dimethyleneaniline		0.010	0.66	Hexachlorocyclopentadiene		0.057	2.4
2,4-Dimethyl phenol		0.036	14	Hexachloroethane		0.055	30
Dimethyl phthalate		0.047	28	Hexachloropropylene		0.035	30
Di-n-butyl phthalate		0.057	28	Hexachlorodibenzo-p-dioxins		0.000063	0.001
1,4-Dinitrobenzene		0.32	2.3	Hexachlorodibenzo-furans		0.000063	0.001
4,6-Dinitro-o-cresol		0.28	160	Indeno (1,2,3-c,d) pyrene		0.0055	3.4
2,4-Dinitrophenol		0.12	160	Iodomethane		0.19	65
2,4-Dinitrotoluene		0.32	140	Isobutanol (Isobutyl Alcohol)		5.6	170
2,6-Dinitrotoluene		0.55	28	Isodrin		0.021	0.066
Di-n-octyl phthalate		0.017	28				
Di-n-propylnitrosoamine		0.40	14				

Identification of Constituents of Concern for Waste Codes F001-F005, F039 and Underlying Hazardous Constituents (UHCs)

CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg	CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg
Isosafrole		0.081	2.6	1,2,3,4,6,7,8,9-OCDD		.000063	0.005
Kepone		0.0011	0.13	1,2,3,4,6,7,8,9-OCDF		.000063	0.005
Methacrylonitrile		0.24	84	Oxamyl[2]		0.056	0.28
Methanol (TCLP)		5.6	0.75[1,2]	Parathion		0.014	4.6
Methapyrilene		0.081	1.5	PCBs (Total) all isomers or Aroclors		0.10	10
Methiocarb[2]		0.056	1.4	Pebulate[2]		0.042	1.4
Methomyl[2]		0.028	0.14	Pentachlorobenzene		0.055	10
Methoxychlor		0.25	0.18	Pentachlorodibenzo-p-dioxins		.000063	0.001
Methyl ethyl ketone		0.28	36	Pentachlorodibenzo-furans		.000035	0.001
Methyl isobutyl ketone		0.14	33	Pentachloroethane[2]		0.055	6.0
Methyl methacrylate		0.14	160	Pentachloronitrobenzene		0.055	4.8
Methyl methanesulfonate		0.018	NA	Pentachlorophenol		0.089	7.4
Methyl parathion		0.014	4.6	Phenacetin		0.081	16
3-Methylcholanthrene		0.0055	15	Phenathrene		0.059	5.6
4,4-Methylene-bis-(2-chloroaniline)		0.50	30	Phenol		0.039	6.2
Methylene chloride		0.089	30	1,2-Phenylenediamine[2,3]		CMBST	CMBST
Metolcarb[2]		0.056	1.4	1,3-Phenylenediamine		0.010	0.66
Mexacarbate[2]		0.056	1.4	Phorate		0.021	4.6
Molinate[2]		0.042	1.4	Phthalic acid[2]		0.055	28
Naphthalene		0.059	5.6	Phthalic anhydride		0.055	28
2-Naphthylamine		0.52	NA	Physostigmine[2]		0.056	1.4
o-Nitroaniline[2]		0.27	14	Physostigmine salicylate[2]		0.056	1.4
p-Nitroaniline		0.028	28	Promecarb[2]		0.056	1.4
Nitrobenzene		0.068	14	Pronamide		0.093	1.5
5-Nitro-o-toluidine		0.32	28	Propham[2]		0.056	1.4
o-Nitrophenol[2]		0.028	13	Propoxur[2]		0.056	1.4
p-Nitrophenol		0.12	29	Prosulfocarb[2]		0.042	1.4
N-Nitrosodiethylamine		0.40	28	Pyrene		0.067	8.2
N-Nitrosodimethylamine		0.40	2.3[2]	Pyridine		0.014	16
N-Nitroso-di-n-butylamine		0.40	17	Safrole		0.081	22
N-Nitrosomethylethylamine		0.40	2.3	Silvex (2,4,5-TP)		0.72	7.9
N-Nitrosomorpholine		0.40	2.3	1,2,4,5-Tetrachlorobenzene		0.055	14
N-Nitrosopiperidine		0.013	35	Tetrachlorodibenzo-dioxins		.000063	0.001
N-Nitrosopyrrolidine		0.013	35	Tetrachlorodibenzo-furans		.000063	0.001
				1,1,1,2-Tetrachloroethane		0.057	6.0
				1,1,2,2-Tetrachloroethane		0.057	6.0
				Tetrachloroethylene		0.056	6.0
				2,3,4,6-Tetrachlorophenol		0.030	7.4
				Thiodicarb[2]		0.019	1.4

Identification of Constituents of Concern for Waste Codes F001-F005, F039 and Underlying Hazardous Constituents (UHCs)

CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg	CONSTITUENT	HOW MUST THIS CONSTITUENT BE MANAGED?	WW Mg/l	NWW Mg/kg
Thiophanate-methyl[2]		0.056	1.4	Antimony		1.9	1.15[1]
Toluene		0.080	10	Arsenic		1.4	5.0[1]
Toxaphene		0.0095	2.6	Barium		1.2	21.0[1]
Triallate[2]		0.042	1.4	Beryllium		0.82	1.22[1,6]
Bromoform (Tribromomethane)		0.63	15	Cadmium		0.69	0.11[1]
1,2,4-Trichlorobenzene		0.055	19	Chromium (Total)		2.77	0.60[1]
1,1,1-Trichloroethane		0.054	6.0	Cyanides (Total)		1.2	590
1,1,2-Trichloroethane		0.054	6.0	Cyanides (Amenable)		0.86	30[6]
Trichloroethylene		0.054	6.0	Fluoride[3]		35	NA
Trichloromonofluoromethane		0.020	30	Lead		0.69	0.75[1]
2,4,5-Trichlorophenol		0.18	7.4	Mercury (non-waste water from retort)		NA	0.20[1,2]
2,4,6-Trichlorophenol		0.035	7.4	Mercury (All others)		0.15	0.025[1]
2,4,5-T		0.72	7.9	Nickel		3.98	11.0[1]
1,2,3-Trichloropropane		0.85	30	Selenium		0.82	5.7[1,5]
1,1,2-Trichloro-1,2,2-trifluoroethane		0.057	30	Silver		0.43	0.14[1]
Triethylamine[2]		0.081	1.5	Sulfide[3]		14	NA
Tris(2,3-dibromopropyl)phosphate		0.11	0.10[2]	Thallium		1.4	0.20[1]
Vernolate[2]		0.042	1.4	Vanadium[3]		4.3	NA 1.6[1]
Vinyl chloride		0.27	6.0	Zinc[3]		2.61	NA 4.3[1]
Xylene(sum of o-,m-,and p- isomers)[4]		0.32	30	2-Ethoxyethanol (F005)[7]		INCIN or BIODG	INCIN
				2-Nitropropane (F005)[7]		INCIN or CHOXD	INCIN

❑ No UHC's apply

1. These concentrations are expressed in mg/l and are measured through an analysis of TCLP extract; all others measured through a total waste analysis.
2. These constituents are only applicable as Underlying Hazardous Constituents. They are not constituents requiring treatment in F039 wastes.
3. Not an underlying hazardous constituent requiring treatment in D001-D043 wastes, per 268.2(i). F039 WW standard only.
4. These compounds are regulated by the sum of their concentration instead of as individual constituents.
5. Effective August 24, 1998 in unauthorized states or states with no LDR program, Selenium at 5.7 Mg/L is not considered an underlying hazardous constituent in D001-D043 waste as it is above the characteristic level. This becomes effective in authorized states once that state adopts.
6. These constituents are applicable as Underlying Hazardous Constituents. F039 WW standard applicable.
7. Waste contains this compound as the only listed F001-F005 solvent.

I hereby certify that all information submitted in this and all associated documents is complete and accurate to the best of my knowledge and information.

Name: (Print) ______________________ Title: ______________________

Signature: ______________________ Date: ______________________

NON-HAZARDOUS WASTE MANIFEST

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

NON-HAZARDOUS WASTE

GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No.		Manifest Document No.	2. Page 1 of
3. Generator's Name and Mailing Address				
4. Generator's Phone ( )				
5. Transporter 1 Company Name	6. US EPA ID Number		A. State Transporter's ID	
			B. Transporter 1 Phone	
7. Transporter 2 Company Name	8. US EPA ID Number		C. State Transporter's ID	
			D. Transporter 2 Phone	
9. Designated Facility Name and Site Address	10. US EPA ID Number		E. State Facility's ID	
			F. Facility's Phone	

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
a.				
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above	H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

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

Printed/Typed Name	Signature	Date: Month Day Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date: Month Day Year

Please print ~~or type.~~ Non+ (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039.

~~UNIFORM~~ HAZARDOUS WASTE MANIFEST (Continuation Sheet)	21. Generator's US EPA ID No.	Manifest Document No.	22. Page	Information in the shaded areas is not required by Federal law.

23. Generator's Name	L. State Manifest Document Number
	M. State Generator's ID
24. Transporter ___ Company Name / 25. US EPA ID Number	N. State Transporter's ID
	O. Transporter's Phone
26. Transporter ___ Company Name / 27. US EPA ID Number	P. State Transporter's ID
	Q. Transporter's Phone

HM	28. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	29. Containers No.	Type	30. Total Quantity	31. Unit Wt/Vol	R. Waste No.
	a.					
	b.					
	c.					
	d.					
	e.					
	f.					
	g.					
	h.					
	i.					

S. Additional Descriptions for Materials Listed Above	T. Handling Codes for Wastes Listed Above

32. Special Handling Instructions and Additional Information

GENERATOR

TRANSPORTER

33. Transporter ___ Acknowledgement of Receipt of Materials		Date
Printed/Typed Name	Signature	Month Day Year
34. Transporter ___ Acknowledgement of Receipt of Materials		Date
Printed/Typed Name	Signature	Month Day Year

FACILITY

35. Discrepancy Indication Space

American Ecology Corporation

PCB Control Sheet

Generator: ______________________________

Site Address: ______________________________

City, State: ______________________________

EPA ID #: ______________________________

Page: ________ of __________

Manifest #: ______________________________

For American Ecology Use-Only

Load #: ______________________________

Received: ______________________________

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
WSID#	Qty	Pkg	Type of Material	D/F	Manuf	Manifest Line#	Serial# / Unique#/ Drum#	KVA	Weight K	Dielect Vol	PPM	OSD	Category	Absorbents added

Explanation:

1. **WSID#:** US Ecology approved waste stream ID#.
2. **Qty:** Enter quantity. **(Idaho Only)**
3. **PKG:** Enter Packaging type-same as container type on manifest.
4. **Type of Material:** Enter description of material. Be specific.
5. **D/F:** Specify if the transformer or article is full (F), drained (D), or drained and flushed (D/F).
6. **Manuf:** Enter the manufacturer. **(Idaho Only)**
7. **Manifest Line#**: For each item, indicate which line # of the manifest it is shipped on.
8. **Serial#/Unique#:** Enter the nameplate serial number for transformers or articles or a unique number for each container.
8. (Note: If there is no nameplate serial#, you must assign a unique number to each container.)
9. **KVA:** Enter the nameplate KVA rating of the transformer or article.
10. **Weight K:** Enter the weight in kilograms.
11. **Dielect Vol:** Enter the nameplate dielectric volume of the transformer or article.
12. **PPM:** Enter the parts per million PCB contained in the material.
13. **OSD:** Enter the date the material was removed from service and designated for disposal [761.65(a), 761.180(a), 761.207(a)].
14. **Category**: Specify US Ecology Beatty Category (see attachment). **(Beatty Only)**
15. **Absorbents Added:** Specify non-biodegradable absorbents added. **(Beatty Only)**

Certification: In order for US Ecology to accept the waste material specified at the US Ecology-Grand View, Idaho or Beatty, Nevada facility the undersigned as an authorized employee of the generating company hereby warrants and certifies to US Ecology that the waste material listed above, delivered to and accepted for disposal by US Ecology shall conform to the above description and that all waste material and packaging shall comply with all current state and federal regulations.

Signature: ______________________________ Title: ______________________________ Date: ____________________

Note: A completed PCB Control Sheet, including generator's signature, must accompany each shipment of regulated PCB waste.

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number 000297665 FLE

GENERATOR

5. Generator's Name and Mailing Address

Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1.					
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name — Signature — Month Day Year

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month Day Year

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month Day Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)	21. Generator ID Number	22. Page	23. Manifest Tracking Number

24. Generator's Name

25. Transporter ______ Company Name — U.S. EPA ID Number

26. Transporter ______ Company Name — U.S. EPA ID Number

27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers No.	28. Containers Type	29. Total Quantity	30. Unit Wt./Vol.	31. Waste Codes		

32. Special Handling Instructions and Additional Information

GENERATOR

33. Transporter ______ Acknowledgment of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

34. Transporter ______ Acknowledgment of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

TRANSPORTER

35. Discrepancy

36. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

DESIGNATED FACILITY

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC

2012 Waste Tracking Summary Spreadsheet

Waste Package No.	Waste Name	Contract Cost Item No.	Generation Start Date	Waste Package Contents	Waste Package ID Code	Waste Package Quantity (cy, gal, etc.)	Waste Package Gross Weight (lb)	Waste Package Tare Weight (lb)	Waste Package Net Weight (lb)	Waste Profile No.	Manifest/ Bill of Lading No.	Consolidated Container Type	Consolidated Container ID	Current Location	Date In	Date Out	TSDF Destination	ETA Seattle	Treatment Category	Date Received at TSDF	Receipt of Return Manifest from TSDF	Receipt of Certificate of Disposal

Profile Amendment Request Form

_______________________________ hereby requests an amendment to WMI profile #:_______________________
(Contact Name)

to include the following:

Amendment Type: ❑ One Time Only Request (Event) ❑ Permanent Addition to Profile (Base)

❑ Additional Analytical/MSDS to be added to profile (see attached)

❑ Volume Increase (specify volume) ____________ ❑ Tons ❑ Cubic Yards ❑ Drums ❑ Gallons ❑ Other (specify) ____________

❑ Constituent(s) to be added and/or modify current range in chemical composition:

Chemicals or constituents to be added/modify	Low	High	Units

❑ Change current ranges on profile (specify below)

pH Range _____ to _____ Free Liquid Range _____ to _____

❑ Other (specify) ____

____

____

GENERATOR CERTIFICATION

By signing this form, the Generator hereby certifies:
The information provided in this document, the referenced Waste Management Generator's Waste Profile Sheet, and all other referenced documents contain true and accurate descriptions of the waste material. All information regarding known or suspected hazards in the possession of the Generator has been disclosed.

Generator/Customer Signature: ______________________________ Date: ____________________

Company Name: ____

Name (Print): ______________________________ Title: ____________________

FOR WASTE MANAGEMENT USE ONLY

Submitted By: ______________________ Date: ____________ Time: ____________________
(W.M. Initials)

WM Approval: ______________________________ Date: ____________________

Agency Approval Required: ❑ Yes ❑ No

❑ Profile Extension
Original Expiration Date ________________
Requested Extension ________________
New Expiration Date ________________

❑ Analytical Extension
Analytical Due Date ________________
Requested Extension ________________
New Analytical Due Date ________________

Conditions/Precautions: ____

____

____

____

APPENDIX B

Contractor Quality Control Plan

TABLE OF CONTENTS

TABLE

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

Bristol	Bristol Environmental Remediation Services, LLC
CO	Contracting Officer
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control System Manager
DFW	definable feature of work
DQCR	Daily Quality Control Report
NE Cape	Northeast Cape
QAR	Quality Assurance Representative
QC	quality control
SS	Site Superintendent
USACE	US Army Corps of Engineers
AHA	Activity Hazard Analysis

1.0 CONTRACTOR QUALITY CONTROL PLAN

This Contractor Quality Control Plan (CQCP) has been developed by Bristol Environmental Remediation Services, LLC (Bristol), for approval by the US Army Corps of Engineers (USACE), Alaska District, as a control mechanism for the work to be performed for the Northeast Cape (NE Cape) Hazardous, Toxic, and Radioactive Waste Remedial Actions Project at Northeast Cape, St. Lawrence Island, Alaska, under Contract No. W911KB-12-C-0003. This plan outlines the personnel, procedures, tracking controls, records, and forms necessary to maintain quality control (QC) during the project.

1.1 THREE-PHASE QUALITY CONTROL

Bristol implements a three-phase QC system as Standard Operating Procedure. The primary purposes of this system are to plan and schedule work to ensure adequate preparation by Bristol for the initiation of each definable feature of work (DFW) and to ensure adequate coordination and communication between Bristol and the USACE.

The Contractor Quality Control System Manager (CQCSM) is responsible for implementing the three-phase QC system. This system incorporates preparatory, initial, and follow-up phases for each DFW (listed in Section 1.4 of this CQCP). Additional preparatory and initial phases may be added if the quality of work becomes unacceptable, the CQCSM or Site Superintendent (SS) changes, the work on a DFW resumes after a substantial hiatus, other problems develop, or if the USACE requests it. An overview of each phase is provided below.

1.1.1 Preparatory Phase

The preparatory phase is performed before beginning fieldwork on each DFW. This phase occurs after all required plans, documents, and materials have been approved and accepted and after copies of documentation are made available at the work site.

The USACE will be notified at least 48 hours in advance of the beginning of the preparatory phase for each DFW. The CQCSM will conduct a preparatory phase meeting to be attended by the SS, the Crew Foreman, and the USACE Quality Assurance Representative (QAR). The preparatory phase meeting for each DFW will be documented on the Preparatory Phase Meeting Checklist (Attachment 1). The CQCSM is responsible for ensuring that all preparatory phase items are accomplished. The CQCSM letter of authority is provided in Attachment 2. The preparatory phase includes the following items that will be discussed during the preparatory phase meeting:

- Review the general procedures of the applicable DFW. An overview of the work to be performed will be discussed with pertinent personnel.
- Review the drawings and figures (if applicable).
- Check that all materials and/or equipment have been tested, submitted (if applicable), and approved.
- Review the provisions that have been made to provide required QC inspection and testing.
- Examine the work area to ensure that all required preliminary work has been completed and is in compliance with the contract.
- Examine required materials and equipment and sample work to ensure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- Review the appropriate Activity Hazard Analyses (AHAs) to ensure safety requirements are met.
- Discuss procedures for controlling quality of the work, including repetitive deficiencies. Document construction tolerances and workmanship standards for DFWs (if applicable).
- Check that the USACE Contracting Officer (CO) has accepted the portion of the appropriate plan for the work to be performed.
- Discuss the initial control phase.

Work will not begin until all action items identified on the Preparatory Phase Meeting Checklist have been completed and signed off by the CQCSM.

1.1.2 Initial Phase

The initial phase occurs when the fieldwork begins for each DFW. The CQCSM will document the initial phase of each DFW on the Initial Phase Inspection Checklist (Attachment 1). The USACE will be notified at least 24 hours in advance of the beginning of the initial phase for each DFW. The exact field location of the initial phase will be indicated on the checklist for future reference and comparison with the follow-up phase. The initial phase will be repeated if work crews are significantly altered or any time acceptable specified quality standards are not met.

The CQCSM is responsible for ensuring that all initial phase items are accomplished. These include the following:

- Check work to ensure that it is in full compliance with contract requirements. The CQCSM will review the Preparatory Phase Meeting Checklist and any other documentation from the preparatory phase.
- Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing (if applicable).
- Establish with the SS and the Crew Foreman (or other appropriate personnel) the level of workmanship expected for each DFW, and verify that the level meets minimum acceptable standards.
- Resolve differences as discovered or discussed.
- Check that field activities comply with the Site Safety and Health Plan and AHA. Ensure that the Site Safety and Health Officer reviews the AHAs with each worker.

1.1.3 Follow-Up Phase

After the initial phase has been completed and work for a DFW has begun, the CQCSM will perform the follow-up phase. This phase consists of a site visit and completion of the Follow-up Phase Inspection Checklist (Attachment 1), which will be attached to the Daily Quality Control Report (DQCR).

1.1.4 Additional Preparatory and Initial Phases

The CQCSM will conduct additional preparatory and initial phases on the same DFW if the quality of work becomes unacceptable, the CQCSM or SS changes, the work on a DFW resumes after a substantial period of inactivity, other problems develop, or if the USACE requests it.

1.2 COMPLETION INSPECTIONS

1.2.1 Punch-Out Inspection

At the completion of work or at a milestone established in the project schedule, the CQCSM will conduct an inspection of the work and develop a punch list of items that do not conform to the approved plans and specifications. The punch list will be included in the DQCR (Attachment 1) and will contain the estimated dates when the deficiencies will be corrected. After being notified by the SS that any deficiencies have been corrected, the CQCSM will make a second inspection to verify that the deficiencies have been corrected. The results of the second inspection will be included in the DQCR. After the second inspection has been accomplished, the CQCSM will notify the USACE that the project site is ready for the USACE's pre-final inspection.

1.2.2 Pre-Final Inspection

The USACE QAR will perform the pre-final inspection to verify that all Contract Line Item Number work tasks are complete. A USACE pre-final punch list may be developed by the QAR as a result of this inspection. The CQCSM will ensure that all items on this list have been corrected before notifying the QAR, so that a final inspection by the USACE can be scheduled. Bristol will correct any items noted on the pre-final punch list in a timely manner to stay within the project's planned schedule.

1.2.3 Final Acceptance Inspection

The CQCSM, the SS, or the Project Manager and the USACE QAR or Contracting Officer's Representative will attend the final acceptance inspection. Additional government personnel and/or other representatives may also attend. On the basis of results of the pre-final inspection, the CO will formally schedule the final acceptance inspection.

Bristol will give notice to the CO as soon as possible following the pre-final inspection date with assurance that all specific items previously identified as unacceptable, along with all remaining work, will be acceptable and complete by the date of the final acceptance inspection.

1.3 PROCEDURES FOR MEASUREMENT AND PAYMENT

Measurement of work accomplished for payment on this firm-fixed price contract will be achieved in two primary ways: One method will track tasks that are lump sum items, such as the mobilization/demobilization and landfill cap. The second method will track and measure unit-price quantities for any of the options that will be approved by the USACE, such as the disposal cost of additional contaminated soil and miscellaneous debris, drums, and wooden poles. Bristol has submitted a schedule of values to the USACE for the services provided under this contract.

1.4 DEFINABLE FEATURES OF FIELDWORK

A DFW is a uniquely defined field task for the project. The CQCSM will monitor and inspect all DFWs to ensure completion in accordance with the specifications and applicable regulations. DFWs are presented in Table 1-4 in the anticipated progression of work. The actual progression of work may differ from that indicated in the table. Work progression and sequencing will be decided in the field by the SS.

Table 1-4 Definable Features of Work for Contract Line Items

Definable Feature of Work
POL Soil Removal at MOC (Sites 10, 11, 13, 15, 19, and 27), PCB Soil Removal (Sites 13 and 31), and As Soil Removal (Site 21)
Miscellaneous Metal Debris, Wires, Poles, and Drums (sitewide)
Monitored Natural Attenuation Sampling (Site 8) and Groundwater Monitoring (MOC)
Radar Dome Road Sampling
MULTI INCREMENT®[1] Soil Sampling of Bulk Bag Staging Areas and Fuel Containment
Site 28 Sediment Mapping
Site 28 Phase I Sediment Removal and Confirmation Sampling
Removal of POL Liquids and Associated Stained Soil from Site 10
Monitoring Well Abandonment

Notes:
[1]*MULTI INCREMENT*® is a registered trademark of EnviroStat, Inc.

As	=	arsenic	PCB	=	polychlorinated biphenyl
MOC	=	Main Operations Complex	POL	=	petroleum, oil, and lubricants

1.5 DOCUMENTATION

The CQCSM will ensure that current and up-to-date records, documented daily in the DQCR, are maintained to provide factual evidence that required QC activities and/or tests have been performed. The DQCR will contain the following information:

- Contractor/subcontractor and area of responsibility
- Operating equipment with hours worked, idle, or down for repairs
- Work performed each day, including location, description, and subcontractors/work crew involved
- Approximate percent progress of work performed each day
- Job safety evaluations stating what was checked, results, and instructions or corrective actions
- Instructions given or received and conflicts in written plans and/or specifications
- Bristol’s verification statement of completion of work tasks (by activity number)

The DQCR will also provide a description of the weather conditions encountered and any delays experienced. In addition, the DQCR will cover both conforming and deficient information.

The signed original and one copy of the DQCR will be furnished to the USACE QAR and USACE Distribution List daily within 24 hours of the date covered by the report. The DQCRs will not be submitted for days when no work is performed. However, one DQCR, at a minimum, will be prepared and submitted for every 7 days of no work, on the last day of the no-work period. All calendar days will be accounted for throughout the field period of the project. The first DQCR following a day of no work will be for the day worked only.

The DQCRs will be signed and dated by the CQCSM. Each DQCR will include other reports prepared by subcontractors and any subordinate QC personnel, should they be assigned that task. The CQCSM will forward each DQCR daily to the Project Manager in Anchorage for review.

(Intentionally blank)

ATTACHMENT 1

Contractor Quality Control Forms

Daily Quality Control Report

Follow-Up Phase Inspection Checklist

Initial Phase Inspection Checklist

Preparatory Phase Meeting Checklist

Punch-Out Inspection Checklist

EXAMPLE

DAILY QUALITY CONTROL REPORT
ENVIRONMENTAL QUALITY CONTROL/QUALITY ASSURANCE REPORT

(ER 415-1-302)

Contract No. / Delivery Order No.	UPC/Project Title and Location of Work
	Northeast Cape HTRW Remedial Actions. Northeast Cape, St. Lawrence Island, Alaska.

CQC Report Number: NEC 2012-01
Date or Time Period: Date ##, 2012
Client: USACE, Alaska District

Weather Conditions: Clear.

Temp 7:00 am: ##°F

Temp 5:00 pm: ##°F

Winds were calm out of the south.

Quality Control Inspections Performed This Date (Include inspections, results, deficiencies, and corrective action.)

Preparatory: No
Initial: No
Follow-up: No

Environmental Field Sampling and Testing

Has field testing been performed this date? Yes ☐ No ☐ N/A ☐

Type of Test	Method/Matrix	Quantity of Samples	Total
		0	0
		0	0
		0	0
		0	0

Have Data Quality Objectives been achieved? Yes ☐ No ☐ N/A ☒

Have Samples Been Collected for Laboratory Analysis? Yes ☐ No ☐ N/A ☐

Type of Test	EPA Test Method/Matrix	Daily Samples	Total Samples
DRO – Soil	AK102		
RRO - Soil	AK103		
PCBs	EPA8082		

Notes:

Have QA and QC samples been collected in the specified quantity?	Yes ☐	No ☐	N/A ☐
Have samples been properly labeled and packaged?	Yes ☐	No ☐	N/A ☐
Have appropriate QC laboratory tests been ordered? (matrix spikes, method blanks, surrogates, reference standards, etc.)	Yes ☐	No ☐	N/A ☐
Have required amount of QC trip blanks and rinsates been achieved?	Yes ☐	No ☐	N/A ☐

Health and Safety

Worker protection levels this date:	Level C ☐	Level D ☐	
Was any work activity conducted within a confined space?	Yes ☐	No ☐	N/A ☐
Was any work activity conducted within an area determined to be immediately dangerous to life and health?	Yes ☐	No ☐	N/A ☐
Were approved decontamination procedures used on workers and equipment as required?	Yes ☐	No ☐	N/A ☐
Was a Job Safety Meeting held this day?	Yes ☐	No ☐	N/A ☐
Were there any "Lost Time" accidents this day? (If YES, attach copy of completed accident report)	Yes ☐	No ☐	N/A ☐
Was hazardous waste/material released into the environment?	Yes ☐	No ☐	N/A ☐

Safety Comments: (include any infractions of approved safety plan, and include instructions from government personnel. Specify corrective action taken.)

A Health and Safety Meeting was held today. The following topics were discussed:

Safety signature sheet attached to DQCR.

Work Activities Performed This Date

Specification or Contract Reference	Activity and Location
	1.

Manpower and Equipment

Labor Classification	Number	Hours	Equipment Type	Number	Hours Used
Proj. Mgr.—Molly Welker	1		White GMC Crewcab, Gas, Long Box w/gas Service Tank	50-115	1 Day
C.I.H.—Clark Roberts			White Chevy, Duramax Diesel, Crewcab, Short Box w/cover.	50-134	1 Day
Site Supt./SSHO—Chuck Croley	1		White Chevy 2500, Extended Cab, Gas, Short Box w/diesel Service Tank.	50-137	1 Day
CQCSM—Russell James	1		White Chevy, Extended Cab, Gas, Long Box, w/black rack	50-142	1 Day
Op./Foreman—Maze Thompson	1		White Chevy Blazer. Gas	50-166	1 Day

Labor Classification	Number	Hours	Equipment Type	Number	Hours Used
Mechanic—	1		White GMC Diesel, (BDBL) Crewcab, Longbed w/white rack	50-169	1 Day
Oiler—	1		Red GMC, Crewcab, Long Box Diesel	50-171	Down
Admin Assistant—	1		Ottawa Yard Goat, 5th wheel tractor	50-320	1 Day
Bear-guard/Laborer—	1		International S4700 Fuel/Lube Truck	50-205	1 Day
Operator -Allen Dennis	1		Ford F700 Mechanic Truck w/compressor, Welder, & Hyd Boom	50-206	1 Day
Laborer -	1		Kaiser Jeep 6X6 Cargo Truck w/water Tank	50-322	1 Day
Laborer -	1		Cat 988B Loader w/bucket & Forks	50-505	1 Day
Laborer -	1		Cat 160H Motor Grader	50-702	1 Day
Landfill Cap Operator-	1		Cat 460TH Extended Boom Forklift	50-806A	1 Day
Landfill Cap Operator-	1		Cat D6T Dozer	NC 27A16095	1 Day
Landfill Cap Operator-	1		Cat D8N Dozer	51-107	1 Day
Operator-	1		Arctic Cat Side by Side	50-923	1 Day
Landfill Driver-	1		Arctic Cat Side by Side	50-924	1 Day
Replacement Mechanic-			Cat 322BL Excavator	51-207	1 Day
Environ. Sampler-Eric Barnhill	1		IR Light Tower	52-128	1 Day
Hazardous Waste Specialist-Tyler Ellingboe			IR Light Tower	52-130	1 Day
			Frost Fighter Heater	52-206	1 Day
			IR 60KW Generator	52-210	1 Day
			Volvo 330L Loader/Forklift		1 Day
			Volvo A40D Rock Truck	DTO 552	1 Day
			Volvo A40D Rock Truck	DTO 553	1 Day
			287B Skid Steer	26A15295	1 Day
			287B Skid Steer	25W52289	1 Day
			Compressor w/engine (Mechanics Truck)		1 Day
			Welder (Mechanics Truck)		1 Day
			Compressor w/engine (Fuel/Lube Truck)		1 Day
			DeWalt Compressor w/engine		1 Day
			DeWalt electric compressor		1 Day
			DeWalt electric compressor		1 Day
			DeWalt Generator	Environ #1	1 Day
			DeWalt Generator	Environ #2	1 Day
			Generac Generator 6KW		1 Day
			Zaxis 120 Excavator	CMI-HE1262	1 Day
Totals			***Totals***		

Labor Classification	Number	Hours	Equipment Type	Number	Hours Used
Subcontractor			**Equipment**		
Totals	4				

Subcontractor			**Equipment**		
Totals					

Fairweather			**Equipment**		
Medic-			Medical Clinic	1	1 Day
Medic-					
Medic-					
Totals					

Global Services			**Equipment**		
Cook-			75 KW Generator		1 Day
Baker-			Camp Facility		1 Day
Bull Cook-					
Totals					

Subcontractor			**Equipment**		
Totals					

Materials Received to be Used on or Incorporated into Site

Instructions Given by QAR to Bristol (include names, reactions, and remarks.)

Instructions Given by Bristol to Subcontractors (include names, reactions, and remarks.)

Work Progress

Are there any Contractor-caused delays or potential finding of fact? Yes ☐ No ☒

Are there any Government-caused delays or potential finding of fact? Yes ☐ No ☒

Are there any unforeseeable or weather-related delays? Yes ☐ No ☒

Progress Tracking Table

PROJECT SUMMARY TO DATE			
Item	Today's Total (Units)	Previous Total	Project Total
Material Hauling - Volvo A40D Rock Trucks – (DTO 552)			
Material Hauling - Volvo A40D Rock Trucks – (DTO 553)			
POL Soil Excavation			
Site 13 PCB Soil Excavation			
Site 21 Arsenic Soil Excavation			
Site 31 PCB Soil Excavation			
Wooden Pole Stumps			
Wire and Miscellaneous Debris			
POL Liquids			
Metal Drums			
Intact Batteries			
Broken Batteries			

Comments/Remarks:

Definable Feature of Work	Progress
Soil Removal	
Miscellaneous Metal Debris, Wires, Poles and Drums	
Site 28 Sediment Mapping	
MNA at the MOC and Site 8	

Comments/Remarks (include any visitors to project and miscellaneous remarks pertinent to work):

Contractor's Verification: On behalf of the Contractor, I certify that the above report is complete and correct and that all materials and equipment used, work performed, and tests conducted during this period were in strict compliance with the contract plans and specifications, to the best of my knowledge, except as noted above.

CQCSM Signature Date

Site Superintendent Signature Date

Government Quality Assurance Comments

Was QA testing performed this day? Yes ☐ No ☐ N/A ☐

Concurs with the QC report? Yes ☐ No ☐ N/A ☐

Additional comments or exceptions:

QAR Signature **Date** **Supervisor's Initials** **Date**

Follow-up Phase Inspection Checklist

Contract No.: ________________________________ Date: ________________

Contract Title: 2012 Northeast Cape HTRW Remedial Actions

Definable Feature of Work: ____

Specification Section: ________ Review Completed: _________ Approval Obtained: ________

Location of Inspection: ____

Deficiencies Noted:

Corrective Action Taken:

CQCSM Date

QAR Date

Original and one copy to _______ QAR.

Retain copy in Bristol field project file.

Forward completed copy to Bristol QC Manager.

Initial Phase Inspection Checklist

Contract No.: ________________________________ Date: ________________

Contract Title: 2012 NE Cape HTRW Remedial Actions

Definable Feature of Work: ____

Specification Section: ________ Review Completed: _________ Approval Obtained: ________

Personnel Present		
Name	**Position**	**Organization**
1.		
2.		
3.		
4.		
5.		
6.		
7.		

(List additional personnel on reverse side)

B. Are materials being used in compliance with the contract plans and specifications?

Yes _______ No _______ If not, explain: ____

____

C. Are procedures and/or work methods in compliance with approved shop drawings, plans and specifications?

Yes _______ No _______ If not, explain: ____

____

D. Is workmanship acceptable?

Yes _______ No _______ Indicate areas of needed improvement (attach extra sheet).

E. Safety violations and corrective action taken:

____

CQCSM Date

____

QAR Date

Original and one copy to _______, QAR.

Retain copy in Bristol field project file.

Forward completed copy to Bristol QC Manager.

Preparatory Phase Meeting Checklist

Contract No.: Date: ________________

Contract Title: 2012 NE Cape HTRW Remedial Actions

Definable Feature of Work: ____

Specification Section: ________ Review Completed: _________ Approval Obtained: ________

Personnel Present		
Name	**Position**	**Organization**
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

(List additional personnel on reverse side)

Submittals Involved		
Number and Item	**Reviewed**	**Approval Code/Remarks**
1.		
2.		
3.		
4.		
5.		

(List additional items on reverse side)

Have all items been approved? Yes _______ No _______

Are all materials on hand? Yes _______ No _______

Tested? Yes _______ No _______

Reviewed? Yes _______ No _______

Properly Stored? Yes _______ No _______

Preparatory Phase Meeting Checklist

Items not on hand in accordance with submittals	
1.	4.
2.	5.
3.	6.

Tests required in accordance with contract requirements	
Test	**Paragraph**
1.	
2.	
3.	

Has all preliminary work been completed in accordance with the specifications?

Yes ______ No ______

Accident prevention pre-planning topics:

1. ____________________
2. ____________________
3. ____________________

Equipment safety checklists:

Attached for:

1. ____________________
2. ____________________
3. ____________________

On-file for:

1. ____________________
2. ____________________
3. ____________________

Required Workmanship Levels:

1. ____________________
2. ____________________
3. ____________________

Remarks (attach extra sheet if needed):

Preparatory Phase Meeting Checklist

Sequence of Work			
Control Point	Project Plan Reference	Type of Inspection	Acceptance Criteria

CQCSM Date

USACE QAR Date

Original and one copy to USACE QAR.
Retain copy in Bristol field project file.
Forward completed copy to Bristol QC Manager.

Punch-Out Inspection Checklist

Contract No.: Date: ________________

Contract Title: 2012 NE Cape HTRW Remedial Actions

Definable Feature of Work: ____

Specification Section: ________ Review Completed: _________ Approval Obtained: ________

Location of Inspection: ____

Deficiencies Noted:

Corrective Action Taken:

____
CQCSM Date

____
QAR Date

Original and one copy to _______, QAR.

Retain copy in Bristol field project file.

Forward completed copy to Bristol QC Manager.

ATTACHMENT 2

CQCSM Letter of Authority

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

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

May 14, 2012

Mr. Russell James
Bristol Environmental Remediation Services, LLC
111 W. 16th Avenue, Third Floor
Anchorage, Alaska 99501

RE: Contractor Quality Control System Manager Letter of Direction
Northeast Cape HTRW Remedial Actions
Northeast Cape, St. Lawrence Island, Alaska
U.S. Army Corps of Engineers Contract No. W911KB-12-C-0003

Dear Mr. James:

This letter outlines your responsibilities as the Contractor Quality Control System Manager (CQCSM) for the above-referenced project. As the CQCSM, you have the authority and responsibility to implement and maintain the project Contractor Quality Control Plan and supervise quality control personnel who may be assigned to assist you. Your presence is required at the project site during all fieldwork activities.

You have the authority, responsibility, and organizational freedom to identify quality problems in the project; to initiate, recommend, and provide solutions; and to verify implementation of those solutions. In addition, you have the authority and responsibility to reject and stop all work that does not conform to the project specifications and contract requirements.

Should you have any questions concerning these duties, please contact me immediately.

Sincerely,

Bristol Environmental Remediation Services, LLC

Molly Welker
Project Manager

Acknowledged,

Russell James

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

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

June 25, 2012

Mr. Eric Barnhill
Bristol Environmental Remediation Services, LLC
111 W. 16th Avenue, Third Floor
Anchorage, Alaska 99501

RE: Contractor Quality Control System Manager Letter of Direction
Northeast Cape HTRW Remedial Actions
Northeast Cape, St. Lawrence Island, Alaska
U.S. Army Corps of Engineers Contract No. W911KB-12-C-0003

Dear Mr. Barnhill:

This letter outlines your responsibilities as the Contractor Quality Control System Manager (CQCSM) for the above-referenced project. As the CQCSM, you have the authority and responsibility to implement and maintain the project Contractor Quality Control Plan and supervise quality control personnel who may be assigned to assist you. Your presence is required at the project site during all fieldwork activities.

You have the authority, responsibility, and organizational freedom to identify quality problems in the project; to initiate, recommend, and provide solutions; and to verify implementation of those solutions. In addition, you have the authority and responsibility to reject and stop all work that does not conform to the project specifications and contract requirements.

Should you have any questions concerning these duties, please contact me immediately.

Sincerely,

Bristol Environmental Remediation Services, LLC

Molly Welker
Project Manager

Acknowledged,

Eric Barnhill

APPENDIX C

Accident Prevention Plan/
Site Safety and Health Plan

TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
Bristol	Bristol Environmental Remediation Services, LLC
Btu/hr	British thermal units per hour
CEO	Chief Executive Officer
CFR	Code of Federal Regulations
COC	contaminants of concern
CPR	cardiopulmonary resuscitation
EEO	Equal Employment Opportunity
EM	Engineer Manual
EMT	Emergency Medical Technician
HSM	Health and Safety Manager
MSDS	Material Safety Data Sheet
NE Cape	Northeast Cape
OSHA	Occupational Safety & Health Administration
PAD	Physical Agent Data Sheet
PCB	polychlorinated biphenyl
PM	Project Manager
POL	petroleum, oil, and lubricants
PPE	personal protective equipment
SS	Site Superintendent
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TLV	threshold limit value
USACE	US Army Corps of Engineers
UV	ultraviolet

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SIGNATURE PAGE

PLAN PREPARATION

Clark Roberts, Certified Industrial Hygienist (CIH), has reviewed this Accident Prevention Plan in accordance with the guidance and requirements of the US Army Corps of Engineers Engineer Manual 385-1-1, 2008 edition.

Clark Roberts, CIH Health and Safety Manager, 210-863-9445	July 19, 2012 Date

APPROVALS

By their signatures, the undersigned approve this Accident Prevention Plan and the attached Site Safety and Health Plan.

Clark Roberts, CIH Health and Safety Manager	July 19, 2012 Date
Steve Johnson Chief Executive Officer	July 19, 2012 Date

CONCURRENCE

By their signatures, the undersigned concur with this Accident Prevention Plan and the attached Site Safety and Health Plan.

Molly Welker Project Manager	July 19, 2012 Date
Chuck Croley Site Superintendent/Site Safety and Health Officer	July 19, 2012 Date

(Intentionally blank)

1.0 BACKGROUND INFORMATION

1.1 CONTRACTOR

Bristol Environmental Remediation Services, LLC (Bristol)

1.2 CONTRACT NUMBER

W911KB-12-C-0003

1.3 PROJECT NAME

Northeast Cape HTRW (hazardous, toxic, and radioactive waste) Remedial Actions

1.4 PROJECT DESCRIPTION

Section 2.0 of the Work Plan includes a description of the site; Section 3.0 and Section 4.0 of the Work Plan include a description of site activities.

(Intentionally blank)

2.0 STATEMENT OF SAFETY AND HEALTH POLICY

Bristol

INDUSTRIES

SAFETY POLICY

Bristol Industries is committed to maintaining a safe environment under all working conditions. Our goal is to achieve zero accidents with every job and with all work conducted for the company. Our commitment to this goal relies on the skills and attitude of every employee to exercise safe working practices. Our company's *Occupational Health and Safety Manual* presents basic information for conducting business in a safe manner. It is expected that, on condition of employment, every employee be familiar with the contents of this Manual and apply the information in a practical and competent manner. It is essential to the success of the company that all employees are committed to maintaining their safety and that of their co-workers.

Joe Terrell

Joe Terrell
Chief Executive Officer

October 22, 2005
Date

(Intentionally blank)

3.0 RESPONSIBILITY AND LINES OF AUTHORITY

3.1 STATEMENT OF EMPLOYER'S ULTIMATE RESPONSIBILITY

A primary objective of Bristol is to promote the safety and well-being of its employees as a high priority in daily operations. We are committed to providing a workplace that assesses hazards and known dangers, and to properly preventing or controlling any recognized hazards to reduce injury, illness, or death.

Bristol's policy is based on the following statements:

- Working safely is a condition of employment with Bristol. This requirement applies to workers and subcontractors.
- Each employee is responsible for safe work practices in compliance with safety policies and procedures and for reporting hazards and accidents.
- Each employee is responsible for preventing injuries. Bristol believes all injuries are preventable.
- All hazards are controllable; no employee is expected to take unnecessary risks.
- Bristol maintains a drug-free workplace. Alcohol and/or illegal drugs are prohibited on Bristol property and operations at all times.
- Management is responsible and accountable for the proper implementation of federal, state, and local occupational safety, health, and environmental regulations.
- Employees must notify management of any unsafe condition or procedure encountered on the job.
- Management will discuss specific job hazards with each employee and enforce safe work practices.
- Training employees to work safely is essential.
- Employees and management staff must take reasonable efforts to protect the property and assets of clients and of Bristol.
- Safety must take precedence over expediency or shortcuts.
- Our goal is to achieve zero accidents on this project and with all work conducted on Bristol projects.
- Subcontractors performing work on behalf of Bristol, or in Bristol facilities, are required to follow Bristol health and safety procedures and practices.

3.2 IDENTIFICATION AND ACCOUNTABILITY

Chief Executive Officer (CEO)

Steve Johnson is responsible for the company safety and health program and has direct oversight of all projects and their management teams.

Project Manager (PM)

Molly Welker, PM, is responsible for ensuring that 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.

Corporate Health and Safety Manager (HSM)

Clark Roberts, Certified Industrial Hygienist, is responsible and accountable for ensuring on-site activities are performed in accordance with the requirements of this project.

Site Safety and Health Officer (SSHO)

Charles ("Chuck") Croley is responsible and accountable for providing the day-to-day safety coverage on site. Any safety issues that may arise will be brought to the attention of the Site Superintendent (SS), and a determination will be made as to what action needs to take place.

3.3 COMPETENT / QUALIFIED PERSONS

Required qualifications for competent and/or qualified persons for specific trades and tasks are identified in Activity Hazard Analysis (AHA) forms for definable features of work (Attachment 3). The required qualifications for the SSHO are identified in Attachment 2.

3.4 COMPETENT PERSON REQUIREMENTS

No work will be performed unless a designated competent person is present at the job site.

3.5 PRE-TASK PLANNING

All phases of work that involve a type of work presenting hazards not experienced in previous project operations, or for which a new crew or subcontractor is to perform the work, will require a Pre-task Safety and Health Analysis before work begins.

3.6 LINES OF AUTHORITY

Corporate/Regional Safety Manager

The Corporate Safety Manager is responsible for implementing Bristol's Safety and Health Policies and overseeing effective implementation of safety programs across the company. This individual is also responsible for overseeing and providing required training necessary to serve individual project locations and provide an effective safety program on a company-wide basis. The individual appointed to this position is Clark Roberts. Mr. Roberts is directly responsible to the company Chief Executive Officer (CEO), Steve Johnson.

Regional Program Manager

The Regional Program Manager is responsible for all construction and project operations conducted throughout Bristol. This individual is responsible for supervising the development and implementation of site safety programs that comply with company safety policies, as well as those mandated by specific contract documents and site requirements. The individual serving in this capacity is Patricia Curl. Ms. Curl is responsible to the company CEO through the company's senior leadership team.

Field Manager

The Project Field Manager has primary responsibility for establishing a properly functioning project safety program, with the assistance of the Bristol Safety Department. The Field Manager is responsible for construction operations on this project. This individual is responsible for supervising construction to ensure that the project is completed safely. The individual appointed to this position is Chuck Croley, who is responsible to the Regional Program Manager.

Site Safety and Health Officer

The SSHO is responsible for developing, supervising, and implementing the site safety program for this project. This individual is responsible for all aspects of site safety associated with the performance of work under this contract. The individual appointed to this position is Chuck Croley, who is directly responsible to the Regional Program Manager and Regional Safety Manager to ensure the site safety program is implemented properly, effectively, and in accordance with governing laws, codes, and standards. The safe operation of all site workers, including subcontractors and suppliers, will come under the direction of the SSHO.

Construction Quality Control Manager

The Construction Quality Control Manager is responsible for recording and documenting all safety and health paperwork on a daily basis and for reporting all meetings, trainings, and deficiencies to the US Army Corps of Engineers (USACE) representatives. The individual appointed to this position is Russell James, who reports directly to the CEO.

3.7 POLICY AND PROCEDURES FOR NONCOMPLIANCE

The Bristol policy for noncompliance with the Accident Prevention Plan (APP) or any other regulation is as follows:

- First violation – Verbal warning and attendance at a reorientation by the employee(s) and their supervisor or/and crew.
- Second violation – Written warning and attendance at a reorientation by the employee(s), their project team.
- Third violation – Removal from site and attendance at a reorientation by the project crew and a senior-level officer of the company.

Under conditions of imminent danger to life and/or serious safety violation, the Bristol Project Team will bypass the above-written steps and enact the warranted enforcement (days off and/or removal from the project site, to include a reorientation).

3.8 MANAGER AND SUPERVISOR ACCOUNTABILITY

Bristol strongly encourages safety accountability from its managers and supervisors. The Bristol policy for managerial noncompliance with the APP or any other regulation is as follows:

- First violation – Verbal warning and attendance at a reorientation.
- Second violation – Written warning and attendance at a reorientation.
- Third violation – Removal from site.

Under conditions of imminent danger to life and/or serious safety violation, the Bristol Project Team will bypass the above-written steps and enact the warranted enforcement (days off and/or removal from the project site).

(Intentionally blank)

4.0 SUBCONTRACTORS AND SUPPLIERS

4.1 IDENTIFICATION OF SUBCONTRACTORS AND SUPPLIERS

Primary subcontractors will include the following:

Subcontractor	Assignment
Bering Air	Aircraft charters
ECO-LAND, LLC	Surveying
Fairweather, LLC	Infirmary and emergency medical services
Global Services, Inc.	Camp services
Northland Services	Marine transportation
Security Aviation	Aircraft charters
TestAmerica Laboratories, Inc.	Fixed-based analytical testing laboratory
Waste Management, Inc.	Solid, RCRA and TSCA soil disposal

Notes:
RCRA = Resource Conservation and Recovery Act
TSCA = Toxic Substances Control Act

4.2 SAFETY RESPONSIBILITIES OF SUBCONTRACTORS AND SUPPLIERS

All subcontractors and suppliers performing work on site or providing materials to the site are controlled by the project team. Suppliers are generally controlled by the Quality Manager and PM, through the material submittal and approval process, while subcontractors are controlled more directly. Subcontractors are controlled directly by the Field Manager and coordinated by the direction provided during the conduct of construction operations. Control and coordination of subcontractors is accomplished through daily management, reporting processes, weekly subcontractor coordination meetings, and monthly supervisor safety meetings.

All subcontractors, suppliers, and visitors will sign in at the Bristol site office for an orientation prior to proceeding for any activity. Signage will be posted directing these parties to the site office. Failure to follow the sign-in policy may result in removal from the site.

All subcontractors will comply with the applicable portions of this APP as a condition of work. Each subcontractor will have a competent person for its work and will appoint an "On-Site Safety Manager" who will be responsible for safety compliance at all times. Safety Managers will report to the Bristol SSHO. Subcontractors and suppliers will not be allowed to enter work zones until they have met the requirements of the APP and have been properly briefed by the SSHO or the designee.

5.0 TRAINING

5.1 First-Day, First-Hour Orientation

Before each employee (Bristol and subcontractor) begins his or her first day on the job, he/she will be required to attend a Site-Specific Safety Orientation. This orientation will include an overview of the project APP. Other topics will include hazard communication, soil excavation, smoking policy, hours of operation, and other site-specific policies and rules. The safety orientation will be conducted by on-site Bristol project management. All visitors will be required to attend an orientation and to be accompanied by an escort while on the project site.

5.2 Mandatory Training

Training will be conducted for the employee(s) according to scope of work and exposure.

First-aid	Initial, every 3 years
Cardiopulmonary resuscitation (CPR)	Annually
Bloodborne pathogens	Initial
Occupational Safety & Health Administration (OSHA) 10/30	Initial, every 5 years
Motor vehicle	Initial (to follow state and/or federal requirements)
Hazard communication	Initial and when required due to violation of practice
Utility Vehicle	Initial

5.3 Periodic Safety and Health Training

Toolbox Talks and Pre-Task Planning

Safety awareness will be implemented through safety meetings, “Toolbox Talks,” and one-on-one discussions. All Bristol and subcontractor field personnel are required to attend daily Toolbox Meetings. A copy of the Toolbox Safety Meeting Record form that will be used to document these meetings is included in Attachment 5. Updates concerning work practices and hazards, emergency evacuation routes, and emergency procedures will be addressed.

Pre-task planning will be performed before each new task begins. These planning sessions will be held by the Field Manager and the subcontractor responsible for the safety of workers in a crew. Safety will be reviewed for all operations planned for that workday.

5.4 EMERGENCY RESPONSE TRAINING

Supervisors, including foremen, are expected to have first-aid/CPR training. Because Bristol requires supervision on site at all times, at least one person from Bristol and one from a subcontractor trained in first aid/CPR should be on site at all times. Emergency telephone numbers and evacuation routes will be posted on site. A first-aid kit will be available in an accessible location. During orientation and periodically during safety meetings, all personnel will be instructed on the location of the first-aid kit and will be trained in first-aid procedures in the event of an emergency, including spills.

Job Site Posting Requirements

The following items are required to be posted conspicuously at all project sites.

- Bristol Emergency Phone Number Form
- Job Safety Health Protection poster
- Equal Employment Opportunity [EEO] is the Law poster
- U.S. Department of Labor Employment Standards poster
- Bristol Drug Policy Statement
- Bristol Sexual Harassment Policy Statement
- Bristol EEO Policy Statement
- Davis-Bacon Wages
- Notice for Project Safety poster
- All In One Federal Law poster
- Required state posters
- Family and Medical Leave Act of 1993
- Blood Borne Pathogens poster

6.0 SAFETY AND HEALTH INSPECTIONS

6.1 Specific Assignment of Responsibilities

No specific assignments are required or anticipated for this project.

6.2 Internal Inspections / Certifications

Internal safety inspections will be performed daily by the SSHO or SSHO alternate. Daily inspection logs (Attachment 5) will be included in the Daily Quality Control Report.

(Intentionally blank)

7.0 ACCIDENT AND SAFETY REPORTING

7.1 EXPOSURE DATA

Bristol will provide a monthly record of all exposure and accident experience incidental to the work on the USACE Monthly Record of Work-Related Injuries/Illnesses & Exposure form that is submitted to the Contracting Officer's Representative. All project-related work hours have been and will continue to be tracked on Daily Quality Control Reports

7.2 ACCIDENT INVESTIGATIONS

Accidents that result in minor first-aid treatment will be reported verbally to the SSHO and recorded in the first-aid log maintained at the Bristol site office.

Bristol will thoroughly investigate any accident and submit the findings of the investigation, along with appropriate corrective actions, to the USACE Contracting Officer.

Any accident or incident beyond first aid (a recordable event as defined by OSHA) or resulting in any property damage will be reported verbally and in writing to the Contracting Officer within a 24-hour period by using the USACE Pacific Ocean Division (POD) Form 265-E, Immediate Report of Accident, in Attachment 5.

USACE Engineer (ENG) Form 3394 will be completed and submitted within 5 days for injuries/illnesses beyond first aid or for property damages of $2,000 or more. This form is located in Attachment 5.

The SSHO or the PM will contact the nearest OSHA office within 8 hours of being notified of an occupational fatality or multiple injuries (Title 29, Code of Federal Regulations, Part 1904.39 [29 CFR 1904.39]). The contact phone number is 1-800-321-OSHA (6742).

7.3 IMMEDIATE NOTIFICATION

The following require immediate accident notification:

- A fatal injury

- A permanent total disability
- A permanent partial disability
- The hospitalization of three or more people resulting from a single occurrence
- Property damage of $200,000 or more

Bristol's corporate reporting requirements are as follows:

- Reporting of work-related fatality: The SS will report a work-related fatality as soon as possible after becoming aware of it, but no later than 4 hours after the fatality. The SS is required to report the fatality to the Bristol PM and the Corporate HSM. If the SS is unable to report the fatality, the SSHO will report the fatality. If either the PM or the Corporate HSM is unavailable, the fatality must be reported to the Bristol CEO.
- Reporting of work-related hospitalization: The SS will report a work-related injury requiring hospitalization as soon as possible after becoming aware of it, but no later than 4 hours after the hospitalization. The SS is also required to report the hospitalization to the Bristol PM and the Bristol HSM.
- Reporting of work-related injury or illness: The SS will report all lost-time injuries or illnesses to the Bristol PM and the Bristol HSM as soon as possible, but no later than 8 hours after becoming aware of the injury or illness.
- Bristol personnel will provide notifications to state or federal agencies. As previously indicated, the federal OSHA reporting telephone number is 1-800-321-OSHA (6742).
  - The OSHA Form 300, Log of Work-Related Injuries and Illnesses, is maintained at the project site by the SSHO. Each recorded injury or illness is entered in the log within 6 days after notice that a recorded case has occurred (29 CFR 1904.29). If an accident or incident should occur, the SSHO is responsible for making sure all reports are completed.

- The response provided for a given accident should be evaluated depending on the potential impact to the employee, project, and corporation and adjusted accordingly.

Near Miss

For any near misses, the Bristol Incident Report will be completed and immediately forwarded to the persons noted on the report. The report is to be completed for subcontractor as well as Bristol near misses.

(Intentionally blank)

8.0 PLANS, PROGRAMS, AND PROCEDURES REQUIRED BY THE SAFETY MANUAL

8.1 LAYOUT PLAN

A site map with the investigation area is provided in the Work Plan.

8.2 EMERGENCY RESPONSE PLAN

Evacuation might take place during a fire, natural disaster, or national emergency. The SS will ensure all on site are accounted for after evacuation off the site.

8.2.1 Procedures and Testing

All Bristol and subcontract workers will be briefed on evacuation procedures. Emergency contact numbers will be posted on site.

8.2.2 Spill Plans

The spill prevention program is outlined in the Spill Prevention, Control, and Countermeasures (SPCC) Plan, which is Appendix E of the Work Plan.

8.2.3 Firefighting Plan

Firefighting services are not available at the Northeast Cape (NE Cape) site. In the event of a fire within the camp, Bristol personnel will use water hoses and fire extinguishers to extinguish small fires when the size or magnitude of the fire does not compromise the safety of personnel. Under no circumstances will personnel be allowed to enter burning structures or potentially endanger themselves during fire responses. Any fire conditions that appear to be beyond the limited capabilities of Bristol personnel will result in an evacuation of the immediate area as discussed in Section 1.13.6 of the Site Safety and Health Plan (SSHP) (Attachment 1).

General firefighting procedures are as follows:

- Water from existing utilities will be used as needed and if appropriate for the type of fire.

- Portable fire extinguishers will be provided and maintained according to USACE Engineer Manual EM 385-1-1.
- Heavy equipment will be equipped with dry chemical or CO_2 fire extinguishers with a minimum rating of 10-B-C in accordance with EM 385-1-1, Section 18.G.23.

8.2.4 Posting of Emergency Telephone Numbers

Organization / Personnel	Phone Number
Physician's Assistant	Radio contact
USACE Project Manager – Carey Cossaboom	907-753-2689
Northeast Cape Medical Clinic	Radio contact
Bering Air	907-443-5464
Bristol Project Manager – Molly Welker	907-244-7784
Site Superintendent – Chuck Croley	Radio contact
Alternate Site Superintendent – Maze Thompson	Radio contact
Bristol Chief Executive Officer – Steve Johnson	907-250-4955
Corporate Safety and Health Manager – Clark Roberts	210-863-9445
Site Safety and Health Officer – Chuck Croley	Radio contact
Alternate Site Safety and Health Officer – Russell James	Radio contact

8.2.5 Man Overboard

Man overboard prevention provisions are not applicable.

8.2.6 Medical Support and Response

Medical assistance will be limited at the NE Cape site. A medical clinic with a full-time Emergency Medical Technician (EMT) III/Paramedic will be established at the site. The EMT will be available at all times during site work. First-aid kits will be available in trucks on site and at other site locations.

If a medical emergency is beyond the capability of Bristol and island personnel to remedy, a medevac will be initiated by the EMT and coordinated with hospital services in Nome. Workers will be instructed to contact emergency assistance through company radios and satellite phones. The EMT will be given information about the contaminants of concern

(COCs) on site before the beginning of work. Emergency evacuation routes will be discussed in the daily safety meetings.

8.3 PLAN FOR THE PREVENTION OF ALCOHOL AND DRUG ABUSE

Bristol's employees are the company's most valuable resource and, for that reason, employees' health and safety are of paramount concern. Bristol will not tolerate any drug or alcohol use or abuse, which imperils the health and well-being of its employees or threatens its business. Employees who use illegal drugs or abuse other controlled substances or alcohol, on or off duty, tend to be less productive, less reliable, and prone to greater absenteeism, resulting in the potential for increased costs, delay, and risk to the company's business. Employees have the right to work in a drug-free environment and to work with persons free from the effects of drugs.

Bristol, therefore, has committed to maintaining a safe workplace free from the influence of alcohol and drugs. In addition, Bristol is committed to compliance with the requirements of the Drug-Free Workplace Act of 1988, 41 U.S. Code, Section 701, and the Drug-Free Workforce Interim Rule promulgated by the United States Department of Defense. The Bristol Drug and Alcohol Testing Policy is included as Attachment 6.

8.4 SITE SANITATION PLAN

Housekeeping

All work areas will be kept clean and orderly. Housekeeping will be done on a regular basis. All garbage and waste materials will be removed from the site in a timely manner and disposed of appropriately.

The accumulation of rags and other combustible materials in uncontrolled areas is prohibited. Flammable liquids will only be stored in approved containers and locations. Access routes, particularly emergency access routes, will be free of all obstructions. Failure to comply with the combustible and flammable storage and emergency access requirements of this section will be considered an imminent danger, resulting in immediate cessation of affected operations until acceptable conditions are met.

Site Sanitation

Sanitation will be facilitated as follows:

- Drinking water – in accordance with EM 385-1-1, Section 02.C; source – commercially available bottled water supplemented with filtered and treated water from the Suqitughneq River
- Toilet facilities – in accordance with EM 385-1-1 Section 02.E
- Washing facilities – separate men's and women's shower facilities; water facilities – provided with the portable water container for hand washing
- Waste disposal – bag all nonhazardous trash and transport to waste Conex at end of each workday for incineration
- Vermin control – in accordance with EM 385-1-1, Section 02.L
- Waste storage – waste Conex

8.5 Access and Haul Road Plan

Not applicable for this project.

8.6 Respiratory Protection Plan

The use of respiratory protective equipment, other than disposable dust masks, by a Bristol employee is a non-routine task. Respirators will only be used when it is not possible to clear the air through other methods. Respirators will be used in accordance with this program and applicable law. Attachment 7 of the Work Plan includes information on Bristol's Respiratory Protection Program. Use of respirators is not anticipated for the project.

8.7 Health Hazard Control Program

Section 1.3 of the SSHP details potential health hazards. Task-specific hazards are identified in Section 1.4 of the SSHP.

General Chemical Hazards

Previous remedial investigations conducted at the NE Cape site identified several COCs that may present an exposure hazard to site personnel performing a variety of activities at the site. The COCs are polychlorinated biphenyls (PCBs), metals, and weathered petroleum products: diesel fuel and lubrication oils. The contaminants are in the soil and water matrices and pose minimal inhalation hazard at the ambient temperatures of the arctic summer.

The OSHA Permissible Exposure Limits (PELs) and threshold limit values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH) have been identified in this SSHP for COCs that could present industrial hygiene hazards to workers at the NE Cape site. Where there are differences between exposure limits set by these two entities, Bristol will comply with the more restrictive limit(s).

Petroleum, oil, and lubricants (POL) used for support of the operation will consist of fuels, diesel and gasoline, lubricating oils, and solvents. The Material Safety Data Sheets (MSDSs) will be on site for all of the products used on the project. All fuels will be stored in and dispensed from approved containers.

Appropriate personal protective equipment (PPE) will be worn during all arsenic excavations. Arsenic-contaminated soils will be damp/wet in order to eliminate the opportunity for inhalation due to airborne soil particles.

Table 1-1 Project Chemical Exposure Limits

Chemical	OSHA Exposure Limit (PEL)	ACGIH Exposure Limit (TLV)
POL	5 mg/m^3 (TWA) (oil mist)	5 mg/m^3 (TWA)
PCB (42%)	1 mg/m^3 (TWA)	1 mg/m^3 (TWA)
PCB (54%)	0.5 mg/m^3 (TWA)	0.5 mg/m^3 (TWA)
Arsenic	10 µg/m^3 (TWA)	10 µg/m^3 (TWA)

Notes:

ACGIH	=	American Conference of Governmental Industrial Hygienists	PEL	=	Permissible Exposure Level
µg/m^3		micrograms per cubic meter	POL	=	petroleum, oil, and lubricants
mg/m^3	=	milligrams per cubic meter	TLV	=	threshold limit value
OSHA	=	Occupational Safety & Health Administration	TWA	=	8-hour time-weighted average
PCB	=	polychlorinated biphenyl			

General Physical Hazards

General physical hazards and their controls are identified in Section 1.3.2 of the SSHP as well as the AHA tables (Attachment 3). Physical Agent Data Sheets (PADS) are also presented in Attachment 4. The PADS provide specific guidance to protect workers from hazards associated with cold/hot work environments, noise, hand/arm vibration, and ultraviolet (UV) radiation.

8.8 HAZARD COMMUNICATION / RIGHT-TO-KNOW PROGRAM

It is Bristol's policy to comply with the standards set forth by OSHA and the U.S. Department of Labor, as well as those set forth by any state or local governing authority. State and federal OSHA regulations require all employers to notify their employees of any hazards to which they might be exposed and to provide protection from them. Types of hazards covered by Bristol's policy are chemicals, noise, radiation, vibration, extremes in temperature, and biological hazards. The Right-to-Know Manual, which contains MSDSs pertinent to the hazardous materials on the NE Cape project, will be located and/or posted at the Bristol site office.

The SSHO is in charge of maintaining the Right-to-Know Manual. All subcontractors must provide training to their employees and maintain a current MSDS file on the job site for their employees, as well as submit copies to Bristol for coordination.

Hazardous, non-routine tasks will be addressed prior to work being started. Specific hazards, protective measures, and any special equipment needed for the job will be covered. No container of hazardous substances will be released for use unless it is properly labeled and proper PPE has been provided.

When a new hazardous material is introduced or discovered on site, site personnel will be given information about this material at the Toolbox Safety Meeting. The SSHO is responsible for ensuring that the MSDS for the new chemical or material is available on site. The SSHO will ensure that site personnel have access to MSDSs at all times. The MSDSs from Bristol and all the subcontractors will be compiled into one book and kept in the Bristol site office along with the training records for this program. Section 1.5.4 of the SSHP details hazard communication procedures for the project.

8.9 PROCESS SAFETY MANAGEMENT PLAN

This project does not have any highly hazardous chemicals; this plan is not applicable.

8.10 LEAD ABATEMENT PLAN

This project does not involve working around lead-containing material; this plan is not applicable.

8.11 ASBESTOS ABATEMENT PLAN

This project does not involve working around asbestos-containing material; this plan is not applicable.

8.12 RADIATION SAFETY PROGRAM

This project does not involve any radioactive materials or radiation-producing devices; this program is not applicable.

8.13 ABRASIVE BLASTING

This project does not involve abrasive blasting; this program is not applicable.

8.14 HEAT / COLD STRESS MONITORING PLAN

St. Lawrence Island is subject to high winds, rain, and snow. On occasion, weather conditions can become severe enough to present a danger to those working outdoors. In these situations, work will stop, and the control measures discussed in Emergency Procedures (Section 1.13 of the SSHP) will be followed. 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, for those workers required to wear chemical-protective clothing, there is a possibility that they could develop heat stress, depending on their work activities. A PADS on heat stress is available in Attachment 3. 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. These include use of "warm-up sheds" as necessary. The SSHO, for example, will monitor ambient temperatures in the work area, track thermal workloads, and determine the need for personal protective and administrative controls. 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 and warm shelters for rest periods will be provided. ACGIH practices for cold stress will be implemented. A summary of the cold stress prevention guidelines is provided in Attachment 4. A copy of the ACGIH TLV handbook will be available on site.

8.15 CRYSTALLINE SILICA MONITORING

This project does not involve working with crystalline silica; this program is not applicable.

8.16 NIGHT OPERATIONS LIGHTING PLAN

Landing craft operations may require the crew to load or unload during the nighttime hours. In any situation where low lighting may impact visibility, gas-powered light towers will be utilized. The towers are available on site and can double as generators for electrical power.

8.17 FIRE PREVENTION PLAN

The job site fire prevention plan will comply with the requirements of EM 385-1-1, Section 09. The following excerpts are listed as highlighted areas of concern and will not be construed as a complete list of fire prevention measures for this project:

- No smoking is permitted at or in the vicinity of an operation that constitutes a fire hazard. Such areas will be conspicuously posted with “NO SMOKING OR OPEN FLAME” signs.
- Clearance will be maintained around any source of heat to prevent ignition of combustible materials.
- Portable heaters will be equipped with an approved automatic shutoff device. Such heaters, having inputs above 50,000 British thermal units per hour (Btu/hr), will have either a pilot, which must be lighted and proved prior to main burner ignition, or an electrical ignition system (does not apply to heaters under 750 Btu/hr when used with 2-¼ pound containers).
- Use of portable heaters and temporary heating devices will conform to EM 385-1-1, Section 09.D.
- When heaters are used, there must be sufficient ventilation to ensure proper combustion, maintain the health and safety of workers, and limit temperature rise in the area. Site personnel will perform gas monitoring as needed to ensure that there is adequate ventilation when heaters are used.
- Heaters must be a least 10 feet from any combustible tarpaulins, canvas, or similar coverings.

Fire Protection

The Project Team will be responsible for the development and maintenance of an effective fire protection and prevention program throughout all phases of construction. This program will comply with local regulations and EM 385-1-1, Section 09, and will include the following components:

- Provide the necessary equipment and access to it, and locate it conspicuously.
- Equipment will be inspected and maintained in good operating condition.
- Extinguishers must be inspected at least monthly, and the inspection tag will be dated and initialed. Further, extinguishers must be refilled immediately after being discharged.
- The individual nearest to or identifying the fire hazard will respond by exercising the appropriate use of the fire extinguishers provided on site.

8.18 WILD LAND FIRE MANAGEMENT PLAN

The site work does not include any work on or around forestry; this plan is not applicable.

8.19 HAZARDOUS ENERGY CONTROL PLAN

No lockout/tagout activities that would require development of a hazardous energy control plan are anticipated for this project. The following provisions will be followed for electrical cords:

- Cords, connections, and outlets will be inspected before each use. Damaged cords, connections, or outlets will not be used. Prohibited items include cords with damaged or loose insulation.
- Only extension cords with three-prong grounding plugs will be used.
- Cords placed on the ground must be visible, must not interfere with normal foot traffic, and must not present a tripping hazard.
- Cords cannot cross any roads or traffic areas where they could be run over by vehicles, unless they are protected.

Generators will be maintained by site personnel, including a qualified operator, as directed by the SSHO. During construction operations, no systems that could cause injury if power were suddenly applied will be engaged. However, when repairs to electrical connections are required, all portable tool controls on that circuit will be unplugged.

8.20 CRITICAL LIFT PLAN

Lifts will not be used on this project, so the plan is not applicable for this project.

8.21 CONTINGENCY PLAN FOR SEVERE WEATHER

In case of adverse weather or other environmental conditions, the SSHO will determine whether work can continue without compromising worker health and safety. The following adverse conditions could prompt a safety review:

- High wind
- Heavy precipitation
- Fog
- Ice, snow, or cold

Work will resume when severe weather has abated and the project team has determined that it is safe.

8.22 FLOAT PLAN

The site work does not include any work on or around water; this plan is not applicable.

8.23 SITE-SPECIFIC FALL PROTECTION AND PREVENTION PLAN

The site work does not include any work at heights; this plan is not applicable.

8.24 DEMOLITION PLAN

Demolition work is not part of this project; this plan is not applicable.

8.25 EXCAVATION / TRENCHING PLAN

Contaminated soils will be excavated at numerous locations across the site. Open excavations present a fall hazard to personnel and equipment working near them. They can also collapse on and bury workers who enter them. To control these hazards, soil conditions, excavation methods, and site entry/control will be closely monitored by the SS/SSHO.

Excavated soils will not be placed closer than 2 feet to the edge of an excavation. When excavation depths exceed 4 feet, sampling will be accomplished by excavated soil being lifted from the excavation floor and sidewalls, and samples will be taken from the excavator bucket at ground surface level. If at all possible, work will be conducted in a manner that precludes the need for workers to enter excavations. When sampling is necessary, only trained workers will be used, and the SSHO will monitor the sampling activity. Excavations will be maintained in accordance with OSHA Sloping and Benching Standard 1926 Subpart P, Attachment 4, which outlines the specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins (a copy is included as Attachment 9 of this APP). AHAs for excavations less than and greater than 4 feet are available in Attachment 3 of this APP.

8.26 EMERGENCY RESCUE (TUNNELING)

Tunneling operations are not applicable under this contract.

8.27 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

Tunneling, open caissons, and other forms of underground construction are not applicable under this contract.

8.28 COMPRESSED AIR PLAN

Bristol will not perform any work in compressed-air environments; this plan is not applicable.

8.29 FORMWORK AND SHORING ERECTION AND REMOVAL PLAN

Formwork systems are not required in the project specifications; this plan is not applicable.

8.30 Precast Concrete Plan

A Precast Concrete Plan is not applicable for this project.

8.31 Lift Slab Plan

No lift slab operations will be used; this plan is not applicable.

8.32 Steel Erection Plan

A Steel Erection Plan is not applicable for this project.

8.33 Site Safety and Health Plan for Hazardous and Toxic Materials Removal (HTMR) Work

An SSHP is included as Attachment 1 to this document.

8.34 Blasting Safety Plan

No blasting is anticipated; this plan is not applicable.

8.35 Diving Plan

No diving is anticipated; this plan is not applicable.

8.36 Confined Spaces

Confined spaces are not anticipated for this project.

8.37 Thunderstorm / Lightning Plan

Thunderstorms are not anticipated in the project area.

8.38 Hurricane / Blizzard / Destructive Weather Preparation

St. Lawrence Island is subject to high winds, rain, and snow. On occasion, weather conditions can become severe enough to present a danger to those working outdoors. In these situations, work will stop, and the control measures discussed in Emergency Procedures (Section 1.13 of the SSHP) will be followed.

Vehicle doors being blown open can cause damage to the door of the vehicle, and the door being ripped from a person's grip can cause serious hand, arm, or shoulder injuries, as well as vehicle damage. Vehicles will be parked facing into the wind to prevent the wind from forcing doors open and causing damage to vehicles. Vehicle safety will be covered in the daily safety meetings. All building and container doors will have latches or tie-downs to prevent injuries that could result from doors being opened violently from the wind. All loose scrap lumber, waste material, tools, equipment and rubbish, which could become missile hazards in high winds, will be collected for removal/disposal at the close of the workday.

9.0 BRIEFING OF SITE PERSONNEL

All Bristol, subcontractor, and service personnel associated with the project will be fully briefed and made aware of the requirements of the APP.

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10.0 EMERGENCY CONTACTS FOR APP

The office, home, and cell phone numbers of the Bristol primary and secondary emergency contacts are listed below:

Primary Contact		Secondary Contact	
Molly Welker		Maxey Riggs, CSP	
office:	907-563-0013	office:	907-563-0013
cell:	907-244-7784	cell:	907-244-7416
home:	907-522-1805	home:	907-223-4633

(Intentionally blank)

11.0 RISK MANAGEMENT PROCESSES – ACTIVITY HAZARD ANALYSIS

For physical hazards, Bristol has established the following series of AHAs (included as Attachment 3):

- Barge Loading Operations
- Barge Unloading Operations
- Contaminated Sediment Removal and Disposal
- Debris Removal and Staging
- Drum Removal
- Excavation Less than Four Feet in Depth
- Excavation Greater than 4 Feet and Backfilling
- Fueling of Vehicles and Equipment
- POL and PCB Soil Removal and Disposal
- Pole Removal
- Site Restoration
- Surface Soil Sampling
- Subsurface Soil Sampling
- Wire Removal

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FIGURES

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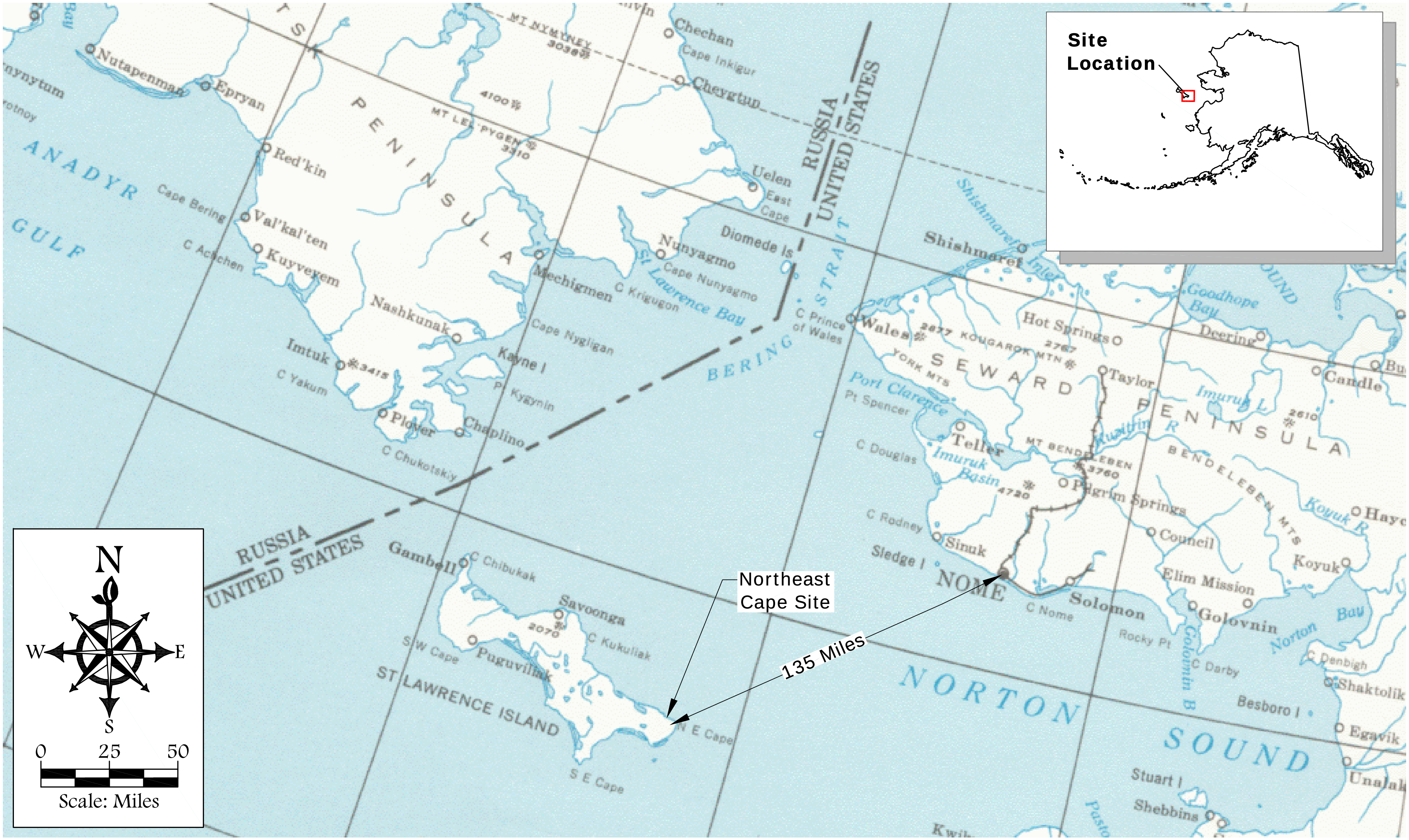

Source: USGS National Atlas Sheet Number 42-43

Legend:

HTRW Hazardous, Toxic, and Radioactive Waste

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

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

DATUM: NAD 83	DATE	05/01/12
PROJECTION: STATE PLANE AK 9	DWN.	NAP
Project No. 34110008	SCALE	SHOWN
	APPRVD.	MW

Legend:

HTRW Hazardous, Toxic, and Radioactive Waste

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

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

DATUM:	NAD 83
PROJECTION:	STATE PLANE AK 9
Project No.	34110008
DATE	05/01/12
DWN.	NAP
SCALE	SHOWN
APPRVD.	MW

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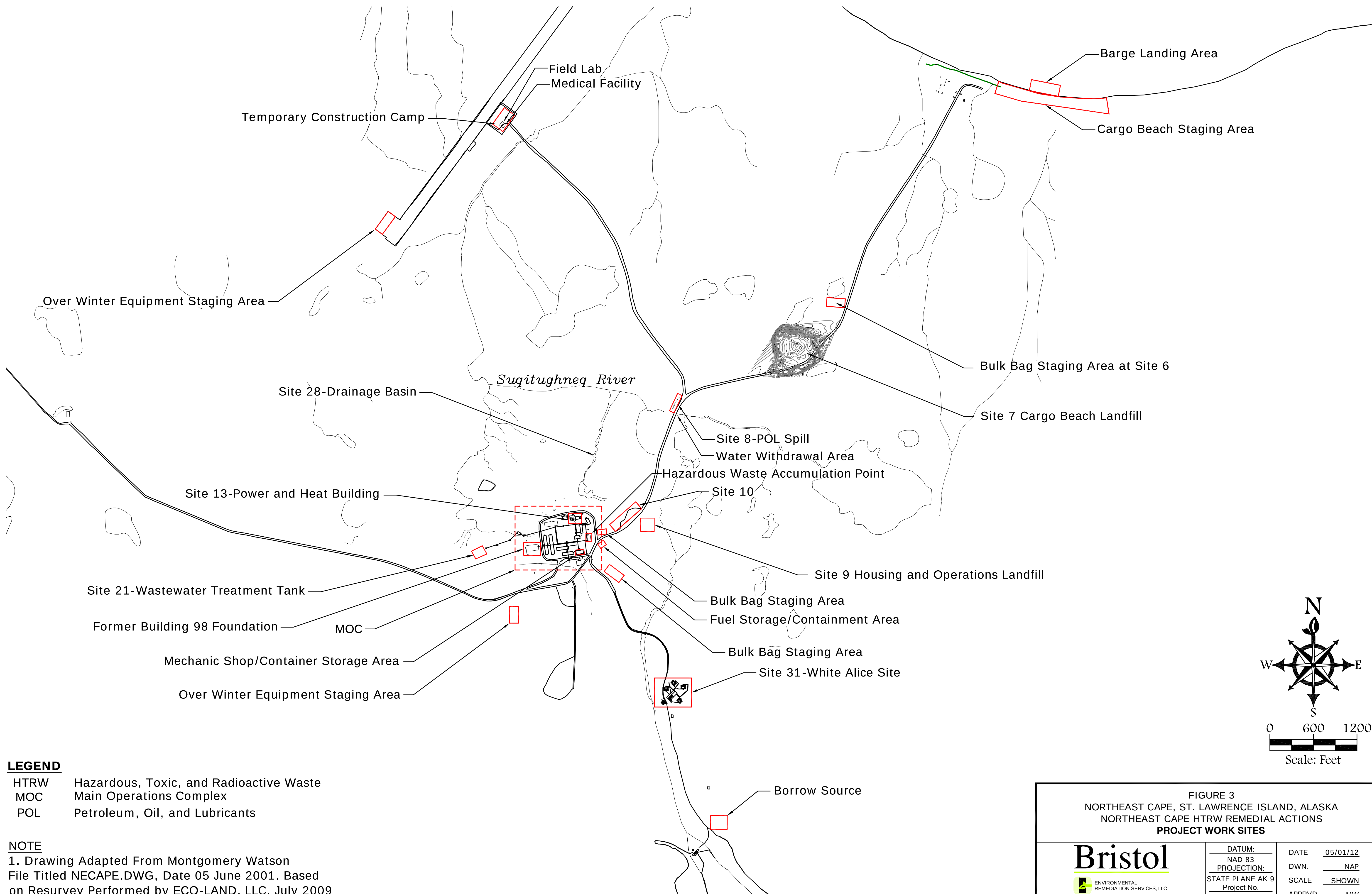

LEGEND

HTRW	Hazardous, Toxic, and Radioactive Waste
MOC	Main Operations Complex
POL	Petroleum, Oil, and Lubricants

NOTE

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

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

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

DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE	05/01/12
DWN.	NAP
SCALE	SHOWN
APPRVD.	MW

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ATTACHMENT 1

Site Safety and Health Plan

TABLE OF CONTENTS

TABLES

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ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
COC	contaminant of concern
CPR	cardiopulmonary resuscitation
DART	Days Away, Restricted, or Transferred
dBA	decibels A-weighted
DOT	U.S. Department of Transportation
DQCR	Daily Quality Control Report
EM	Engineer Manual
EMT	Emergency Medical Technician
GFCI	ground fault circuit interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
mg/m^3	milligrams per cubic meter
mph	miles per hour
MSDS	Material Safety Data Sheet
NE Cape	Northeast Cape
NEC	National Electrical Code
NIOSH	National Institute for Occupational Safety and Health
OP	Occupational Physician
OSHA	Occupational Safety & Health Administration
PADS	Physical Agent Data Sheet
PCBs	polychlorinated biphenyl
PELs	Permissible Exposure Limits
PID	photoionization detector
POL	petroleum, oil, and lubricants
PPE	personal protective equipment

ACRONYMS AND ABBREVIATIONS (continued)

QAR	Quality Assurance Representative
SEC	Site Emergency Coordinator
SPCC	Spill Prevention, Control, and Countermeasures Plan
SS	Site Superintendent
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TLVs	threshold limit values
TWA	time-weighted average
USACE	US Army Corps of Engineers
UV	ultraviolet

1.0 SITE SAFETY AND HEALTH PLAN

1.1 BRISTOL'S SAFETY AND HEALTH PERFORMANCE

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. This goal is routinely achieved.

The Bristol rate for 2011 "Days Away from Work, Restricted Work Activity, and/or Job Transfer," or DART rate, is 1.1. For 2010, the Bureau of Labor Statistics reported that the average DART rate for construction and remediation firms was 2.1. Bristol's 2011 Total Case Incidence Rate (TCIR) (all recordable injuries/illnesses) was 2.2.

1.2 ACCIDENT PREVENTION PLAN

This Site Safety and Health Plan (SSHP) is Attachment 1 to the Accident Prevention Plan (APP).

1.3 HAZARD ANALYSIS

This section describes the general chemical, physical, and biological hazards that are associated with many of the activities that will be conducted at the Northeast Cape (NE Cape) site in 2012. This section also discusses task-specific hazards and the control measures that will be instituted to manage them. To support this discussion, Activity Hazard Analysis (AHA) tables have been prepared for each task in accordance with the US Army Corps of Engineers (USACE) Engineer Manual (EM) 385-1-1 and are included as Attachment 3 of the APP. At a minimum, each AHA includes the following:

- Task description
- Potential hazards
- Chemical
- Physical
- Safety
- Hazard control measures
- Necessary equipment

- Inspection requirements
- Training requirements

If new activities not discussed in this section occur during the course of work and/or some presently described activities change, the AHA tables will be amended to account for those changes. All significant AHA changes will be reviewed by the Site Safety and Health Officer (SSHO) and Health and Safety Manager (HSM) and, subsequently, will be communicated to affected employees.

1.3.1 General Chemical Hazards

Previous remedial investigations conducted at the NE Cape site identified several contaminants of concern (COCs) that may present an exposure hazard to site personnel performing a variety of activities at the site. The COCs are polychlorinated biphenyls (PCBs), metals, and weathered petroleum products: diesel fuel and lubrication oils. The contaminants are in the soil and water matrices and pose minimal inhalation hazard at the ambient temperatures of the arctic summer.

Bristol will collect miscellaneous debris, wood poles, and drums that are littered across the tundra. It is unknown how many of the drums contain product or sludge. When handling drums with unknown contents, care will be taken to minimize dermal and inhalation contact by having the disposal crews wear chemical-protective clothing. Caution will be taken when identifying whether or not drums are empty or full; if product is found, personal protective controls will be applied to all situations involving the handling of unknown materials.

The Occupational Safety & Health Administration (OSHA) Permissible Exposure Limits (PELs) and threshold limit values (TLVs) established by the American Conference of Governmental Industrial Hygienists (ACGIH) have been identified in this SSHP for COCs that could present industrial hygiene hazards to workers at the NE Cape site. Where there are differences between exposure limits set by these two entities, Bristol will comply with the more restrictive limit(s).

Petroleum, oil, and lubricants (POL) used in support of the operation will consist of fuels, diesel and gasoline, lubricating oils, and solvents. The Material Safety Data Sheets (MSDSs) will be on site for all of the products used on the project. All fuels will be stored in and dispensed from approved containers.

1.3.1.1 Polychlorinated Biphenyls

The acronym 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 suspect carcinogen. Skin exposure may contribute to uptake of these chemicals; therefore, skin exposure potential will be evaluated and controlled. The likelihood of exposure should be minimal because of 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, personal protective equipment (PPE) will be in frequent use to prevent contact with PCBs. At a minimum, workers are required to wear appropriate gloves (nitrile) when handling soil/materials suspected of being contaminated with PCBs. The PEL and TLV time-weighted average (TWA) for PCBs with 54 percent chlorine content is 0.5 milligram per cubic meter (mg/m^3), while the PEL and TLV TWA for PCBs with 42 percent chlorine is 1 mg/m^3. Potential sources of PCBs during this project are drums and contaminated soil.

The PELs, TLVs, and physical properties of the hazardous site contaminants discussed above are summarized in Table 1-1 for all COCs that could result in worker exposure.

Table 1-1 Project Chemical Exposure Limits

Chemical	OSHA Exposure Limit (PEL)	ACGIH Exposure Limit (TLV)
POL	5 mg/m^3 (TWA) (oil mist)	5 mg/m^3 (TWA)
PCB (42%)	1 mg/m^3 (TWA)	1 mg/m^3 (TWA)
PCB (54%)	0.5 mg/m^3 (TWA)	0.5 mg/m^3 (TWA)
Arsenic	10 µg/m^3 (TWA)	10 µg/m^3

Notes:

ACGIH	=	American Conference of Governmental Industrial Hygienists	PEL	=	Permissible Exposure Level
µg/m^3		micrograms per cubic meter	POL	=	petroleum, oil, and lubricants
mg/m^3	=	milligrams per cubic meter	TLV	=	threshold limit value
OSHA	=	Occupational Safety & Health Administration	TWA	=	8-hour time-weighted average
PCB	=	polychlorinated biphenyl			

1.3.2 General Physical Hazards

1.3.2.1 Aircraft Operation

Chartered aircraft operations will be required in all phases of this project. Pilot and passengers must wear seat belts at all times. The pilot is responsible for ensuring that passengers are seated and properly secured before moving the aircraft.

The propeller of the aircraft will be avoided at all times, even when the engine is not running. Personnel will stay to the aft of the wing struts at all times. Personnel needing to approach an aircraft will make eye contact with the pilot and approach only when the pilot gives permission. There is no formal charter aircraft training program for contractor employees.

1.3.2.2 Heavy Equipment and Vehicle Operation

Excavators, front-end loaders, haul trucks, graders, and other heavy equipment will be used on this project to excavate contaminated soil, repair roads, grade work areas, and remove debris. 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. Activity Hazard Analysis 8 (located in

Attachment 3 of the APP) provides specific guidance for refueling vehicles and equipment. The majority of the fuels at the site will be diesel, which has a low vapor pressure and is a relatively low fire risk.

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 may 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 in accordance with EM 385-1-1, Section 09.B.03, which states "a. At least one portable fire extinguisher rated 20-B:C shall be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible liquids. b. Each service or refueling area shall be provided with at least one fire extinguisher rated not less than 40-B:C and located so that an extinguisher shall be within 100 ft (30.4 m) of each pump, dispenser, underground fill pipe opening, and lubrication or service area." In addition, spill-control equipment will be available during refueling operations in case a fuel, hydraulic fluid, or lubricant release occurs.

1.3.2.3 Slips, Trips, and Falls

Workers are anticipated to encounter unstable footing conditions (slipping, tripping, or falling) while on site. The potential hazards related to slipping, tripping, or falling associated with this site include the following:

- Uneven terrain
- Slippery soil and rocks
- Standing water

There is a potential for site personnel to fall off heavy equipment and other structures and to fall into open excavations. In addition, debris within the work area (e.g., drums, containers, building debris, abandoned equipment, etc.) could present a trip hazard for site personnel. The entire project site is subject to wet weather that makes most walking surfaces slick and increases the potential for slips and falls.

These slip, trip, and fall hazards will be addressed by keeping the work area as free as possible of debris and other litter. Before personnel begin site activities, the site will be inspected for hazards. Removable objects that present hazards will be marked, and holes (if any) will be covered or marked. Site workers will wear high-traction, hard-toe safety boots and will pay careful attention to surface conditions to prevent slip, trip, and fall injuries. The work area will be inspected before the start of each workday to identify any hazards that could cause injury. The results of these inspections will be communicated to site personnel during the daily Toolbox Safety Meetings.

1.3.2.4 Excavations and Earthwork

Contaminated soils will be excavated at numerous locations across the site. Open excavations present a fall hazard to personnel and equipment working near them. They can also collapse on and bury workers who enter them. To control these hazards, soil conditions, excavation methods, and site entry/control will be closely monitored by the Site Superintendent (SS)/SSHO.

Excavated soils will not be placed closer than 2 feet to the edge of an excavation. Under no circumstances will workers be allowed to enter excavations deeper than 4 feet, unless the excavations have been sloped to 1.5 horizontal to 1 vertical. If at all possible, work will be conducted in a manner that precludes the need for workers to enter excavations. When sampling is necessary, only trained workers will be used, and the SSHO will monitor the sampling activity.

An AHA for excavations less than 4 feet is available in Attachment 3 of the APP.

1.3.2.5 Material Handling

On-site fieldwork often involves handling heavy objects that may also be bulky or awkward to carry. 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 heavy loads if mechanical lifting devices cannot be used. Workers will also wear leather or abrasive-proof gloves when handling sharp objects.

1.3.2.6 Noise and Hearing Conservation Program

All heavy equipment can produce hazardous noise levels in excess of 85 decibels A-weighted (dBA). The SSHO will determine when potential noise exposure is hazardous and protective measures are required. The primary hazard associated with noise exposure is hearing loss. A Physical Agent Data Sheet (PADS) is available in Attachment 4 of the APP.

High noise levels may occur during heavy equipment use and tool operations. A copy of OSHA noise standard, Title 29 Code of Federal Regulations, Part 1910.95 (29 CFR 1910.95) will be posted at the job site. It is assumed that all workers will be exposed to above 85 dBA at least part of the time they are on NE Cape. Therefore, use of hearing protection is mandatory around heavy equipment and noise sources. All personnel with exposure to noise will be provided with appropriate hearing protection. Noise monitoring will be available and used as directed by the SSHO to determine appropriate posting and noise controls. Areas with frequent noise levels that exceed 85 dBA will be posted to warn individuals of the need for hearing protection. Engineering controls will be evaluated for all high-noise operations, including ensuring noise reduction devices are used and maintained in heavy equipment.

1.3.2.7 Weather Hazards and Thermal Stress

St. Lawrence Island is subject to high winds, rain, and snow. On occasion, weather conditions can become severe enough to present a danger to those working outdoors. In these situations, work will stop, and the control measures discussed in Emergency Procedures (Section 1.13 of this SSHP) will be followed.

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, for those workers required to wear chemical-protective clothing, there is a possibility that they could develop heat stress, depending on their work activities. A PADS on heat stress is available in Attachment 4 of the APP. 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. These include use of “warm-up sheds” as necessary. The SSHO, for example, will monitor ambient temperatures in the work area, track thermal workloads, and determine the need for personal protective and administrative controls. 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 and warm shelters for rest periods will be provided. ACGIH practices for cold stress will be implemented. A summary of the cold stress prevention guidelines is provided in Attachment 4 of the APP. A copy of the ACGIH TLV handbook will be available on site.

1.3.2.8 Ultraviolet Radiation

Ultraviolet (UV) radiation from the sun causes sunburns and skin cancer. Ultraviolet radiation from other sources can also cause skin burns varying in degree from mild reddening of the skin (first-degree burns) to more severe and painful blistering (second-degree burns). Long-term skin exposure to UV radiation can cause actinic skin (a dry, brown, inelastic wrinkled skin) and skin cancer. Fair-skinned individuals are more susceptible to developing both sunburns and skin cancer. A PADS on UV radiation is available in Attachment 4 of the APP.

Some drugs, such as the antibiotic tetracycline, can cause skin burns from UV radiation to happen faster and to be more severe. Products containing coal tar can also cause this reaction. These substances are called photosensitizers. Ultraviolet radiation exposure may also trigger cold sores (herpes simplex) in some individuals.

Under sunny conditions on water, snow, and ice, extra precautions will be taken to protect against reflected sunlight. Safety glasses with tinted lenses (with side shields) will be worn. When applying protective ointments or lotions, special attention will be paid to the nose, lips, underside of the chin, and tops of the ears.

1.3.3 High Wind Hazards

The Northeast Cape of St. Lawrence Island is a windy landscape. The wind can lift and transport debris that can be a hazard to site workers. Site workers will wear protective head gear and eyewear while on site.

Vehicle doors being blown open can cause damage to the door of the vehicle, and the door being ripped from a person's grip can cause serious hand, arm, or shoulder injuries, as well as vehicle damage. Vehicles will be parked facing into the wind to prevent the wind from forcing doors open and causing damage to vehicles. Vehicle safety will be covered in the daily safety meetings. All building and container doors will have latches or tie-downs to prevent injuries that could result from doors being opened violently from the wind.

All loose scrap lumber, waste material, tools, equipment, and rubbish, which could become missile hazards in high winds, will be collected for removal/disposal at the close of the workday.

1.3.4 Biological Hazards

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

1.3.4.1 Polar Bears

Polar bears may be found on St. 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 4 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 6 mph. Polar bears have an excellent sense of smell and will hone 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. Polar bear 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. Field workers should always work in pairs.

Polar bears will investigate anything that could potentially turn up food. They will follow roads and snowmobile 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 guarantee your safety.
- Be vigilant.
- Always check outside before leaving a building. If working outside, post a lookout.
- Always carry a radio.
- Have quick access to a safe place, such as a truck or trailer. Never carry food.
- Do not feed wildlife.
- If you see a bear, bear tracks, or droppings, 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.

Bristol will have a local bear guard in the field, and all garbage will be securely contained in a 20-foot container and incinerated daily.

1.3.4.2 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.

1.3.5 Control Measures

Various institutional control measures and safety procedures/standards will be upheld by applicable personnel in order to maintain a safe working environment.

1.3.5.1 Vehicle Inspections

All equipment and vehicles brought to the job site will be inspected in accordance with EM 385-1-1 requirements before being put into service. Equipment not conforming to operational and safety requirements will be repaired and re-inspected. Daily inspections of vehicles and heavy equipment will follow the requirements of the equipment manufacturers and EM 385-1-1, Section 16 and Section 18. Inspection forms are included in Attachment 5 of the APP.

Industrial vehicles will have backup alarms, seat belts, brakes, and lights. The operator will take out of service any equipment that does not comply with the manufacturer's specifications. Deficiencies will be noted and referred to the SS, who, in turn, will ensure that all repairs have been made before the vehicle is returned to service.

1.3.5.2 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 SS will ensure that a proficiency test is administered to each operator for each type of equipment operated. The SS will maintain a list of each operator and the equipment the operator is qualified to operate.

1.3.5.3 Equipment and Vehicle Safe Work Practices

Operators, drivers, and passengers must wear seat belts at all times. Drivers and operators must comply with state regulations governing the safe and legal operation of vehicles. Each driver is responsible for ensuring that passengers are seated and properly secured before moving a vehicle. Under no circumstance will personnel ride on fenders, running boards, or vehicle tops; in buckets; on the lift forks of a forklift; on beds of dump trucks or pickup trucks; or in any other area where a passenger cannot be secured by a properly installed seat belt. Operators of heavy equipment must follow the regulations specific to the type of equipment they are operating. Operators and drivers will obey signs, postings, and instructions.

Those personnel directly involved with spotting for an operator are typically the personnel allowed on the ground in the vicinity of the heavy equipment. Other personnel will remain a safe distance away from operations. Personnel needing to approach heavy equipment while the equipment is operating will observe the following protocols:

- Make eye contact with the operator (and spotter)
- Signal the operator to cease heavy equipment activity, if applicable
- Approach the equipment operator and inform the operator of intentions

Before moving parked heavy equipment, the operator will visually inspect and walk around the vehicle to ensure that the equipment is in good condition and that there are no personnel or objects on the ground that could be damaged by vehicle movement. Operators will use handrails and footholds for mounting and dismounting equipment (three points of contact). Operators will follow equipment start-up procedures described in the appropriate operating manual. Each operator will keep hauling equipment under positive control at all times. In case of malfunction that impairs an operator's ability to control a piece of equipment, the operator will use hydraulic systems such as blades, ripper, belly pan lowered to the ground, and brakes, and shut down the equipment until help arrives and repairs are made. Heavy equipment must have booms, forks, buckets, blades, belly pans, and any other similar part lowered to the ground when the equipment is shut off. Heavy equipment has the right-of-way over other traffic.

When temporarily parked, the keys are to remain in the ignition switch, except when the vehicle is being used as a fall protection anchor. When the vehicle is used as a fall protection anchor, the keys are to be removed and in the possession of the person using the fall protection. Vehicle chocks are required to be used to reduce the potential for rolling when parked.

1.3.5.4 Traffic Control

The speed limit for traffic is 15 mph in all areas of the site except the main roads (identified by the SSHO), where the speed limit is 25 mph. Special caution should be taken near the personnel living area where the speed limit is 10 mph. The SSHO and SS may temporarily change speed limits if required for safe operations. Speed limits apply to heavy equipment, as well as other vehicles. To minimize traffic hazards, specific traffic flow patterns may be established at individual work sites. These flow patterns will be implemented through portable traffic signs, by informing personnel in the daily Toolbox Safety Meetings, or over the radio. Flagmen may be used for traffic control wherever there is heavy traffic, where there are blind spots, and where there are road hazards. The SSHO may require flagmen for any unsafe road condition.

1.3.5.5 Site Roads and Slopes

The SS/SSHO and/or alternate will regularly inspect site roads. The SS/SSHO or designee will discuss current site road hazards and the status of site roads (e.g., closed, under repair, one way) at the daily Toolbox Safety Meetings. Personnel will report unsafe road conditions, if observed, to their supervisor or the SSHO.

Operators will operate equipment with booms, blades, buckets, beds, etc., lowered or in a stable position while on slopes.

1.3.5.6 Control of Hazardous Energy

Hazardous energy can come from mechanical sources, as well as electrical sources. Mechanical sources may be from machinery and from individual components of machinery, such as hydraulic lines or water lines that are still under pressure even though the primary energy source may be turned off. All mechanical maintenance will be performed by a qualified mechanic or personnel under direct supervision of the qualified mechanic.

Portable electrical generators are used to supply power to the base camp and for various demolition equipment and environmental activities. The generators will be maintained by site personnel, including a qualified operator, as directed by the SS. There are no other sources of electrical energy at the job site besides the portable generators that would require lockout/tagout. When it becomes necessary to install or repair portable electrical power systems, the appropriate systems will be shut down.

Implementation of procedures for control of hazardous energy will be administered by the SS/SSHO, in accordance with EM 385-1-1, Section 12, and the Bristol Safety and Health Program Manual.

1.3.5.7 Confined Space Entry

A confined space is defined as a space that meets all of the fol1owing criteria:

- Large enough and so configured that an employee can bodily enter and perform assigned work
- Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry)
- Not designed for continuous employee occupancy

No confined space entry operations are anticipated at the NE Cape site. If it becomes necessary to perform confined space entries, all provisions of the Bristol Confined Space Entry Program will be followed.

1.3.5.8 Electrical Safety

For most workers, electrical safety is limited to the proper use of electrical portable tools and equipment (including lighting). All electrical portable tools and equipment will be inspected before use. In addition, these tools and equipment will be used with ground fault circuit interrupters (GFCIs), or in conjunction with power sources that are GFCI-protected, or vehicle-mounted generators. When using a portable or vehicle-mounted generator, the generator is not required to be grounded, in accordance with National Electrical Code (NEC) 250-6, as long as the following conditions from the EM 385-1-1 have been met:

Portable Generators. Under the following conditions, the frame of a portable generator is not required to be grounded and will be permitted to serve as the grounding electrode for a system supplied by the generator:

- The generator supplies only equipment mounted on the generator and/or cord- and plug-connected equipment through receptacles mounted on the generator.
- The noncurrent-carrying metal parts of equipment and the equipment-grounding conductor terminals of the receptacles are bonded to the generator frame.

Vehicle-Mounted Generators. Under the following conditions, the frame of a vehicle is permitted to serve as the grounding electrode for a system supplied by a generator located on the vehicle (all conditions must be satisfied):

- The frame of the generator is bonded to the vehicle frame.
- The generator supplies only equipment located on the vehicle and/or cord- and plug-connected equipment through receptacles mounted on the vehicle or on the generator.
- The noncurrent-carrying metal parts of equipment and the equipment-grounding conductor terminals of the receptacles are bonded to the generator frame.
- The system complies with all other NEC grounding requirements.

Additionally, the following provisions will be followed for electrical cords:

- Cords, connections, and outlets will be inspected before each use. Damaged cords, connections, or outlets will not be used. This includes cords with damaged or loose insulation.
- Only extension cords with three-prong grounding plugs will be used.
- Cords placed on the ground must be visible, must not interfere with normal foot traffic, and must not present a tripping hazard.
- Cords cannot cross any roads or traffic areas where they could be run over by vehicles.

1.4 TASK-SPECIFIC HAZARDS

The following sections describe in greater detail the hazards associated with each specific task. Attachment 3 of the APP contains AHA tables, completed in accordance with EM 385-1-1, identifying the activity, potential hazards, controls and inspections, training, PPE, and monitoring required for each task.

1.4.1 Contaminated Soils, Poles, and Debris, and Wire Removal and Disposal

Petroleum, oil, and lubricant-contaminated soil, other contaminated soil, and miscellaneous debris, including poles, wires, and drums will be disposed of in accordance with the Waste Management Plan located in Appendix A of the Work Plan. Discovered drums will be removed by personnel wearing proper PPE. Collected drums and other containers containing potentially hazardous liquids will be staged on a lined concrete pad at the Main Operations Complex, which will have secondary containment to control runoff.

The poles, drums, and the wire will be placed into intermodal shipping containers for transportation and disposal off site and staged at Cargo Beach until demobilization. Soil will be loaded into U.S. Department of Transportation (DOT) approved bulk bags for transport and off-site disposal and will be staged on flats at Cargo Beach.

Workers who will help handle the removal of debris from this site will be trained about the operator's visibility limitations. Operators will be informed daily and as often as necessary of the workers' whereabouts. A designated transportation route will be established to isolate the area of vehicular traffic. This route will be communicated to the site workers. Site workers will also wear reflective vests to increase their visibility.

1.4.1.1 Soil Removal

Contaminated soil will be excavated using heavy equipment. Bristol will be excavating and sampling tons of soil. Soil excavations have the potential to grow to cover large areas and to great depths. Excavations will be maintained in accordance with OSHA Sloping and Benching Standard 1926 Subpart P, located in Attachment 9 of the APP, which outlines the specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins.

When excavation depths exceed 4 feet, sampling will be accomplished by excavated soil being lifted from the excavation floor and sidewalls, and samples will be taken from the excavator bucket at ground surface level.

A rock-screening plant will be used for some sites. The soil will be excavated using an excavator and then sorted through the rock-screening plant to remove particles greater than 2 inches. After the soil is sorted, the minus 2-inch material will be loaded into bulk bags.

Workers involved with soil excavation will wear proper PPE at all times. Operators and workers will be in constant communication, and workers will be instructed on proper conduct around heavy equipment and excavations.

1.4.1.2 Pole Removal

One of the hazards associated with the removal of the wood poles concerns the use of the chain saw required to cut the poles down. Chain saws can “kick back” if they strike a piece of metal or a knot in the wood or if they strike the ground. Workers using chain saws will inspect each pole before cutting to look for signs of metal or knots that may cause the chain saw to “kick back”. The angle of cut will be one that does not bring the saw in contact with the ground. Workers using chain saws will wear PPE (including chaps) protection as specified in EM 385-1-1, Section 13F.

1.4.1.3 Wire Removal

Whenever possible, mechanical means will be used to move and dispose of wire. Wire removal may necessitate workers to manipulate wire by hand. If mechanical devices cannot be used, workers will wear leather or cut-resistant gloves for moving wires. The wire removal may include the use of a large spool or spools to remove and store smaller diameter wire. The spool would be connected to a large piece of mobile equipment. The spool and heavy equipment may represent a safety hazard. Workers will wear appropriate PPE, will be aware of the position of moving equipment, and will wear highly visible clothing such as reflective vests.

It is likely that larger-diameter wire that cannot be spooled will be cut into manageable pieces using portable cutting equipment and placed into intermodal containers for transportation. Workers will use proper PPE during cutting operations.

1.4.1.4 Debris Removal

Bristol will remove debris that currently litters the job site. Almost all containers are empty or may contain rainwater. When handling drums or debris with unknown contents, care will be taken to minimize inhalation and dermal contact by having the disposal crews wear chemical-protective clothing. If drums are found intact with the potential to contain chemicals, they may be hoisted with lifting straps or wire rope and loaded into a vehicle for safe transportation to the Hazardous Waste Accumulation Point (HWAP). Chains and/or fiber rope will not be used. Free rigging using equipment forks will not be allowed. These personal protective controls will be applied to all situations involving the handling of unknown materials.

Workers who will help handle the removal of debris from this site will be trained about the operator's visibility limitations. Operators will be informed daily and as often as necessary of the workers' whereabouts. A designated transportation route will be established to isolate the area of vehicular traffic. This route will be communicated to the site workers. Site workers will also wear reflective vests to increase their visibility.

1.4.2 Barge Loading and Unloading

Contaminated soil will be taken off site in DOT-approved bulk bags. Wooden poles, drums, wires, and other miscellaneous debris from the surrounding areas will be taken off site in intermodal containers. Physical hazards associated with this task include being struck by heavy equipment or becoming pinned or crushed underneath heavy loads. Workers will be trained about the operator's visibility limitations. Operators will be informed daily and as often as necessary of the workers' whereabouts. Unloading and loading activities will be performed by a combination of Bristol personnel and Northland Services personnel. Communications and coordination between the two groups will be conducted by the SS. Only essential personnel will be allowed in the loading areas. Some spotter activity may be necessary during the loading and unloading operations. The spotter will be on the ground and will be in the line of sight of the operator for communication.

1.4.3 Sampling

Sampling activities will be performed in accordance with the Uniform Federal Policy – Quality Assurance Project Plan (Appendix D of the Work Plan). Environmental samples will be collected from different matrices. Hazards associated with sampling are primarily chemical in nature and are discussed in Section 1.3.1 of this SSHP. The level of PPE used will depend on the type and location of samples being collected. The physical hazards include sprains and strains from improper lifting or overexertion and cuts from sharp objects, as well as slips, trips, and falls. Sampling crews may be required to walk on uneven or slick surfaces. Samples will be retrieved via backhoe and delivered to the sampler on the surface if excavations prove unsafe for personnel entry.

1.4.4 Site Restoration Operations

Site restoration and revegetation will include the use of heavy equipment to blade out excavated terrain and landfill areas. Physical hazards associated with this activity are posed by the use of heavy equipment in areas where workers are performing specific tasks. All site workers will wear reflective vests to increase visibility while working around heavy equipment. Workers will be trained about the operator's visibility limitations. Operators will be informed daily and as often as necessary of the workers' whereabouts. Manual lifting may be required during remediation activities. Site workers wil1 be trained in proper lifting techniques to minimize the potential for injury.

1.4.5 Airfield Operations

Bristol will use the existing airstrip at NE Cape, but improvements will be required. Bristol personnel will function as the ground contact and observation person for aviation activities at NE Cape. The SS/SSHO or administrative assistant will contact Bering Air about weather conditions at NE Cape any time a charter flight is due to land at NE Cape. Bristol personnel will observe and report weather conditions, such as visibility, wind direction, wind velocity (including gusts), and temperature. A large, heavy-duty wind sock will be installed on the east end of the runway.

When the airstrip is in use, a safe setback from the airstrip centerline will be maintained so that materials and equipment movement does not interfere with aircraft operations. Airstrip shoulders will not be used as roadways during airfield operations. No materials will be stored within this area, except with USACE specific approval.

Before daily flight operations, an inspection and maintenance of the airstrip surface will be performed and any debris discovered will be removed. Due to weather conditions, inspections of the airstrip surface may be conducted on a more frequent basis.

Heavy equipment will not be used on any part of the airstrip surface for aircraft loading or unloading. Loading/unloading operations will be performed on the airstrip aprons.

1.5 TRAINING REQUIREMENTS

All Bristol personnel assigned to the NE Cape project will have training in the areas of their responsibilities. The type of training will depend on the location of the workers and the activities they will perform. Safety awareness will be implemented through daily safety meetings, stand-up training, and one-on-one discussions. Training requirements anticipated for the project are summarized in Table 1-2.

All site personnel working on the excavation and landfill cap activities will have received Hazardous Waste Operations and Emergency Response (HAZWOPER) training. All training documentation will be reviewed by the SS/SSHO. Individuals not providing evidence of 40-hour HAZWOPER training, 8-hour refresher training (when necessary), 8-hour supervisory training (when necessary), or 3 days of on-the-job supervision will not be allowed to enter an excavation area or Site 9. This requirement will also pertain to all site visitors.

Table 1-2 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-hour HAZWOPER, 8-hr Refresher, or 3 days of on-the-job supervision
Supervisors in work zones	8-hour HAZWOPER Supervisor
Arsenic awareness (29 CFR 1926.1118)	Workers excavating arsenic-contaminated soils
At least two personnel at all times	Certified in First Aid/CPR
Users of personal protective equipment	Specifics and physical limitations of use

Notes:
CFR = Code of Federal Regulations
CPR = cardiopulmonary resuscitation
HAZWOPER = hazardous waste operations and emergency response

1.5.1 Site-Specific Training

The SSHO will provide and document site-specific training during the project site kickoff meeting and whenever new workers arrive on site. The site kickoff meeting will cover all aspects of this SSHP. No site workers will be allowed to begin work on site until the site-specific training has been completed and documented by the SSHO. As part of the site-specific training, the following topics will be covered:

- Project introduction and orientation
- Requirements and responsibilities for accident prevention and maintaining safe and healthful work environments
- General safety and health policies and procedures and pertinent provisions of EM 385-1-1
- Chemical, physical, and toxicological properties of site contaminants
- Spill containment procedures and notifications
- Job hazards and the means to control/eliminate those hazards, including applicable position and/or AHAs
- Selection, use, and limitations of PPE

- Employee and supervisor responsibilities for reporting all accidents
- Decontamination emergency response procedures and medical facilities
- Confined space entry (if applicable)
- Procedures for reporting and correcting unsafe conditions or practices

1.5.2 Safety Briefings

Site workers will attend Toolbox Safety Meetings led by the SSHO daily and/or before the start of new work activities. A copy of the daily Toolbox Safety Meeting Record form that will be used to document these meetings is included in Attachment 5 of the APP. The daily meetings will be conducted under supervision of the SS/SSHO but may be conducted by other professional personnel, depending on the topic. Updates in work practices and hazards, emergency evacuation routes, and emergency procedures will be addressed. At each toolbox meeting, safety will be reviewed for all operations planned for that workday.

1.5.3 First Aid and CPR

All Bristol full-time employees who perform fieldwork have received first-aid and cardiopulmonary resuscitation (CPR) training that has been taught by a certified instructor. All first aid/CPR provider certifications will be reviewed and updated before deployment to the NE Cape. Persons trained in first aid and CPR will have received instruction on bloodborne pathogens in accordance with 29 CFR 1910.1030. 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. A copy of the Bristol Bloodborne Pathogens Program is included as Attachment 8 to the APP. There will be an Emergency Medical Technician (EMT) III on site at all times during regular field activities, but not during field mobilization or demobilization activities.

1.5.4 Hazard Communication

As part of the site-specific training, the SSHO will provide hazard communication training for all hazardous materials brought 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 includes the following:

Container Labeling. Personnel will ensure that drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations. Incoming and outgoing labels will be checked for identity, hazard warning, and name and address of responsible party.

Material Safety Data Sheets. An MSDS will be on site for each hazardous chemical used or known to be on site.

At a minimum, site personnel will be instructed in the following:

- Chemicals and their hazards in the work area
- How to prevent exposure to these hazardous chemicals
- Controls in place to prevent worker exposure to these chemicals
- Procedures to follow if workers are exposed to these chemicals
- Location of MSDSs
- How to read and interpret labels and MSDSs for hazardous substances found on site
- Emergency spill procedures
- Proper storage and labeling

When new hazardous material is introduced or discovered on site, site personnel will be given information about this material at the daily Toolbox Safety Meeting. The SS/SSHO is responsible for ensuring that the MSDS for the new chemical or material is available on site. The SSHO will ensure that site personnel have access to MSDSs at all times. At a minimum, MSDSs will be located at the Bristol field office on site.

1.5.5 Site Visitors

During the course of field activities, visitors will come to the site. All visitors will be required to comply with applicable portions of this SSHP, check in with the SS and SSHO, and sign the Site Control Log before going to a specific site. The SSHO will conduct a brief safety and health training session to communicate the general hazards associated with the site and emergency procedures. All visitors must sign the Certificate of Worker/Visitor Acknowledgment form after the briefing.

1.6 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:

- Heavy equipment and hand-tool operation
- Noise
- Dust/asbestos dust (in soil)
- Dust/arsenic in soil
- Slips, trips, and falls
- Drum handling
- PCB-contaminated dust
- Heat stress and cold stress
- Oils and solvents
- Antifreeze solutions
- Petroleum-contaminated water

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 3 of the

APP). Because of 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.

Listed below are some factors that may indicate the need to reevaluate site conditions and PPE selections:

- Encountering or handling contaminants other than those previously identified
- Commencing a new work phase
- Changing job tasks during a work phase
- A change of season or weather
- A change in a work activity that increases or decreases contact with contaminants
- A change in ambient levels of contaminants

All PPE changes must be approved by the SSHO. Any changes in PPE for specific tasks will be communicated as soon as possible to the field crew by the SSHO and during the daily periodic training sessions conducted by the SSHO. At a minimum, all changes will be documented in the field logbook and on the daily Toolbox Safety Meeting Record form (Attachment 5 of the APP).

The types of protective equipment to 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 protective equipment Levels C and D will be available for use during the planned project activities. The general PPE components that make up these levels are listed below. Anticipated PPE levels associated with site-specific tasks are summarized in Table 1-3.

Each worker will be responsible for inspecting his or her equipment for cracks, holes, and proper fitting. If any abnormalities are found, the worker will report the defect to the SSHO.

1.6.1 Optional Inner Coveralls, Boot Covers, and Face Shield (or Safety Glasses) - Level D

Level D PPE includes the following:

- Hard hats at all times: Hard hats will comply with American National Standards Institute (ANSI) Z89.1-1969, Safety Requirements for Industrial Head Protection
- Hard-toe boots are required, and steel-shank boots are recommended. Safety-toe footwear will comply with ASTM International standards F2412-05 Standard Test Methods for Foot Protection and F2413-05 Standard Specification for Performance Requirements for Foot Protection
- Safety glasses at all times: Safety glasses will comply with ANSI Z87.1-1968, American National Standard for Occupational and Educational Eye and Face Protection
- Hearing protection as required
- Chemical gloves or apron as required
- Leather gloves as required
- Rain gear as required

1.6.2 Level C

Level C PPE includes the following:

- National Institute for Occupational Safety and Health- (NIOSH-) approved full-face or half-mask air-purifying respirator, with 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 ANSI Z89.1-1969, Safety Requirements for Industrial Head Protection
- Safety glasses at all times: Safety glasses will comply with ANSI Z87.1-1968, American National Standard for Occupational and Educational Eye and Face Protection
- Hearing protection as required

Table 1-3 Anticipated PPE Requirements

Site-Specific Task or Activity	Anticipated PPE Level
Runway repairs	Level D
Stream crossing construction/repair	Level D
Removal of liquids, sludges, residues, and sediments	Level D, Level C if exposure action levels could be exceeded
Removal of POL- or PCB-contaminated soil	Level D, Level C if exposure action levels could be exceeded
Removal of arsenic-contaminated soil	Level D, Level C if exposure action levels could be exceeded
Sampling and analysis	Level D, Level C if exposure action levels could be exceeded
Packaging of debris and materials	Level D, Level C if exposure action levels could be exceeded
Transportation of debris and materials	Level D

Notes:
PCB = polychlorinated biphenyl
POL = petroleum, oil, and lubricants
PPE = personal protective equipment

1.6.3 Limitations of Personal Protective Equipment

Workers should be aware of PPE limitations and their effects on working conditions. These limitations are presented in Table 1-4.

Regular work clothing will be worn only in areas where site contaminants do not pose a significant dermal contact hazard. Because clothing is porous and, as such, does not provide liquid contact protection, chemical-resistant clothing will be worn during activities involving the handling of contaminated liquids. Leather boots and gloves that inadvertently become contaminated with these materials will be discarded because they cannot be adequately decontaminated.

Chemical-protective goggles are required when handling liquids that may be corrosive or irritating to the eyes. If such liquids also pose a splash hazard to the face, then face shields will be worn in addition to protective goggles. Under no circumstances will safety glasses or face shields be worn as a substitute for chemical-protective goggles.

Table 1-4 PPE Limitations

PPE Items	Limitations
Hard hat	Hard hats should not be painted or have holes drilled into them. These are considered damaged, and damaged hard hats cannot protect properly.
Safety-toe footwear	Hard-toe footwear can cause cold feet in cool weather. Heavy wool socks are helpful.
Safety glasses	Glasses that fit snugly and have peripheral protection are best, as most injuries occur from the side or top. Damaged or scratched glasses will impair vision and could fail under impact. Polycarbonate lenses are preferred.
Hearing protection	Earplugs and muffs have to be inserted or cover the ears as specified by the manufacturers, or they will not protect to their maximum capability.
Gloves	Gloves wear out and/or get ripped and torn. Daily inspections should be done. Gloves should be replaced if they are not in good condition. Gloves also reduce finger dexterity.
Overalls/coveralls	Overalls/coveralls cannot be used as a chemical barrier and cannot prevent all punctures or cuts.
Rain gear and other outerwear	Rain gear and other outerwear may cause workers to be off-balance or awkward and will limit peripheral vision. Body heat will be difficult to dissipate. Chemical-protective clothing must be selected according to the contaminant of concern and its physical and chemical properties.

Note: PPE = personal protective equipment

For this project, all standard chemical-resistant gloves are acceptable for the primary COCs at the concentrations anticipated. This means that the SSHO may identify locally any available chemical-resistant glove (e.g., neoprene, nitrile, polyvinyl chloride, or natural rubber) for use in any conditions where there is either contact with contaminated soil or the contact is incidental (e.g., pressure washing tank interiors).

1.7 INSPECTION OF PPE

Before donning protective clothing, workers will visually inspect each garment to identify defects such as tears, cracks, holes, and delaminations, which may allow chemicals to penetrate the clothing. This inspection procedure will involve holding the clothing in the light to illuminate penetration points and stretching the fabric along stitched or bonded seams to confirm the structural integrity of the garment. The surface of the clothing will also be inspected for any signs of wearing, cracking, or degradation. Personal protective equipment that displays tears, perforations, or chemical degradation will be replaced.

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 safety glasses, chemical-protective goggles, and face shields, will be inspected for structural integrity and cleanliness. Goggles and glasses that are severely scratched will be discarded.

1.7.1 Monitoring PPE Effectiveness

The SSHO will make frequent checks on PPE being worn by workers to ensure effectiveness. Workers will be instructed and encouraged to report PPE deficiencies and relay suggestions for improvements to the SSHO. Results of PPE checks and reports from workers will be documented in the daily logs.

1.8 MEDICAL SURVEILLANCE PROGRAM

Bristol will comply fully with 29 CFR 1910.120(f)(6) and 29 CFR 1926.65(f)(6) at all times.

1.8.1 Medical Program

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

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

The specific requirements for this project include all of the above. These physicals and tests will be completed before personnel begin working on site. The Occupational Physician (OP) performing the physical examinations will be given a list of known site hazards and contaminants before performing fit-for-work examinations and testing. This list will include arsenic, as well as a copy of the OSHA arsenic standard, 29 CFR 1910.1018. A board-certified medical physician, Alexander Baskous, will provide the examinations.

Because of limitations on medical treatment available 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.

The elements listed below will be included in the medical surveillance program. Additional elements may be included at the discretion of the OP (Dr. Baskous).

- Complete medical and occupational history (initial examination only)
- General physical examination of major organ systems
- Pulmonary function testing, including functional vital capacity and forced expiratory volume one second (FEV 1)
- Comprehensive blood count with differential
- Blood chemistry screening profile
- Urinalysis with microscopic examination
- Audiometric testing (as required by the Hearing Conservation Program)
- Visual acuity
- Chest x-ray (this test will be performed no more frequently than every 4 years, unless directed otherwise by the OP)
- Electrocardiogram (as directed by the OP)

1.8.2 Frequency of Examinations

In addition to initial, annual, and exit medical examinations, workers must also receive medical examinations and be provided with emergency medical surveillance within 72 hours of the following:

- A worker being exposed to hazardous material(s) during a spill or emergency
- A worker exhibiting signs and symptoms of exposure
- A worker developing a lost-time injury or illness while involved in NE Cape site activity

Additional surveillance may also be required whenever the OP determines that examinations need to be conducted more frequently than once each year.

In most cases, the emergency surveillance will be conducted by the on-island EMT. Any worker who receives emergency medical surveillance on site will not be allowed to resume work at the site until the EMT issues a certificate of medical fitness.

A certificate of medical fitness will also be required before any worker who sustains a lost-time injury or illness on site will be permitted to resume work activities. The certificate will be issued to the worker by the EMT and must be received by the SS before the worker will be permitted to return to work.

1.8.3 Medical Data Sheet

A Medical Data Sheet will be completed by all on-site personnel and will be kept in Bristol's NE Cape field office by the EMT during site operations. Completion of this data sheet is required in addition to compliance with the medical surveillance program requirements. This data sheet will accompany any personnel when medical assistance is needed, or if transportation to hospital facilities is required.

1.8.4 Information Provided to the Occupational Physician

The OP will be furnished with the following information:

- Site information from Section 2.0 in the WP, Site Description, and Section 3, Scope of Work
- Information about each employee's anticipated or measured exposures
- A description of any PPE used or to be used
- A description of each employee's duties as they relate to the employee's exposures (including physical demands and heat/cold stress)
- A copy of 29 CFR 1910.120 or 29 CFR 1926.65
- Information from previous examinations not readily available to the examining OP
- A copy of Section 5.0 of NIOSH Publication No. 85-115, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*
- Information required by 29 CFR 1910.134, Respiratory Protection

1.8.5 Physician's Written Opinion

Before the fieldwork begins, a copy of the OP's written opinion for each employee will be obtained and furnished to the HSM and the employee. The opinion will address the employee's ability to perform fieldwork and will contain the following:

- The OP's recommended limitations on the employee's work and/or PPE usage
- The OP's opinion about increased risk to the employee resulting from work
- A statement that the employee has been informed and advised about the results of the examination

Medical records will be maintained in accordance with 29 CFR 1910.120, 29 CFR 1926.65, and 29 CFR 1910.1020.

1.9 AIR MONITORING

This section describes the air monitoring that may be performed at the NE Cape site. Airborne exposures to COCs may be assessed using both direct and indirect monitoring methods. Direct methods provide "real-time" measurements that can be used to make decisions in the field in regard to hazard control methods, levels of PPE, and work practice controls. Indirect methods involve more standard types of exposure assessment, such as collecting samples from workers' breathing zones and submitting the samples to a laboratory for chemical analysis. Indirect methods generally provide greater analytical precision than direct methods, but they do not provide data in real-time for on-site decision making. This type of sampling and analysis provides historical data for use in planning future activities.

All field instruments will be calibrated and maintained in accordance with the manufacturers' specifications. Field personnel may perform routine maintenance of field equipment. Air monitoring activities will be documented in the Daily Quality Control Report (DQCR).

1.9.1 Direct Methods

Real-time monitoring equipment that may be used at the NE Cape site includes a photoionization detector (PID). The PID provides the capability to detect a wide variety of organic and inorganic vapors and gases, particularly POL, solvents, and fuels. The PID will be the instrument used most often for initial characterization (screening) of soils and excavations activities, and it will be used periodically as work progresses to ensure that levels of PPE selected for operations remain appropriate.

Exposure limits that will be observed at the NE Cape site are those enforced by OSHA and recommended by the ACGIH. Where exposure limits differ between these two authorities, the lower exposure limit will be observed. Exposure limits for all contaminants discussed above are presented in Table 1-1.

1.10 NOISE MONITORING

Certain operations may exhibit a noise level exceeding the 85-decibel OSHA action level. As part of the medical surveillance program, all site personnel will have baseline audiometric tests before flying to NE Cape. Noise monitoring may be conducted by the SSHO, and personnel will wear hearing protection as directed by the SSHO. As a general rule, hearing protection will be worn when noise levels prevent conversation in a normal voice at a distance of 3 feet, or when work is conducted within 5 feet of heavy construction equipment.

Noise monitoring and calibration will be recorded in the field logbook, or on the Air Monitoring Data Record.

1.11 Site Control Measures

1.11.1 Work Zones

Work zones will be established daily. The configuration of the work zones will depend on the type of activity being performed (e.g., landfill capping, excavating, or sampling).

Excavations and other hazards will be demarcated to prevent people and vehicles from entering work zones.

1.11.2 Buddy System

The buddy system will be employed during most site activities. Employees will be required to be within the visual or oral presence of at least one other person when in a designated work zone. Certain field tasks can be done independently, such as the bear guard activities during fueling and mechanic activities, and the SS often will travel alone between sites during site reconnaissance and survey activities.

1.11.3 Communications

A variety of communications systems will be used for on-site and off-site communication. These include handheld radios, vehicle-mounted radios, telephones, air horns, hand signals, and posting of information. Bristol will establish and maintain a bulletin board at the construction camp where written off-site communications will be posted.

1.11.4 Handheld Radios and Telephones

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

1.12 GENERAL SITE RULES

1.12.1 General Safety Rules

The following general safety rules will be strictly followed on site:

- Bristol will maintain a safety and health bulletin board in an area commonly accessed by workers. The bulletin board will be maintained current, in clear view of on-site workers, and protected against the elements and unauthorized removal. The board will contain, at a minimum, the following safety and health information:
  - Map denoting the route to the nearest emergency care facility (EMT trailer)
  - Emergency radio contact numbers and phone numbers (for satellite phone)
  - Copy of the most up-to-date SSHP, with AHAs, mounted on or adjacent to the bulletin board and accessible on site by all workers
  - Copy of the Safety and Occupational Health deficiency tracking log mounted on or adjacent to the bulletin board, or the location stated where it will be accessible on site by all workers upon request
  - OSHA Form 300A posted in accordance with OSHA requirements and mounted on or adjacent to the bulletin board or the location stated where it will be accessible on site by all workers
  - Alaska Safety and Health promotional posters
  - Date of last lost work injury, including number of consecutive days without a lost work injury
  - Federal OSHA Safety and Health poster
- All Bristol and subcontractor personnel must attend the daily safety meeting.
- All site personnel will wear the PPE specified by this SSHP. This includes hard hats and safety glasses, which must be worn at all times in active work areas. Hard-toe shoes will also be worn in all construction areas.

- Facial hair (beards, long sideburns, or mustaches) that may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.
- Personnel must follow proper decontamination procedures.
- Eating, drinking, chewing tobacco or gum, smoking, and any other practices that may increase the possibility of hand-to-mouth contact are prohibited in the exclusion zones and the contamination reduction zones.
- All signs and demarcations will be followed. Such signs and demarcations will not be removed, except as authorized by the SSHO.
- All personnel must follow the work-rest regimens and other practices required by the heat stress program.
- All personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.
- No person will operate equipment unless trained and authorized to do so.
- Ladders will be solidly constructed, in good working condition, and inspected before use. No one may use defective ladders.
- Hand and portable power tools must be inspected before use. Defective tools and equipment will not be used.
- GFCIs will be used for cord and plug equipment used outdoors or in damp locations. Electrical cords will be kept out of walkways and puddles, unless protected and rated for the service.
- Eyewash stations will be positioned in work areas where hazards exist from corrosive liquids or other eye-damaging activities. The eyewash station will be capable of providing a 15-minute flow/supply of water, and extra eyewash fluids will be readily available.
- Improper use, mishandling, or tampering with safety and health equipment and samples is prohibited.
- Horseplay of any kind is prohibited.
- Possession or use of alcoholic beverages or controlled substances on any site is forbidden.
- All accidents, no matter how minor, must be reported immediately to the SS.
- All personnel will be familiar with the site Emergency Response Plan.

1.12.2 Prevention of Alcohol and Drug Use

The use of alcohol or illicit drugs at the NE Cape site or camp is prohibited. The SS will immediately terminate, from the site, personnel who are involved in such activities. Terminated personnel will be transported off site by the most expeditious manner possible.

1.12.3 Housekeeping

All work areas will be kept clean and orderly. The accumulation of rags and other combustible materials in uncontrolled areas is prohibited. Flammable liquids will only be stored in approved containers and locations. Access routes, particularly emergency access routes, will be free of all obstructions. Failure to comply with the combustible and flammable storage and emergency access requirements of this section will be considered an imminent danger, resulting in immediate cessation of affected operations until acceptable conditions have been met.

1.13 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 lines of communication required.

1.13.1 Medical Emergencies

Medical assistance will be limited at the NE Cape site. A medical clinic with a full-time EMT will be established at the site. The EMT will be available at all times during site work. First-aid kits will be available in trucks on site and at other site locations.

If a medical emergency is beyond the capability of Bristol and island personnel, a medevac will be initiated by the EMT and coordinated with hospital services in Nome.

Workers will be instructed to contact emergency assistance through company radios and satellite phones. The EMT will be given information about the COCs that may be encountered on site before the beginning of work. Emergency evacuation routes will be discussed in the daily safety meetings.

1.13.2 Fire Response

Firefighting services are not available at the NE Cape site. Bristol personnel will attempt to put out small fires with fire extinguishers or water hoses available on site. However, Bristol personnel are not trained in firefighting techniques. Under no circumstances will personnel be allowed to enter burning buildings or potentially endanger themselves during fire responses. Any fire conditions that appear to be beyond the limited capabilities of Bristol personnel will result in an evacuation of the immediate area, as discussed in Section 1.13.6 of this SSHP. The SS will be in command of all personnel during an emergency.

1.13.3 Environmental Emergencies

The SS will assess environmental emergencies, such as leaks or spills. Spill response and notification will be conducted in accordance with the Spill Prevention, Control, and Countermeasures (SPCC) Plan.

1.13.4 Site Security during Emergencies

Site security during emergencies and other unexpected events will be the responsibility of the SS. His primary responsibility will be to ensure the safe evacuation, treatment, and transport of site personnel, as warranted by the emergency. Under no circumstances will persons be allowed to enter evacuated areas or work areas during an emergency.

1.13.5 Lines of Authority

The SS will serve as the Site Emergency Coordinator (SEC), or may designate a qualified alternate. The functions of the SEC are as follows:

- In an emergency, notify the USACE.
- Maintain effective emergency plans for the site.
- Follow directions from the USACE regarding response actions.

- Make all regulatory agency contact through the USACE Contracting Officer.
- Contact the Bristol HSM, Project Manager, and Chief Executive Officer.

1.13.6 Evacuation and Safe Refuge

Evacuation routes on site will be clearly identified for all personnel and visitors and will remain accessible for the duration of the project. All areas used for response operations, emergency evacuation, and safe refuge will be contingent on the approval and authorization of the USACE. Bristol employees, USACE personnel, and visitors will be briefed on the general Emergency Response Plan, fire plan, and evacuation plan during initial site briefings. Specific evacuation routes, safe distances, and places of refuge will be established by the SS upon arrival on the island and before the commencement of site activities. For emergencies that occur within the construction camp, a general rally point has been established at the Old Airport Terminal pad. This location is across the prevailing wind direction and is also a safe distance from the runway. Under the Emergency Response Plan, each work team lead/foreman will be responsible for immediately performing a head count and conveying the results to the SS/SEC.

1.13.7 Communications

In the event of an emergency, the following means of communication will be used:

- Radios and satellite telephones, hand signals, and the line-of-sight buddy system.
- Air horns (three short blasts) to alert workers that an emergency requires evacuation. The SEC will communicate information about the emergency to personnel after everyone has arrived at the designated safe refuge area.
- If an evacuation is necessary, all equipment, activities, and operations will be shut down.

1.13.8 Emergency Contact Information

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

Emergency Contact Information

Organization / Personnel	Phone Number
Physician's Assistant	Available by radio
USACE Project Manager – Carey Cossaboom	907-753-2689
Northeast Cape Medical Clinic	Available by radio
Bering Air	Available by telephone
Bristol Project Manager – Molly Welker	907-244-7784
Site Superintendent – Chuck Croley	Radio contact
Alternate Site Superintendent – Maze Thompson	Radio contact
Bristol Chief Executive Officer – Steve Johnson	907-250-4955
Corporate Safety and Health Manager – Clark Roberts	210-863-9445
Site Safety and Health Officer – Chuck Croley	Radio contact
Alternate Site Safety and Health Officer – Russell James	Radio contact

Note:
USACE = US Army Corps of Engineers

1.13.9 Spill Prevention Program

The spill prevention program is outlined in the SPCC Plan (Appendix E of the Work Plan). If a spill occurs, the steps and procedures listed below must be taken to protect the health and safety of nearby personnel. Workers will be expected to do the following:

- Evacuate the area and contact the SS.
- Follow the Emergency Response Plan initiated by the response team.
- Swiftly transport any exposed personnel to the nearest medical facility for observation.

1.13.10 Evaluating Emergency Preparedness

The SS will contact the USACE in case of an emergency. Debriefings after an incident will include summaries from participants about changes needed and an overall critique of this SSHP. Changes, reviews, and updates to the SSHP may result from actual field conditions or changing conditions. No changes will be made without written approval from the USACE Project Manager and Contracting Officer.

1.13.11 Emergency Response Contacts

Emergency contacts listed in this SSHP may change. The SS will inform workers of any change in emergency procedures or contact information once the information is made available.

1.13.12 Adverse Weather or Other Environmental Conditions

In case of adverse weather or other environmental conditions, the SSHO, in consultation with the SS, will determine whether 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
- Earthquakes

1.14 Record-Keeping Requirements

All safety and health record-keeping requirements mandated by 29 CFR 1910.120, 29 CFR 1926, and 29 CFR 1904 will be followed. These records include injury and illness logs, accident/incident reports, site inspection reports, daily Toolbox Safety Meetings, monitoring reports, SSHO logs, and MSDSs.

Health and safety records will be maintained on site at the Bristol field office to fulfill all OSHA, Workers' Compensation, and insurance record-keeping requirements. These include the following:

- OSHA's Form 300, "Log of Work-Related Injuries and Illnesses:" This log is maintained at the project site. Each recorded injury or illness is entered in the log within 6 days after notice that a recorded case has occurred (29 CFR 1904.2).
- Bristol Industries Incident Report Form: A copy of this report (or insurance claim report) must be available within 7 days after receiving notice that a recorded case has occurred (29 CFR 1904.4).

Copies of these OSHA forms are included in Attachment 5 of the APP.

The nearest OSHA office must be contacted within 8 hours of the SS or SSHO being notified of an occupational fatality or multiple injuries (29 CFR 1904.39). The contact phone number is 907-269-4957.

1.14.1 Site Safety Inspection Documentation

Site safety inspections will be conducted by the Site Safety and Health Officer, Chuck Croley, or his alternate CQCSM, Russell James, and documented in the DQCRs and submitted to the USACE. This documentation will include safety inspections, work summaries, safety meetings, incident investigations, and other required documentation. An example of the SSHO Daily Inspection Log is included in Attachment 5 of the APP.

The SSHO's daily inspection documentation will contain the following, at a minimum:

- Date
- Work area(s) visited
- Number of employees in the work area(s)
- PPE and work equipment in use
- Special safety or health precautions (excavations, etc.)
- SSHO signature

A safety meeting will be held each morning before beginning work at a site. The daily meeting will be documented on the Toolbox Safety Meeting Record form (included in Attachment 5 of the APP). The daily meeting will be used to review the hazards associated with the activities planned for the day and measures to reduce the potential for incidents. The Toolbox Safety Meeting Record form will be included in the DQCR.

1.14.2 Personnel Sampling / Monitoring Reports

During the course of field activities, some personnel may use personal air sampling pumps or passive badge samplers or dosimeters. These types of equipment will be used to monitor exposures for workers involved in specific activities at work sites. These sampling activities will be documented in the field logbook and on the Daily Inspection Log maintained by the SSHO and the Air Monitoring Data Record, as necessary.

1.14.3 Accident / Incident Reports

An incident is defined as follows:

- A fatality
- Hospitalization of three or more workers
- An injury or illness that meets the OSHA recordability criteria
- A property/vehicle/equipment incident that results in damage greater than $2,000
- Cases involving first aid treatment

Accidents that result in minor first-aid treatment should be reported verbally to the SSHO and recorded in the first-aid log maintained at the infirmary.

If an accident or incident should occur, the SSHO is responsible for making sure all reports are completed.

Any accident or incident beyond first aid (a recordable event as defined by OSHA) or resulting in any property damage will be reported verbally and in writing to the Contracting Officer within a 24-hour period by using the USACE Pacific Ocean Division (POD) Form 265-E, Immediate Report of Accident (included in Attachment 5 of the APP).

Any accident resulting in a lost workday and/or property damage exceeding $2,000 will be reported both verbally and in writing. Verbal reporting will be provided immediately –

regardless of the time of day. The POD Form 265-R will be submitted to the USACE within 24 hours and the Engineer Form (ENG) 3394 (included in Attachment 5 of the APP) will be completed and submitted to the USACE within 72 hours of the accident.

USACE Engineer (ENG) Form 3394 will be completed and submitted within 5 days for injuries/illnesses beyond first aid or for property damages of $2,000 or more. (This form is located in Attachment 5 of the APP).

For accident reporting purposes, the SS will be responsible for notifying the USACE Contracting Officer's Representative or the on-site QAR of the incident before, or simultaneously with, notifying Bristol management personnel. In the event of an accident, the following personnel will be notified.

Telephone Contacts for Accident Reports

Title	Name	Work Telephone
Contracting Officer's Representative	Ron Broyles	907-753-5789
Alaska District Safety Officer	Harry (Buster) Goodwin	907-753-2896
USACE Industrial Hygienist	Steve Oneill	907-753-2681

USACE = US Army Corps of Engineers

Email Contact for Accident Reports

Title	Name	Email	Telephone
District Safety Officer	Doug Wootten	Harry.b.goodwin@usace.army.mil	907-753-2896

For Bristol corporate reporting requirements:

Reporting of Work-Related Fatality. The SS will report a work-related fatality as soon as possible after becoming aware of it, but no later than 4 hours after the fatality. The SS is required to report the fatality to the Bristol Project Manager and the Corporate HSM. If the SS is unable to report the fatality, the SSHO will report the fatality. If the Project Manager or the Corporate HSM is unavailable, the fatality must be reported to the Bristol Chief Executive Officer.

<u>Reporting of Work-Related Hospitalization</u>. The SS will report a work-related injury requiring hospitalization as soon as possible after becoming aware of it, but no later than 4 hours after the hospitalization. The SS is required to report the hospitalization to the Bristol Project Manager and the Bristol HSM.

<u>Reporting of Work-Related Injury or Illness</u>. The SS will report all lost-time injuries or illnesses to the Bristol Project Manager and the Bristol HSM as soon as possible, but no later than 8 hours after becoming aware of the injury or illness.

Bristol personnel will provide notifications to state or federal agencies. As previously indicated, the federal OSHA reporting telephone number is 907-269-4957. Instances involving a single employee hospitalization will be reported to Alaska State OSHA at 907-269-4995.

1.14.4 Safety and Health Information

The SS/SSHO will review safety and health issues daily, and this information will be reported in the DQCR. Safety and health issues will be discussed at the daily Toolbox Safety Meetings. The DQCR will also document all field activities performed at the site.

The DQCR will document the date, time, field activities performed, names of personnel, weather conditions, visitors to the site, areas where photographs were taken, calibration records for instruments, any air-monitoring results, and start and completion times of activities.

1.14.5 Hazard Communication Program / Material Safety Data Sheets

The SSHO, as part of site-specific training, will provide hazard communication training for all hazardous materials brought on site. The training will include reviewing the hazards of the chemicals, symptoms of exposure, first aid, MSDSs for spill control information, and appropriate labeling requirements. The MSDSs will be required for all hazardous materials used on site. The MSDSs will be maintained on site by the SSHO.

1.14.6 Safety and Health Phase-Out Report

At the completion of the project, a Safety and Health Phase-out Report will be prepared, and will include the following information:

- Summary of the overall success of the Safety and Health Program (accidents/incidents, injury/illness cases)
- Final decontamination documentation for equipment, vehicles, or facilities before demobilization
- Summary of exposure monitoring and air sampling results
- Signatures of the SSHO and the HSM

ATTACHMENT 2

Site Safety and Health Officer Resume

CHARLES (CHUCK) CROLEY

Site Superintendent / Site Safety & Health Officer

Years Experience
Total: >35; Bristol: 6

Areas of Expertise
Quality Control

Site Superintendent

Safety and Health Management

Fuel Storage Tank (FST) Installation and Removal

Well Drilling and Sampling

Mobilization and Demobilization to Remote Sites

Training and Certifications
Certified UST Worker, State of AK No. 172 (Installation/Retrofitting and Decommissioning)

Certified Safety Instructor-ATV Safety Institute-ID No. 120099

U.S. EPA/ AHERA-Asbestos Abatement Worker - AK No. 5249

30-Hour OSHA Construction Safety and Health

40-hour EPA/AHERA Asbestos Supervisor/Worker / plus 8-hour Refresher

40-hour HAZWOPER / 8-hour Supervisor / 8-hour Refresher, current

8-hour Entry to Confined Spaces

24-hour Excavation, Trenching, and Soil Mechanics

USACE Construction Quality Management for Contractors

Hazardous Materials Transportation (DOT/IATA)

Certified Erosion & Sediment Control Lead

Education
Laramie High School, Laramie, Wyoming, 1963

Bristol ALLIANCE OF COMPANIES

Mr. Croley has worked on remote site projects throughout Alaska for over 35 years. From 1968 to 1979, he worked for a variety of construction and drilling contractors that conducted soils investigation and mining exploration work. The soils investigations included work for geotechnical studies for the Trans-Alaska oil pipeline. Projects in mining fields included mineral exploration and hydrological studies for dam foundations. Mr. Croley is an experienced Site Superintendent, Health and Safety Officer, and Contractor Quality Control Systems Manager (CQCSM) for projects encompassing construction, aboveground and belowground fuel tank installations and removals, monitoring well drilling, sampling for a variety of media, reserve pit closures, demolition projects, and oil field investigations.

Professional Experience

- **Site Supervisor/SSHO, N.E. Cape HTRW Remedial Actions, USACE, Alaska District, St. Lawrence Island, Alaska (05/2011 – 10/2011; $18M).** Directed mobilization / demobilization activities for a 40-man camp and all related equipment, supplies, and personnel to conduct removal actions for 15 tons of arsenic-contaminated soil, 1,773 tons of PCB-contaminated soil, 5,550 tons of POL-contaminated soil, 105 tons of PCB hazardous waste soil, and 34 tons of miscellaneous metal debris. Related activities included setting up an on-site chemical analysis laboratory, rebuilding and maintaining roads, and rebuilding and maintaining the airstrip runway and parking apron. Responsible for the supervision and safety of staff. Oversaw support of an independent, USACE supported, NALEMP project.
- **Site Supervisor/SSHO, FUDS, Demolition Project, Fort Sumner Army Airfield, USACE, Albuquerque District, Fort Sumner, New Mexico (01/2011-02/2011; $300K).** Directed demolition of various structures at WWII-era FUDS site to remove ongoing potential hazards. Activities included structure demolition, demolition and backfilling of various foundations, and the removal of metal hazards.

Supported site inspection activities that included monitoring well installations and closing water wells. Soil sampling activities included trenching/excavation activities. Oversee the removal of all demolition debris from the site.

- **Site Supervisor/SSHO, N.E. Cape Debris Removal, Landfill Cap, and Soil Removal, USACE, Alaska District, St. Lawrence Island, Alaska (05/2010 – 10/2010; $7.8M).** Directed mobilization / demobilization activities for a 40-man camp and all related equipment, supplies, and personnel to conduct debris removal from a landfill and construct a legal landfill cap; locate and remove in excess of 800 tons of PCB-contaminated soil; locate, remove, screen, and ship off-site 2500 tons of POL contaminated soil; conduct water and soil studies; set up a portable chemical analysis laboratory; and conduct debris removal activities from tundra / wetlands. Responsible for the supervision and safety of staff. Conducted three separate tours of the project for visiting dignitaries, ranging from one to 26 participants.
- **Site Supervisor/SSHO, FUDS, Tierra Amarilla Air Force Station, USACE, Albuquerque District, Tierra Amarilla, New Mexico (04/2010; $223K).** Directed a subcontractor for the excavation, removal, and shipment offsite of 360 tons of debris and the demolishment of physical hazards, such as open manways and a deteriorating sewage system with several large septic tanks.
- **Site Supervisor/SSHO, N.E. Cape In-situ Chemical Oxidation (ISCO) and Intrusive Drum Removal/Landfill Cap, USACE, Alaska District, St. Lawrence Island, Alaska, (05/2009 – 10/2009; $6.2M).** Directed the mobilization of a 30-man-camp and related heavy construction materials and equipment, via barge and landing craft, from Anchorage, Alaska to St. Lawrence Island, Alaska, which is located roughly 130 miles offshore west of the western coast of Alaska. Responsible for the supervision and safety of all Professional staff, equipment operators, laborers, surveyors, subcontractor personnel, and camp staff. The project included an In-situ Chemical Oxidation study on a subsurface hydrocarbon plume in arctic terrain and conditions. The project also included an intrusive removal of old drums containing waste oil that had been placed in a landfill, where the oil was recovered and the drums cleaned and reburied as inert debris in the landfill. The project included mining, hauling, and placing 28,000 cubic yards of cap material for the landfill and then re-vegetation of the landfill cap area. At the end of the project, all waste material, equipment, and camp were loaded on barges and demobilized.
- **Site Supervisor/SSHO, Clean and Inspect Diesel Fuel Tanks, FAA, Biorka Island and Level Island, Alaska (2008; $93K).** Supervised cleaning and inspection of diesel tanks and other activities. The scope of work included preparing planning documents and reports; mobilizing and demobilizing to and from Biorka Island; cleaning and inspecting five 20,000-gallon ASTs on Biorka Island; inspecting the secondary containment of the 20,000-gallon tanks; mobilizing and demobilizing to and from Level Island; and cleaning and inspecting two 10,000-gallon ASTs on Level Island.
- **Site Supervisor/SSHO, Phase II and Phase III, Landfill Remedial Action, FAA, Cape Yakataga, Alaska (Summers of 2007 and 2008; total project for two years: $14.3M).** Supervised remedial action activities for Bristol Construction, LLC on FAA project. Phase II and Phase III. Project included the excavation, containerization, and transportation of dioxin affected soil from an old landfill. During Phase II soil was placed in 8’ X 20’ containers,

trucked 40 miles and then loaded on Landing Craft and barges for transportation to the disposal site in Oregon. Phase III of the project involved loading the soil into 9 cubic yard supersacks, trucking the 40 miles and loading the supersacks onto Landing Craft and barges for transportation to the final disposal site in Oregon. Both phase of the project involved waste characterization and confirmation sampling for chemical analysis. Monitoring wells were installed for monitoring. Final site restoration included the establishment of a borrow source, hauling the backfill 8 miles, regarding the site, site restoration that included grass seeding, tree planting, and stream bank restoration to ADEC guidelines.

- **Site Supervisor/SSHO, Kodiak Air Traffic Control Tower (ATCT) AST Upgrades, FAA, Kodiak, Alaska (2007; $98K).** Supervised the removal of a 2,000-gallon AST and replaced with a newly designed 1,000-gallon AST. Installation included new fuel piping. Outside piping was secondarily contained and interior piping upgraded to include new fuel filtration and valve system. A new VeederRoot monitor and inventory control system was installed.
- **Site Supervisor/SSHO, Cold Bay AST Upgrades, FAA, Alaska (2007; $93K).** Supervised AST upgrade activities for Bristol Construction Services, LLC. Site activities included the removal of an old 500 gallon, single wall AST and associated piping with a newly designed 500 gallon double walled AST and new associated piping and the installation of a VeederRoot monitoring and inventory control system.
- **Site Supervisor/SSH, Biorka Island Groundwater Investigation, FAA, Alaska (2006; $99K).** Supervised the emergency removal of a 1000 gallon AST, the survey of a previously removed pipeline, the location of 5 historical POL release areas and the soil sampling of these areas for contaminants, and the air monitoring and sampling of a area underneath an occupied building to determine the presence of any contaminants.
- **Site Supervisor/SSHO, ATCT UST Upgrades, FAA, Anchorage, Alaska (2006; $45K).** Supervised UST upgrade activities for Bristol Construction that involved with the reconditioning of manway protective coating and pulling all of the fuel and return lines and replacing with new lines and valves. The project also called for the installation of new piping that would allow a newly installed emergency generator to use the UST as a primary fuel source.
- **Site Superintendent/SSHO and Equipment Operator, Airport Tower Installation, FAA, Adak, Alaska (2005; $500K).** Directed a project that involved the upgrades of navigation aids at a Critical Navigation Site without the disruption of services. The scope of work included resealing two radomes by re-caulking and re-bolting (in excess of six thousand bolts and gaskets), demolition of two remote communication air/ground (RCAG) antennas and construction of two new RCAG antennas inside the radomes; the installation and burial of electrical and communications cables in over 300 lineal feet of trenches; the installation of two uninterruptible power supply systems (UPS); the construction of three new antennas (C-3, Glideslope, and Localizer); the repair of the main power supply box; and the installation of a new LCD lighting system on the NDB towers. The project also included installation of a new monitoring system, new piping, and the repair of an aboveground storage tank (AST) that furnishes fuel to the site emergency generator.

- **CQCSM, N.E. Cape Debris and Tram Demolition, U.S. Army Corps of Engineers (USACE), Alaska District, St. Lawrence Island, Alaska (2005; $5.2M).** Set up the Project Quality Control and Site Safety Management System at the start of the fieldwork. Conducted all beginning of field project orientations and Preparatory inspections. Conducted five safety classes for all-terrain vehicles per EM 385-1-1.
- **CQCSM/Alternate SSHO, Landfill Project, CH2M Hill Constructors, Inc. (CCI), U.S. Air Force, Shemya, Alaska (2005; $2.1M).** Project involved capping an old landfill and constructing a new landfill with an adjoining asbestos cell. The project involved the excavation, placement, and grading of 112,000 cubic yards of three different soils types for the designed capping of the old landfill and excavation of 80,000 cubic yards in the construction of the new landfill and asbestos cell.

Professional Experience

- **Harding Lawson Associates, Anchorage, Alaska (01/1979 – 10/2004).**
  - Site Superintendent/ SSHO, and CQCSM for the Bureau of Land Management, and Equipment Operator for R & R Lodge Fuel Spill Cleanup, Alaska Range (2004; $100K). This project entailed excavation and sampling activities for a fuel spill from a fuel bladder and containment area at a remote hunting lodge in the Alaska Range. The project included the excavation of 55 cubic yards of fuel-contaminated soil over bedrock, alongside a short (1,600-foot) active airstrip, to a depth of 9 feet. Excavation was accomplished with small equipment. Five cubic yards of soil were removed from the site by small aircraft (Cessna 206) and 50 cubic yards were stockpiled on a liner for land-farming activities.
  - Contract Site Supervisor, Closure Activities at an Inactive Reserve Pit, Chevron/Texaco, West Kavik, Alaska's North Slope (2004; $750K). The first phase consisted of mobilization, construction, and demobilization of a remote site camp with Rolligons. The camp included power generation, freshwater treatment, grey water treatment, and cooking facilities, as well as living accommodations for 20 persons. The second phase consisted of mobilization and demobilization of equipment capable of mining approximately 8,500 cubic yards of gravel from an old airstrip and placing the gravel on top of an inactive reserve pit. Acted as SSHO while he was on site.
  - Site Superintendent/SSHO, Restoration at Red Devil Mine, BLM, Alaska (2003; $450K). Project consisted of demolition activities, a site investigation, and a historical site sampling activity for restoration at Red Devil Mine, a remote Alaska site where all equipment and personnel were mobilized by aircraft. The project included the demolition of six ASTs ranging from 200- to 350-barrel tanks and an ore hopper and ore-crushing facility. Project included the on-site burial of materials from demolition activities (including metal, wood, and concrete). Demolition activities took place in supplied air because of the presence of lead and mercury contaminants. A site investigation was conducted using a probe-pounding rig. A successful Historical Site Investigation was conducted for an ore house that had been destroyed more than 50 years prior and the site had been built over. The investigation was conducted using present-day air photos, old maps and field books, and a backhoe.

- Contract Field Operations Manager, Closure Activities at Inactive Reserve Pits, Glenn Springs Holdings, Inc., a subsidiary of Occidental Petroleum, North Slope, Alaska (2002-2003; $1.25M). This project involved closure activities at three inactive reserve pits sites on the North Slope, Alaska. The first phase was the planning and mobilization of drilling equipment mounted on Rolligons to complete a subsurface investigation, and estimate drilling wastes and volumes of clean drill pad gravel. The second phase included the route selection and building and maintenance of eight miles of ice roads over tundra and river bottoms. The second phase also included the excavation and transport of 9,500 cubic yards of drilling wastes to the grind-and-inject facility at Prudhoe Bay from the reserve pit, and the hauling and placement of clean gravel, via Rolligon, at a third reserve pit. The work involved coordination among three oil companies and their contractors.
- CQCSM/Alternate SSHO, Demolition and Site Restoration, USACE, Alaska District (2001-2003; $5M). Managed demolition and site restoration of the Tok Fuel Terminal, Alaska. Site tasks included researching historical photographs; asbestos, polychlorinated biphenyls (PCBs), and lead-based paint (LBP) sampling; conducting a landfill investigation; construction of a solid waste landfill that included an asbestos cell; the removal and packaging of hazardous wastes; the removal of petroleum, oils, and lubricants (POL)-contaminated soil; site-wide abatement and disposal of asbestos and LBP; demolition and burial of 23 buildings; demolition and burial of four 1,000-gallon FSTs, one 1,000-barrel water storage tank, and one 5,000-barrel FST; and demolition and removal of one 1,000-barrel FST, two 5,000-barrel FSTs, nine 30,000-barrel FSTs, and 30,000 lineal feet of tank-farm-related fuel and fire retardant pipelines.
- CQCSM/Alternate SSHO, School Demolition Project, USACE, Alaska District, Eielson Air Force Base (2001; $1.2M). Managed the demolition of the Ben Eielson Taylor Elementary School, Eielson AFB, and the construction of an Olympic-sized soccer field, a softball field, bleachers and fencing of the entire sports complex. Complicated demolition and disposal activities were involved, including security concerns with off-site disposal of debris, asbestos removal prior to demolition, and suspected mercury releases. Construction included leveling and placement of several types of soils, installation of an underground water hydrant system, concrete, asphalt, grass seeding, and fencing activities. Supervised quality control for contractor and subcontractor activities.
- CQCSM/Alternate SSHO, Demolition of Long-Range Radar Station, USACE, Alaska District, Fort Yukon, Alaska (1999-2002; $5M). Managed multifaceted demolition of a long-range radar station. Directed removal and long-term storage of more than 650 cubic yards of POL-contaminated soils. Supervised asbestos removal and asbestos storage of materials from 13 buildings, four radar towers, and utility facilities; demolition of two 60-foot by 60-foot and two 120-foot by 120-foot radar towers; demolition and debris removal of 12 buildings; decommissioning and demolition of 26 ASTs; construction of a solid waste landfill; placement of various types of demolition debris in the landfill, including use of an asbestos cell; and capping of the landfill to State of Alaska criteria. Conducted soils exploration program and water sampling; constructed new fuel storage and monitoring system. Installed biovent system.
- CQCSM/SSHO, FST Upgrades, USACE, Alaska District/FAA, Various Locations, Alaska (1998). Responsibilities included on-site construction management and health and safety, developing reporting documents, and assisting in planning and submittal of documents Managed FST upgrades at Port Heiden, Wrangell, Metlakatla, Sand Point, and Dillingham, Alaska. Project entailed removal of seven regulated underground storage

tanks (USTs) and one AST, and installation of five ASTs for prime fuel sources at remote navigation aid sites. Fuel systems included lead detection, inventory control, and remote site monitoring systems.

- CQCSM/SSHO, Tank Removal and Soil Remediation, USACE. Alaska District, Galena Air Force Station (AFS), Alaska (1997). Responsibilities included on-site construction management and assisting with completing planning and reporting documents, managing submittals, performing network analysis, and submitting pay requests. Managed cleaning of three bulk fuel ASTs; decommissioning of three USTs; and construction, operation, and maintenance of a 5,100-cubic-yard bioremediation cell. The project included demolition, asbestos abatement and waste management.
- CQCSM/SSHO, UST Removal at the Galena AF Power Plant, USACE, Alaska District, Galena, Alaska (1996-1997). Responsibilities included on-site construction management, site safety, and assisting with completing planning and reporting documents, managing submittals, performing network analysis, and submitting pay requests. The project included removal of two 12,000-gallon and two 25,000-gallon fuel USTs and five 55- to 1,000-gallon USTs that contained fuel and oil/water separator waste; removal and stockpiling of 700 cubic yards of contaminated soil; installation of two 30,000-gallon ASTs at a remote site off the road system.
- Contract Site Superintendent, Reserve Pit Closeout, Exxon Mobil, Flaxam Island, Alaska (2000-2001; $7.5M). Provided construction and safety oversight and permit compliance for closeout of two inactive reserve pits on Alaska's North Slope. Winter 2001 activities included drilling a new 2,500-foot disposal well for grinding and injecting reserve pit wastes; excavation of two inactive reserve pits and two flare pits; confirmation sampling and on-site laboratory analyses; slurrying and injecting cuttings; and reviewing and verifying quantities and pay items. Winter 2002 activities included construction of a 68-mile offshore ice road on the Arctic Ocean; excavation of contaminated soil from reserve pits, and the excavation and hauling of 20,000 cubic yards of drilling wastes to the Prudhoe Bay grind and injection facility. Project considerations included sensitive wildlife habitats, construction in arctic conditions, and North Slope safety requirements. Job range: $7.5 million.
- Contract Site Quality Control Manager, Quality Assurance Monitoring, Alaska Department of Natural Resources, Joint Pipeline Office (JPO) for the Northstar Development Project, Point McIntyre/Point Storkerson, North Slope, Alaska ($3M). Provided in-field quality assurance monitoring during construction of two 10-inch pipelines running from Seal Island, offshore, to Point McIntyre, onshore, and then onshore and terminating at BP's Gathering Center 1. The offshore underwater pipeline portion was approximately 6 miles long and depths to 50 feet.
- Site Superintendent, Cleanup at Fuel Site, Exxon Company, USA, Flaxman Island, Alaska Cleanup project at a former fuel storage area at the Alaska State A-1 drill site on remote Flaxman Island in the Beaufort Sea. The project involved the use of a field laboratory to field screen and segregate 1,000 cubic yards of soil during the winter. The excavated contaminated soil was then transported, via Roligon, back to the Prudhoe Bay area for treatment.
- Site Superintendent, Inactive Reserve Pit Investigations, for Exxon Company, USA, Flaxman Island, Alaska. The project consisted of winter investigations of two inactive reserve pits at Alaska State A-1 and G-2 drill sites on Flaxman Island, Alaska, a remote

Island in the Beaufort Sea. The investigations included relocation of the reserve pits, soil drilling with a drill rig transported via Roligon, excavation of trenches (in permafrost materials) for drill mud sampling and investigating the use of liners.

- Contract Site Quality Control Manager, Quality Assurance Monitoring, Alaska Department of Natural Resources, JPO for the Alpine Development Project, Colville River, North Slope, Alaska. Provided in-field quality assurance monitoring during horizontal directional drilling and installation of four pipelines beneath the Colville River. The crossing was approximately 4,100 feet long.
- Construction Manager/SSHO, Development of Soil Gas Recovery System, USACE, Alaska District, Fort Wainwright, Alaska. Provided construction management of an experimental soil gas recovery system that included the installation of two horizontally drilled wells, a 1,000-foot-long air-injection well, and a 750-foot-long vapor-extraction well. The experimental system included the installation of a variety of monitoring wells and nuclear density probe wells, as well as the compressor plant for the air injection. Also implemented site safety plan.
- Construction Superintendent/SSHO, FST Improvements, FAA, McGrath, Alaska.
- Supervised project to decommission eight FSTs and install seven FSTs. Also responsible for site safety.
- Construction Superintendent/SSHO, FST Improvements, FAA, Bethel, Alaska. Supervised the decommissioning of 14 FSTs and installation of 9 FSTs. Also responsible for site safety.
- Construction Superintendent/SSHO, UST Decommissioning, FAA, Cordova, Alaska. Supervised the decommissioning of 19 FSTs and installation of nine FSTs. Responsible for site safety.
- Construction Superintendent/SSHO, UST Decommissioning, Municipality of Anchorage, Alaska. Directed field operations for decommissioning of three USTs at a power-generating facility.
- Construction Superintendent/SSHO, FST Replacement, FAA, Statewide Alaska (1990-1998). Directed field operations for the FAA for Alaska (statewide) FST replacement project to decommission USTs and ASTs, construct new fuel systems, and clean up fuel-affected soil. Responsible for site safety. Completed projects at four Anchorage and 16 rural locations, involving 190 USTs and ASTs, 122 decommissionings, 79 installations, and 11 upgrades.
- Senior Technician, Hunters Point Annex Restoration, USACE, San Francisco, California. Logged borings, field-screened soil samples for radiation, installed and sampled monitoring wells, located drill borings for future projects, and mapped dump sites suspected of containing radiation-affected waste.
- Drilling Superintendent/Senior Technician, Groundwater Investigations, FAA, Bettles, Alaska. Performed groundwater investigations. Supervised drilling and environmental soil and water sampling program to trace the limits of a contaminant plume. Responsible for site safety.

- Drilling Superintendent/Senior Technician, Reserve Pit Monitoring, Confidential Client, Kenai, Alaska. Supervised a reserve pit monitoring project over a two-year period. Supervised field operations including drilling, environmental soil sampling, and groundwater testing for possible groundwater contamination.
- Drilling Superintendent, Milne Point Gravel Study, for Conoco, Inc., North Slope, Alaska. Directed a drilling and soil sampling program for gravel mine site exploration.
- Drilling Superintendent, Drilling and Soil Sampling Program at the Point McIntyre Development, ARCO Alaska, Inc., North Slope, Alaska. Supervised a drilling and soil sampling program for a foundation study for a drill pad design and pipeline construction. Installed a ground temperature monitoring system. Drilling activities included onshore and over-ice operations.
- Drilling Superintendent, Field Investigation, Sohio Petroleum Company, Beaufort Sea, Alaska. Supervised field investigation for the Endicott Geotechnical Investigation, which involved drilling onshore and offshore soil borings, and performing in-situ testing to establish design criteria for the development of Endicott oil field facilities. Coordinated field crews, maintained all equipment, and troubleshot drilling problems.
- Superintendent/Senior Technician, U5-A Slab Investigation, ARCO Alaska, Inc., North Slope, Alaska. Supervised drilling for an environmental soil sampling and geotechnical drilling program inside a warehouse in a permafrost area. The purpose of the project was to investigate a foundation failure and related chemical release.
- Drilling Superintendent, Support for FST Decommissioning, USACE, Alaska District, Various Sites throughout Alaska. Served as drilling superintendent for FST decommissionings and installations, soil and water investigations and studies, and remedial action and construction projects.
- Senior Technician, Remedial Investigation, USACE, Sacramento District, at Fort Ord, California. Performed remedial investigation for the installation and sampling of monitoring wells, and collection of inventory and control samples.
- Senior Technician, Heavy Metal Sampling, ARCO Alaska, Inc, Prudhoe Bay, Alaska . Developed a system to sample for heavy metals in high-pressure natural gas at Prudhoe Bay, Alaska.
- Senior Technician, Soil Sampling, Exxon Company, U.S.A, Seward and Valdez, Alaska. Conducted environmental soil sampling programs on and around contaminated soil stockpiles
- Senior Technician, Soil Sampling, Confidential Client, Beluga, Alaska. Conducted environmental soil sampling programs on a soil bioremediation project near Beluga, Alaska. The sampling took place at several remote gravel pads in southcentral Alaska. Directed the initial construction of two bioremediation cells.
- Senior Technician Tatitlek Soil Remediation Project, Exxon Company U.S.A., So
- Senior Technician, Sampling and Monitoring System, Chevron U.S.A., Inc. Directed drilling operations for sampling the core of a man-made ice island and constructing a monitoring system in the Beaufort Sea, Alaska. Conducted over-ice sampling for future ice or gravel island drilling locations.

- Senior Technician, Groundwater Investigation, State of Alaska, Minto, Alaska. Responsible for overseeing groundwater investigation and permanent abandonment of a freshwater production well.
- Senior Technician, Seismic Monitoring System Development, ARCO Alaska, Inc. Directed drilling operations and recovery of seismic equipment, and construction of a seismic monitoring system for a production well test (UGNU tiltmeters) on the North Slope, Alaska.
- Senior Technician, Reserve Pit Closeout, ARCO Alaska, Inc., and Conoco, Inc, North Slope, Alaska. Directed drilling and environmental soil sampling for reserve pit closeout permit requirements on the North Slope of Alaska, using hollow-stem auger and coring systems. Installed permanent ground temperature monitoring systems. Collected and field tested surface-water samples to monitor closeout permit compliance.
- Senior Technician, Drilling and Sampling Programs, Exxon Company, U.S.A, Alaska. Conducted drilling and sampling programs at a remote arctic exploration site (Point Thomson Units 1 and 4, North Slope, Alaska) during summer and winter. Directed bioremediation activities at the same site, including mobilization and demobilization of workers, equipment, camp facilities, and bioremediation work, using marine and overland transportation.
- Senior Technician, UST Removal at the Alaska Aviation Heritage Museum, Municipality of Anchorage, Alaska. Responsible for overseeing the removal of three USTs in a shallow groundwater area.
- Senior Technician, Site Investigation, Confidential Client, Anchorage, Alaska. Performed service station site investigation and directed drilling operations for soil testing around buried facilities and utilities.
- Senior Technician, Support Causeway, Municipality of Anchorage, Alaska. Drilled five offshore borings and performed cone penetrometer tests for a causeway linking Anchorage and Fire Island.
- Senior Technician, Third Avenue Shelter Project, Municipality of Anchorage, Alaska. Drilled three borings in an earthquake slide area in which cone penetrometer testing was conducted to a depth of 120 feet.

♦ **Senior Technician, Municipality of Anchorage Projects, Alaska.** Participated in the following area projects:

- Peters Creek Watershed Improvement District (W.I.D.)
- Nancy Local Improvement District 174 and W.I.D.
- Chester Creek Oil and Gas Separators
- West 42nd Avenue
- West High Culvert
- 56th Street Walls
- Girdwood Anchorage Telephone Utility Site
- 39th and 40th Streets, Anchorage Telephone Utility Site
- Southeast Interceptor Project

- Bear Valley Anchorage Telephone Utility Site
- Chugiak Fire Station
- Hiland Drive Slope Stabilization
- Diamond Trunk Storm Drainage Study
- Senior Field Technician/Drilling Superintendent, Geotechnical Investigation, ARCO Alaska, Inc. Performed geotechnical investigation for Prudhoe Bay Unit reserve pits on the North Slope of Alaska. Work consisted of drilling and logging test borings via 3-inch frozen cores. Project objective was to measure the depth of chemical contamination beneath the reserve pit. Collected soil samples for chemical analyses.
- Senior Field Technician/Drilling Superintendent, Groundwater Investigation, Union Oil Company of California. Performed groundwater investigation on the Kenai Peninsula, Alaska. Drilled borings and sampling soil and groundwater for geochemical analyses to evaluate impacts on groundwater resources and potential contaminant transfer.
- Senior Field Technician/Drilling Superintendent, Site Investigation, Butler Aviation, Anchorage, Alaska. Performed site background investigation. Drilled borings and sampled soil and groundwater for geochemical laboratory analyses.
- Senior Field Technician/Drilling Superintendent, Sampling Program, ARCO Alaska, Inc. Performed work on an environmental project on the North Slope of Alaska, to explore possible effects of dispersion and biological accumulation of chemical contaminants in tundra. Duties included sampling surface water, soil, and vegetation at 250 sampling points for geochemical analyses. Assisted in field measurements of pH, electrical conductivity, and dissolved oxygen content of water.
- Senior Field Technician/Drilling Superintendent, Groundwater Investigation, ARCO Alaska, Inc. Performed an investigation to examine the potential for reserve pit water to seep through gravel containment berms on the North Slope, Alaska. Assisted in installing and monitoring instrumentation to identify groundwater characteristics in saturated and unsaturated zones, and to profile ground temperatures. Collected groundwater, soil, reserve pit water, and drilling reserve samples for geochemical analyses.
- Senior Field Technician/Drilling Superintendent, Multiphase Groundwater Investigation, Confidential client, Alaska. Performed multiphase investigation of impacts of plant discharges on groundwater in a multi-aquifer system for the Bernice Lake Power Plant in Alaska. During the initial phase, performed geochemical sampling of groundwater to evaluate potential problems. In Phase II, assisted in installing and monitoring groundwater and ground temperature instrumentation.
- Senior Field Technician/Drilling Superintendent, Soil and Groundwater Investigations, Tesoro Alaska Petroleum, Alaska. Performed soil and groundwater contamination investigation for an underground hydrocarbon spill at an industrial facility. Participated in drilling test borings and sampling soil and groundwater.
- Senior Field Technician/Drilling Superintendent, Preliminary Site Investigation, Pacific Gas and Electric's Hinkley Compressor Station in Hinkley, California. Performed preliminary site appraisal and participated in collecting groundwater samples from approximately 100 wells including domestic, agricultural, public water supply, and industrial wells in an investigation of chromium-contaminated groundwater.

- Senior Field Technician/Drilling Superintendent, Geotechnical Investigation, ARCO Alaska, Inc. Performed geotechnical investigation project, sampled soil, performed resistivity testing, and installed thermistors as part of freeze-thaw studies to redesign a flare pit on the North Slope, Alaska.
- Senior Field Technician/Drilling Superintendent, Boring and Sampling Program, America North, Inc./Alaska Gold Nome, Alaska. Drilled borings for the Steadman Field Site Investigation, and sampled soil contaminated with mercury and arsenic in Nome, Alaska. Project included investigating a waste disposal area.
  - Other related project experience includes the following:
    - Duck Island Development Area, Beaufort Sea, Alaska
    - Port of Nome Over-Ice Investigation, Nome, Alaska
    - Soil Boring Programs, Trans-Alaska Pipeline Route
    - Mukluk Island Site, Beaufort Sea, Alaska
    - Offshore Drilling, Beaufort Sea, Alaska
    - Drilling of Five Island Sites, Beaufort Sea, Alaska
    - Wharf and Docking Facilities, Afognak Island, Alaska
    - Rotary Drilling and Wireline Coring, Remote Island in Indian Ocean
    - Alpine Permafrost Institute, Pikes Peak, Colorado

♦ **Driller, Senior Technician, Drill Superintendent, Construction Superintendent, and Field Operations Manager, MACTEC Engineering and Consulting Inc., and its predecessors (Harding ESE and Harding Lawson Associates) (1979 to 10/2004).** Performed the role of CQCSM and alternate SSHO on many USACE Projects throughout Alaska. Description of duties in the various positions are as follows:

- As senior technician, responsibilities included installing monitoring wells; sampling water and soil; handling oil and hazardous substances; performing field measurements on water samples; installing soil-gas wells; and installing thermistors, manometers, and piezometers. Conducted freeze-thaw studies, cone penetrometer tests, permafrost investigations, and percolation tests.
- As general drilling superintendent, operated and maintained drilling equipment, supervised drill crews, and was responsible for site safety. Experienced with permafrost drilling, refrigerated coring, mineral exploration, dam foundation drilling and testing, over-water and over-ice operations, and helicopter drilling.
- As construction superintendent, mobilized and demobilized construction crews and materials to various remote Alaska sites via air, land, and water transportation. Provided oversight for removal and storage of contaminated soil, decommissioning of USTs and ASTs, and installation of new FSTs and distribution systems, and was responsible for site safety.

Additional Training and Certifications

Certified in UST Installation/Retrofitting, International Code Council
No. 1057168-U1

Certified in UST Decommissioning, International Code Council-No. 1057168-U2

Certified in the Use of Nuclear Testing Equipment – Alaska No. 16619

40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER), plus 8-hour Supervisor and 8-hour Refresher, Bristol Industries

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

24-hour Construction Project Administration

Hydrogen Sulfide Safety Training

Radiation Protection Training

10-hour Construction Safety

Defensive Driving Training

Bristol
ALLIANCE OF COMPANIES™

Chuck Croley

Has completed 8 hours of annual refresher training as required by

29 CFR 1910.120

Hazardous Waste Operations & Emergency Response

March 29 , 2012

Clark Roberts, C.I.H.
Instructor

OSHA Occupational Safety and Health Administration

35-600697976

This card acknowledges that the recipient has successfully completed a 30-hour Occupational Safety and Health Training Course in **Construction Safety and Health**

Chuck Croley

Maxey Riggs 2-16-18

(Trainer name — print or type) (Course end date)

RUSSELL C. JAMES

Environmental Scientist

Years Experience
Total: 9; Bristol: 5

Areas of Expertise
Environmental Sampling and Monitoring

Contaminated Site Assessments/Remediation

Construction Quality Control Systems Management

Remote Site Logistics

Geographic Information Systems

Trimble Geographic Positioning Systems

Data Management

Training and Certifications
AK Certified Erosion and Sediment Control Lead (CESCL)

30-Hour Occupational Safety and Health Training

U.S. Army Corps of Engineers, Construction Quality Management for Contractors

HAZWOPER Supervisor Training – 3/ 2009, Bristol Industries

8-Hour HAZWOPER Training

CPR and First Aid for Adults, National Safety Council®

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

Hazardous Materials Transportation (DOT/IATA)

Defensive Driving Training

Education
B.S., *magna cum laude,* Environmental Geography; Minor, Geology, Valdosta State University, Valdosta, Georgia, 2005

Bristol ALLIANCE OF COMPANIES™

Since 2003, Mr. James has gained proficiency and expertise in Geographic Information Systems (GIS) and Geographic Positioning Systems (GPS). He has integrated GPS and GIS for a number of projects with local governments, the US Army Corps of Engineers® (USACE) and private organizations, and is adept at incorporating GIS/GPS with environmental sampling, remediation and mapping. He is well versed in databases, data review and skilled in the use of ArcGIS, Geomedia Professional and Trimble® GPS equipment and software. Since 2007, Mr. James has been performing environmental field work in Alaska, Arizona, Washington and New Mexico. His experience includes collecting soil, sediment, surface water and groundwater samples; soil boring and monitoring well installations; remote site logistics, including remote Alaska sites; underground storage tank removal; conducting Phase I Site Assessments; and writing Removal Action and Site Investigation reports.

As an Environmental Scientist for Bristol, Mr. James is responsible for environmental sampling and monitoring, including soil boring and well installations, data collection, data review and GIS mapping; conducting site assessments and site investigations; participating in Removal Actions; and writing reports. Mr. James has spent three years serving as Construction Quality Control Systems Manager (CQCSM) for removal actions at remote Alaska sites.

Project Experience

- **Construction Quality Control Systems Manager (CQCSM) and Environmental Scientist, Northeast Cape Hazardous, Toxic, and Radioactive Waste (HTRW) Remedial Actions, USACE, Alaska District, St. Lawrence Island, Alaska (07/201 – 10/2011).** This project was a removal action performed at a former air force station on St. Lawrence Island consisting of the removal of DRO-, PCB- and arsenic-contaminated soil and debris removal. Responsibilities included ensuring contract specifications between USACE and Bristol were met; providing oversight for various activities performed in the field; and acting as liaison between Bristol and USACE. Tasks involved daily reporting to USACE through Daily Quality Control Reports (DQCRs), GPS, and GIS mapping services, meeting with subcontractors, conducting morning safety meetings, acting as interim Site Superintendent and Site Safety and Health Officer (SSHO), reporting to the Bristol home office, environmental sampling, authoring planning documents, and writing the Removal Action Report.

- **CQCSM and Field Technical Lead, Site Inspections of Kiska and Amchitka Islands Military Munitions Response Program (MMRP) Projects, and HTRW and CON/HTRW Projects, USACE, Alaska District, `Kiska and Amchitka Islands, Alaska (04/2011 – 05/2011).** This investigation involved searching for munitions and explosives of concern (MEC) on Kiska and Amchitka Islands as well as investigating historically contaminated sites on Amchitka Island in the Alaskan Aleutian Chain. Responsibilities included management of GPS data; completion of DQCRs; planning of daily field activities; ensuring contract specifications were met; communicating with USACE on work progress. Daily field tasks involved traversing Kiska and Amchitka Islands; collecting GPS data regarding MEC and site features; producing field maps; downloading and managing GPS data. Contributed to the planning documents and final reports.
- **CQCSM and Environmental Scientist, Northeast Cape HTRW Remedial Actions, USACE, Alaska District, St. Lawrence Island, Alaska (07/2010 – 10/2010).** This project consisted of the removal of DRO-, PCB-, and arsenic-contaminated soil, debris removal and the capping of a 1.6 acre landfill. Responsibilities included ensuring contract specifications between USACE and Bristol were met; providing oversight for various activities performed in the field; and acting as liaison between Bristol and USACE. Tasks involved completing DQCRs, GPS, and GIS mapping services, meeting with subcontractors, reporting to the Bristol home office, environmental sampling, authoring planning documents, and writing the Removal Action Report.
- **GIS Team Leader, Site Inspections and Removal Response Actions at Former Army Air Field Properties: Hobbs, Carlsbad, Deming and Fort Sumner, New Mexico and at Former Air Force Station Properties: Las Cruces, and Tierra Amarilla, New Mexico, USACE (04/2010 – 10/2011).** Provided GIS and technical support for various FUDS across New Mexico. Responsibilities included management and organization of GIS and GPS data; establishing ArcMap templates; populating Environmental Data Management System (EDMS); working with the Staged Electronic Data Deliverable (SEDD)format.
- **Site Superintendent/SSHO, Tierra Amarilla Air Force Station Removal Response, USACE, Tierra Amarilla, New Mexico (06/2010).** This project focused on removing physical hazards, primarily solid debris, from a FUDS property in New Mexico. Responsibilities included managing transportation of debris to the Rio Rancho Landfill for appropriate disposal; conducting safety meetings for on-site personnel; and management of scheduling, coordination and execution of on-site activities.
- **CQCSM and Environmental Scientist, Northeast Cape In-Situ Chemical Oxidation (ISCO) Study and Intrusive Drum Removal/Landfill Cap, USACE, Alaska District, St. Lawrence Island, Alaska (04/2009 – 12/2009).** This project involved an intrusive drum removal; landfill cap; and an ISCO study to remediate DRO-contaminated soil at a former Air

Force Station on St. Lawrence Island. Responsibilities included ensuring contract specifications between USACE and Bristol were met; providing oversight for various activities performed in the field; and acting as liaison between Bristol and USACE. Tasks involved completing DQCRs, GPS, and GIS mapping services, meeting with subcontractors, reporting to the Bristol home office, environmental sampling, authoring planning documents, and writing the Removal Action Report.

- **GIS Specialist, Monitoring Well Inventories, USACE, Alaska District, Fort Wainwright and Fort Richardson, Alaska (01/2009 – 10/2009).** The goal of this project was to update an existing database of monitoring well locations with the most current data and included a field reconnaissance. Responsibilities included updating the current database regarding monitoring wells, maintaining open communications with the USACE's GIS point of contact, and establishing effective field data collection techniques using GPS. The project goal was to implement a more effective and accurate GIS database regarding the status and position of monitoring wells on base. Tasks included GPS field collection, and data management and integration into USACE's GIS standards.
- **GIS Specialist, Wetlands Delineation and Project Management, Alaska Natural Gas Development Authority, Anchorage, Alaska (10/2008 – 12/2008).** This project involved wetland delineation of a potential corridor for a natural gas pipeline extending from North Pole, Alaska to Beluga, Alaska. Project responsibilities included prepping data and GPS units for field crews; maintaining and organizing GPS field data; and displaying field data in GIS map atlases, which consisted of hundreds of alignment sheets encompassing over 350 miles of potential pipeline corridor.
- **Environmental Scientist, Leaking Underground Storage Tank (LUST) Excavation Sites, EPA Region 9, Navajo Nation (08/2008 – 09/2008).** The goal of this project was to remove and dispose of six LUSTs in the Navajo Nation and characterize the sites for contamination. Assisted in the supervision of subcontractors excavating Underground Storage Tanks (USTs) for removal. Collected field screening headspace samples using a photoionization detector (PID). Collected soil and surface water samples for analysis at fixed laboratory. Six USTs were removed from three sites.
- **Environmental Scientist, Landfill Removal Project, Phase III, FAA, Cape Yakataga, Alaska (04/2008 – 7/2008).** Collected waste characterization and confirmation soil samples for the decommissioning of a landfill and biocell. Monitored the installation of soil borings and monitoring wells, and conducted groundwater sampling. Authored final report summarizing field activities, presenting analytical data, and providing recommendations for future site remediation.
- **Environmental Scientist, UST Corrective Action, USACE, Alaska District, Fort Richardson, Alaska (10/2007).** Project responsibilities included split spoon sample collection, soil boring oversight, soil classification, and acquisition of dig permits. Collected field-screening headspace samples using a PID.

- **Environmental Scientist, Release Investigation, FAA, Unalakleet, Alaska (9/2007 – 10/2007).** Acquired surface and subsurface soil samples from eight sites near Unalakleet, Alaska. Collected field-screening headspace samples using a PID. Also conducted field-screening using Horiba OCMA 350 Infrared Spectrometer.
- **Environmental Scientist, Treatability Study, Parsons, Joint Base Elmendorf-Richardson, Alaska (10/2007).** Assisted installation of bladder pump and set up of micro purge system for groundwater sampling from monitoring wells. Calibrated YSI brand water quality meter and logging system for groundwater monitoring. Helped with construction of well injection system.
- **Environmental Scientist, Landfill Removal Project, Phase II, FAA, Cape Yakataga, Alaska (08/2007 – 04/2008).** Responsible for soil sample collection; waste container data management, and packaging and shipping of soil samples. Composed interim progress report and authored work plan for 2008 field activities.
- **GIS Specialist, CAMPTEX Project, Bristol Bay Native Corporation (BBNC), Bristol Bay Region, Alaska (11/2006 – 07/2007).** Project responsibilities include organizing, analyzing, and maintaining GIS data; acquiring knowledge about the Alaska Native Claims Settlement Act (ANCSA), and adding/digitizing BBNC ANCSA lands into GIS using Geomedia.

Professional Experience

- **GIS Data Collector, South Georgia Regional Development Center (12/2003 to 09/2006**). Responsibilities included GPS collection of field data, analysis and presentation of data in GIS, as well as maintenance and training for Trimble GPS units and software.
  - GIS Data Collector, Campus Mapping Project, Tift County Board of Education, Tift County, Georgia. Responsible for GPS collection of utility points, post-processing analysis of GPS in ArcGIS, and digital production of gas, water, and sewer lines. Involved in acquisition and georeferencing of 14 school floor plans. Nominated for 2006 National Association of Development Organizations (NADO) Innovation Award.
  - GIS Data Collector, Utility Mapping Project, City of Douglas, Georgia. Responsible for the GPS collection and post-processing of utility points contained within public rights-of-way. Points collected include street lights, manhole covers, storm water collection inlets, fire hydrants, water meters, water valves, gas valves, and gas meters, etc. Points were collected with a Trimble GeoXT™ mounted onto a bicycle, post-processed in Pathfinder® Office, and combined into a GIS using ArcMap.
  - GIS Data Collector, Emergency 911 Address Mapping Project, Cook County, Georgia. Responsible for the GPS collection of every address “point-of-entry” within the limits of Cook County. Points were collected with a Trimble ProXR GPS and combined into a GIS using ArcMap 9.1.
  - GIS Data Collector, Utility and Right-of-Way Mapping Project, City of Tifton, Georgia. Responsible for GPS collection of utility points within public rights-of-way in the city of Tifton, Georgia. Points were collected using Trimble ProXR backpack unit and bicycle mount.
  - GIS Data Collector, Sign and Bridge Inventory, Thomas County, Georgia.

- Responsible for the GPS collection of signs and bridges along every county maintained road in Thomas County.

- **Geology Research Internship, 2004 ACRES Program, Georgia State University (05/2004 – 11/2004).** Analyzed the geochemistry of metamorphic rocks in the Uchee Belt, near Columbus, Georgia. Utilized ICP-MS and XRF for chemical analyses of prepared samples. Poster presentation at the Annual GSA Meeting in Denver, Colorado. Abstract can be found at http://gsa.confex.com/gsa/2004AM/finalprogram/abstract_79798.htm.

Awards

Outstanding Service Award, South Georgia RDC, 2006

Honor Graduate: Magna Cum Laude, 2005

Outstanding Student in Environmental Geography, 2005

Gertrude Odum Scholarship, 2000 - 2004

HOPE Scholarship, 2000 - 2004

Bristol

ALLIANCE OF COMPANIES™

Russell James

Has completed 8 hours of annual refresher training as required by

29 CFR 1910.120

Hazardous Waste Operations & Emergency Response

March 29 , 2012

Clark Roberts, C.I.H.
Instructor

OSHA Occupational Safety and Health Administration

26-600640037

This card acknowledges that the recipient has successfully completed a 30-hour Occupational Safety and Health Training Course in

Construction Safety and Health

RUSSELL JAMES

(Trainer name – print or type)

2-26-2010

(Course end date)

ATTACHMENT 3

Activity Hazard Analysis Tables

Barge Loading Operations

Barge Unloading Operations

Contaminated Sediment Removal and Disposal

Debris Removal and Staging

Drum Removal

Excavation Less than Four Feet in Depth

Excavation Greater than 4 Feet and Backfilling

Fueling of Vehicles and Equipment

POL and PCB Soil Removal and Disposal

Pole Removal

Site Restoration

Surface Soil Sampling

Subsurface Soil Sampling

Wire Removal

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Barge Loading Operations
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): M

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	General Activity	Slips, trips, falls Back Injury Crushing Injuries Eye Injury / Hearing Los Dropped Objects	Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Use guardrails • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Wear required PPE: o Hard Hat o Hard-toe boots o Safety glasses with side shields o Reflective vest o Hearing protection, as needed. o Personal Flotation Device o Life ring with 75' line • Use caution around equipment lift materials.	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Container Movement	Crushing from Container free movement Struck by equipment/objects Leak/Spill Contact splash or inhalation of hazardous materials	• Blocks/chocks/Barricades • No loads carried over any individuals • No loads suspended over individuals • Use watchman during container movement • Wear required PPE/reflective vests • Use backup alarms on all equipment • Use 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) • Use chemical splash PPE/Level C protection as warranted	M
X	Vehicle Operation	Rollover	• Stay within the speed limit specified • Follow manufacturer's recommended payload • Use trained operators only	L
X	Equipment operations	Equipment Failure	• Inspect equipment prior to daily operation • Ensure all roll cages and guards are in place and backup alarms operate • OEM equipment modifications only • Machine guarding and enclosures	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment	Daily inspection of vehicles prior to operation
X	Forklifts	• Utilize only trained and qualified operators for operation of equipment	Daily inspection of equipment prior to operation
X	Hand Tools	• On the job training training Toolbox Talks • 40-hour HAZWOPER • HazCom Training Competent Person: Alt. Competent Person:	Daily inspection of equipment prior to operation

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Barge Unloading Operations
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): M

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	General Activity	Slips, trips, falls Back Injury Crushing Injuries Eye Injury / Hearing Loss Dropped Objects	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Use guardrails • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Wear required PPE: o Hard Hat o Hard-toe boots o Safety glasses with side shields o Reflective vest o Hearing protection, as needed. o Personal Flotation Device o Life ring with 75' line • Use caution around equipment lift materials.	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Container Movement	Crushing from Container free movement Struck by equipment/objects Leak/Spill Contact splash or inhalation of hazardous materials	• Blocks/chocks/Barricades • No loads carried over any individuals • No loads suspended over individuals • Use watchman during container movement • Wear required PPE/reflective vests • Use backup alarms on all equipment • Use 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) • Use chemical splash PPE/Level C protection as warranted	M
X	Vehicle Operation	Rollover	• Stay within the speed limit specified • Follow manufacturer's recommended payload • Use trained operators only	L
X	Equipment operations	Equipment Failure	• Inspect equipment prior to daily operation • Ensure all roll cages and guards are in place and backup alarms operate • OEM equipment modifications only • Machine guarding and enclosures	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment	Daily inspection of vehicles prior to operation
X	Forklifts	• Utilize only trained and qualified operators for operation of equipment	Daily inspection of equipment prior to operation
X	Hand Tools	• On the job training training Toolbox Talks • 40-hour HAZWOPER • HazCom Training Competent Person: Alt. Competent Person:	Daily inspection of equipment prior to operation

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	24 April 2012
Activity / Task:	Contaminated Sediment Removal and Disposal
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Russell James
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	General Activity	Contact with or inhalation of hazardous materials Heat or Cold Stress Working in cold, wet environments Back Injury Crushing Injuries Dropped Objects Eye Injury/Hearing Loss Struck by equipment/objects Slips, trips, falls	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades •Wear appropriate PPE for cold, wet environments •Wear hip waders/chest waders in wet areas •Follow appropriate decontamination protocol •Wear hand protection to keep hands warm and dry • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Machine guards/enclosures • Wear required PPE: o Hard Hat o Hard-toe boots o Safety glasses with side shields o Reflective vest o Hearing protection, as needed. • Use caution around equipment lift materials. • Use backup alarms on all equipment • Use traffic control and watchman • Limit personnel in area (site control) • Use impermeable PPE/Level C protection as warranted	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Equipment Operations	Equipment Failure Refueling Equipment	• Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and backup alarms operate. • OEM equipment modifications only. • Machine guarding and enclosures • Have fire extinguishers available nearby •Wear appropriate hand protection	L
X	Vehicle Operations	Material Spill/Contact Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload. • Inspect containers before transport. • Use spill kits. • Use impermeable PPE/Level C protection as warranted.	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment.	Daily inspection of vehicle prior to operation
X	Backhoes	• Utilize only trained and qualified operators for operation of equipment.	Daily inspection of vehicle prior to operation
X	Hand Tools	• On the job training • Toolbox Talks • 40-hour HAZWOPER • HazCom Training • Competent Person: ALT. Competent Person:	Daily inspection prior to operation
X	Pumps and Suction Dredge	• On the job training • 40-hour HAZWOPER • HazCom Training	Daily inspection of equipment prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared: 3 April 2012	Overall Risk Assessment Code (RAC) (Use highest code) L
Activity / Task: Debris Removal and Staging	
Project Location: Northeast Cape St. Lawrence Island	
Prepared By: Emily Conway	
Reviewed By: Maxey Riggs	

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Removal by Hand and General Site Work	Slips, trips, falls Struck by equipment/objects Crushing Injuries Dropped Objects Eye Injury / Hearing Loss Falls from steep slopes Back Injury	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Use guardrails • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Machine guards/enclosures • Wear required personal protective equipment (PPE) o Hard Hat o Hard-toe Boots o Safety Glasses with side shields o Reflective Vest o Hearing Protection, as needed. o Gloves • Use caution around equipment lift materials. • Wear D-ring harness with restraint cable system at approved anchor points • Wear required PPE • Backup alarms on all equipment • Use traffic control and watchman	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Vehicle Operation	Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload. • Use Seatbelts/rollover protection system (ROPS). • For all-terrain vehicles, gloves and hardhats are required. • Utilize only licensed and trained operators. • Ensure equipment is not operated on excessive grades to prevent rollovers.	L
X	Equipment operations	Equipment failure	• Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and back up alarms operate. • Original equipment manufacturer's (OEM) equipment modifications only. • Use machine guarding and enclosures	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment	Daily inspection of vehicles prior to operation
X	Graders, Bulldozers, Backhoe	Utilize only trained and qualified operators for operation of equipment.	Daily inspection of equipment prior to operation
X	Hand Tools	• On the job training training Toolbox Talks • 40-hour HAZWOPER • HazCom Training Competent Person: Alt. Competent Person:	Daily inspection of equipment prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared: 3 April 2012	Overall Risk Assessment Code (RAC) (Use highest code) L
Activity / Task: Drum Removal	
Project Location: Northeast Cape St. Lawrence Island	
Prepared By: Emily Conway	
Reviewed By: Maxey Riggs	

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS
Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Removal by Hand	Slips, trips, falls Struck by equipment/objects Crushing Injuries Dropped Objects Eye Injury / Hearing Loss Falls from steep slopes Back Injury	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Machine guards/enclosures • Wear required personal protective equipment (PPE) o Hard Hat o Hard-toe Boots o Safety Glasses with side shields o Reflective Vest o Hearing Protection, as needed. o Gloves • Use caution around equipment lift materials. • Wear required PPE. • Wear required PPE. • Wear D-ring harness with restraint cable system at approved anchor points • Wear required PPE • Backup alarms on all equipment • Use traffic control and watchman	L
X	Vehicle Operation	Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload. • Use Seatbelts/rollover protection system (ROPS). • For all-terrain vehicles, gloves and hardhats are required. • Utilize only licensed and trained operators. • Ensure equipment is not operated on excessive grades to prevent rollovers.	L
X	Equipment operations	Equipment failure	• Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and back up alarms operate. • Original equipment manufacturer's (OEM) equipment modifications only. • Use machine guarding and enclosures	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment	Daily inspection of vehicles prior to operation
X	Hand Tools	• On the job training training Toolbox Talks • 40-hour HAZWOPER • HazCom Training Competent Person: Alt. Competent Person:	Daily inspection of equipment prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Excavation-Less than 4 feet in depth
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	Probability: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Site Prep	Slips, trips, and falls Back injury Crushing injuries Eye injury Hearing loss	Use care during foot travel, and clear the area of slip and trip hazards Use barricades Cover holes Wear required PPE	L
X	Excavation	Slips, trips, and falls Wall collapse	Use care during foot travel, and clear the area of slip and trip hazards Use barricades Use guardrails Appropriate sloping/shoring Soils classification Daily excavation inspection	M
X	Vehicle Operation	Rollover	Stay within the speed limit specified Use seat belt's Ensure equipment is not operated on excessive grades	L
X	Equipment Operations	Equipment failure Caught between/Caught under	Use back up alarms back-up alarms Use spotter when necessary	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment	Daily inspection of vehicles prior to operation

X	Hand Tools	• On the job training training Toolbox Talks • 40-hour HAZWOPER • HazCom Training Competent Person: Alt. Competent Person:	Daily inspection of equipment prior to operation
X	Excavator and backhoe	Utilized only trained and qualified operators	Daily inspection of heavy equipment prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ____________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Excavation-Greater than 4 feet and Backfilling
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxcy Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Site Preparation	Slips, trips, falls Back injury Eye injury / hearing loss Wall collapse	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Cover holes • Use Material Safety Data Sheets (MSDS) prior to action • Use appropriate PPE o Hard hat o Safety reinforced boots o Face shield/safety glasses o Reflective vest o Hearing protection, as needed • Use proper lifting technique. • Use Buddy System for heavy lifts • Use lifting/transport equipment • Inspection daily of all trenches and excavations • Follow all OSHA and EM 385 1-1 regulations	L

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Excavator operation	Rollover Personnel pinch/crushing	• Stay within the speed limit specified • Follow manufacturer's recommended limits • Use seatbelts/roll over protection systems (ROPS) • Use only qualified and trained operators • Ensure equipment is grounded when not in use • Bucket lowered to ground when not in use • Do not approach operator cab until visual contact is made with operator • SS/SSHO will identify swing radius and pinching zone of excavator while operating and mark safe boundary of personnel with cones, barricade tape, etc.	M
X	Loader operation	Rollover	• Stay within the speed limit specified • Follow manufacturer's recommended limits • Use seatbelts/roll over protection systems (ROPS) • Use only licensed and trained operators • Ensure equipment is ground when not in use • Bucket lowered to ground when not in use. Stay within the speed limit • Do not approach operator cab until visual contact is made with operator	M
X	Compaction with tow compactor	Struck by equipment	• Wear specified personal protective equipment (PPE)/reflective vests • Backup alarms on all equipment	M

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS
Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	All equipment operations	Contact with personnel of other equipment and all hazards indicated above Mechanical fluid leaks	• Use original equipment manufacturer (OEM) equipment modifications only. • Regulated work areas will be established around each job site and safe distances will be maintained between workers and mechanical equipment using safety fence and signs. Mobile equipment will be equipped with backup alarms. • Personnel will remain a safe distance away from operations. Personnel needing to approach heavy equipment while the equipment is operating will observe the following protocols: • Make eye contact with the operator (and spotter); • Signal the operator to cease heavy equipment activity, if applicable; and • Approach the equipment operator and inform the operator of intentions. • Use spill kits to protect environment.	M

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Excavator, loader, and tow compactor	• Use only trained and qualified operators for operation of equipment. • Site-specific training – Toolbox meetings • Competent Person training • Hazardous communication (HazCom) training 40 hour HAZWOPER COMPETENT PERSON: ALT. COMPETENT PERSON:	Daily inspection of vehicles prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Fueling of Vehicles and Equipment
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Maintenance of Equipment	Slips, trips, falls Back Injury Dropped Objects Body Injury/Hearing Loss Cuts Electrical Shock Crushing Injuries	• Use care during foot travel • Housekeeping - clear the area of slip and trip hazards • Use barricades •Use proper lifting technique o Keep back straight during lifts o Use legs – not back/arm muscles for lift o Don't perform lifts on uneven surfaces o Do not walk/carry heavy loads o Use Buddy System for heavy lifts o Use lifting/transport equipment as needed • Use caution around equipment lift materials • Wear required PPE o Hard hat o Hard-toe shoes o Safety glasses with side shields o Reflective vest o Hearing protection (as required) • Wear specified PPE and protective gloves as needed • Use ground fault circuit interrupter (GFCI) • Inspect all cords (remover from service if damaged) • Use machine guards/enclosures	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Fueling	Leak/Spill Fire Splash/Drenching with Fuel	• Use MSDS for guidance • Use spill kits • Fire Extinguisher in Fuels Area • No Smoking in Fuels Area • Use Bonding Clips during fuel transfer to containers • Use chemical splash PPE/eye-face protection as warranted	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Mechanical Pump	• Utilize only trained and qualified operators for operation of equipment. • Site specific training Toolbox safety meetings • HazCom Training Competent Person: ALT. Competent Person:	Daily inspection of equipment prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	POL & PCB Soil Removal and Disposal
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY				
	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	General Activity	Contact with or inhalation of hazardous materials Back Injury Crushing Injuries Dropped Objects Eye Injury / Hearing Loss Struck by equipment/objects Slips, trips, falls	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Machine guards/enclosures • Wear required PPE: o Hard Hat o Hard-toe boots o Safety glasses with side shields o Reflective vest o Hearing protection, as needed. • Use caution around equipment lift materials. • Use backup alarms on all equipment • Use traffic control and watchman • Limit personnel in area (site control) • Use impermeable PPE/Level C protection as warranted	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Equipment Operations	Equipment Failure	Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and backup alarms operate. • OEM equipment modifications only. • Machine guarding and enclosures	L
X	Vehicle Operations	Material Spill/Contact Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload. • Inspect containers before transport. • Use spill kits. • Use impermeable PPE/Level C protection as warranted.	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment.	Daily inspection of vehicle prior to operation
X	Backhoes	• Utilize only trained and qualified operators for operation of equipment.	Daily inspection of vehicle prior to operation
X	Hand Tools	• On the job training Toolbox Talks • 40-hour HAZWOPER • HazCom Training Competent Person: ALT. Competent Person:	Daily inspection of vehicle prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Pole Removal
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Removal by hand, Tracked Vehicle and Boom Truck.	Slips, trips, falls Struck by equipment/objects Crushing Injuries Dropped Objects Eye Injury / Hearing Loss Falls from steep slopes Back Injury Cutting Hazard	• Use care during foot travel, and clear the area of slip and trip hazards • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Machine guards/enclosures • Wear required personal protective equipment (PPE) o Hard Hat o Hard-toe Boots o Safety Glasses with side shields o Reflective Vest o Hearing Protection, as needed. o Chain saw chaps o Face shield • Use caution around equipment lift materials. • Wear D-ring harness with restraint cable system at approved anchor points • Backup alarms on all equipment • Use traffic control and watchman	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Equipment Operations	Equipment failure Cuts/Lacerations	• Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and back up alarms operate. • Original equipment manufacturer's (OEM) equipment modifications only. • Use machine guarding and enclosures	L
X	Vehicle Operations	Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload. • Use Seatbelts/rollover protection system (ROPS). • For all-terrain vehicles, gloves and hardhats are required. • Utilize only licensed and trained operators. • Ensure equipment is not operated on excessive grades to prevent rollovers.	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment.	Daily inspection of vehicle prior to operation
X	Excavator, Boom Truck	Utilize only trained and qualified operators for operation of equipment.	Periodic Inspection Frequent Inspection Start Up Inspection
X	Hand tools - Chain saw	Site Specific Training – Toolbox safety meetings Fall Protection System (if applicable) Competent Person: ALT. Competent Person:	Daily inspection of equipment prior to use

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Site Restoration
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Site Prep	Struck by equipment/objects Back Injury Crushing Injuries Dropped Objects Eye Injury / Hearing Loss Slips, trips, falls	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Wear required PPE: o Hard Hat o Hard-toe boots o Safety Glasses w/ side shields o Reflective Vest o Hearing Protection, as needed. • Use caution around equipment lift materials. • Wear required PPE. • Use backup alarms on all equipment • Use traffic control and watchman	L
X	Equipment Operations	Equipment failure	• Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and backup alarms operate. • OEM equipment modifications only. • Use machine guarding and enclosures.	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Vehicle Operations	Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload.	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	• Utilize only trained and qualified operators for operation of equipment.	Daily inspection of vehicle prior to operation
X	Graders, Bulldozers	Utilize only trained and qualified operators for operation of equipment.	Daily inspection of equipment prior to use
X	Hand tools	• On the job training Toolbox Talks • 40-hour HAZWOPER • HazCom Training Competent Person: ALt. Competent Person:	Daily inspection of equipment prior to use

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ____________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Surface Soil Sampling
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
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Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	General safety requirements for all steps	1) Exposure to cold or hot weather (2) Dehydration	Minimum personal protective equipment: (a) Long pants (b) Long sleeves (c) Hardhat (d) Safety boots (steel or composite toe) (e) Safety glasses (potential eye injury hazard areas) (f) Reflective vest (g) Hear protection, as needed (1a) Wear appropriate clothing for hot or cold weather (1b) Wear sun block (2a) Drink at least 1/2 liter of water an hour (2b) Refer to physical agent data sheet (PADS) for specific details on heat stress and symptoms	L
X	Surface soil sampling	(1) Chemical hazards (2) Unstable footing conditions (3) Noise	(1a) Gloves, safety glasses, and other appropriate PPE will be used during soil sampling collection. Ambient monitoring will be conducted with a photoionization detector (PID) to identify any unusual rise or change in petroleum vapors (2a) Use care and assure solid footing in the work area. (2b) Note all slip hazards in the work area. (2c) Clear the work area of all potential trip hazards (3a) Hearing protection will be used as warranted	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION
ACTIVITY HAZARDS ANALYSIS
Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	PID	Personnel will be trained in PID utilization, calibration, maintenance, and sample collection techniques	Daily calibration and moisture trap or sensor replacement, as needed

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Subsurface Soil Sampling
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	General safety requirements for all steps	1) Exposure to cold or hot weather (2) Dehydration	Minimum personal protective equipment: (a) Long pants (b) Long sleeves (c) Hardhat (d) Safety boots (steel or composite toe) (e) Safety glasses (potential eye injury hazard areas) (f) Reflective vest (g) Hear protection, as needed (1a) Wear appropriate clothing for hot or cold weather (1b) Wear sun block (2a) Drink at least 1/2 liter of water an hour (2b) Refer to physical agent data sheet (PADS) for specific details on heat stress and symptoms	L
X	Sampling using hand auger	Lacerations	When handling auger, pay attention to sharp edges on the sampling end of the tool Use proper PPE (gloves)	L

Add Items

EQUIPMENT	TRAINING	INSPECTION

X	PID	Personnel will be trained in PID utilization, calibration, maintenance, and sample collection techniques	Daily calibration and moisture trap or sensor replacement, as needed
X	Hand Auger, Hand Shovel	Personnel will be appraised of the sharp edges on the sampling end of the auger, and the hazards associated with shovel	None needed

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

Acceptance Authority (digital signature): ______________________________

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Date Prepared:	3 April 2012
Activity / Task:	Wire Removal
Project Location:	Northeast Cape St. Lawrence Island
Prepared By:	Emily Conway
Reviewed By:	Maxey Riggs

Overall Risk Assessment Code (RAC) (Use highest code): L

RISK ASSESSMENT CODE MATRIX *

E= Extremely High Risk
H= High Risk
M= Moderate Risk
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Severity	PROBABILITY: Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Add Identified Hazards

* Refer to DA PAM 385-40 for detailed risk management information

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Removal by hand, Tracked Vehicle and Boom Truck	Slips, trips, falls Struck by equipment/objects Crushing Injuries Dropped Objects Eye Injury / Hearing Loss Falls from steep slopes Back Injury Cutting Hazard	• Use care during foot travel, and clear the area of slip and trip hazards • Use barricades • Cover holes • Use proper lifting technique • Use Buddy System for heavy lifts • Use lifting/transport equipment • Use caution when setting loads • Machine guards/enclosures • Wear required personal protective equipment (PPE) o Hard Hat o Hard-toe Boots o Safety Glasses with side shields o Reflective Vest o Hearing Protection, as needed. • Use caution around equipment lift materials. • Wear D-ring harness with restraint cable system at approved anchor points • Backup alarms on all equipment • Use traffic control and watchman	L

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

	JOB STEPS	HAZARDS	Controls (Actions to Eliminate or Minimize Hazards)	RAC
X	Vehicle Operation	Rollover	• Stay within the speed limit specified. • Follow manufacturer's recommended payload. • Use Seatbelts/rollover protection system (ROPS). • For all-terrain vehicles, gloves and hardhats are required. • Utilize only licensed and trained operators. • Ensure equipment is not operated on excessive grades to prevent rollovers.	L
X	Equipment operations	Equipment failure Cuts/Lacerations	• Inspect equipment prior to daily operation. • Ensure all roll cages and guards are in place and back up alarms operate. • Original equipment manufacturer's (OEM) equipment modifications only. • Use machine guarding and enclosures	L

Add Items

	EQUIPMENT	TRAINING	INSPECTION
X	Trucks	Utilize only trained and qualified operators for vehicles.	Daily inspection of equipment prior to operation
X	Excavator, Boom Truck	Utilize only trained and qualified operators for operation of equipment.	Periodic Inspection Frequent Inspection Start up Inspection
X	Hand tools/Wire cutters	Site Specific Training – Toolbox safety meetings Fall Protection System (if applicable) Competent Person: ALT. Competent Person:	Daily inspection of equipment prior to operation

Personnel Involved (e.g., Competent Persons, Crew / Team Members)

Comments / Notes:

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION

ACTIVITY HAZARDS ANALYSIS

Prescribing Directive for this form is EM 385-1-1, the proponent agency is CEPOD-SO

Acceptance Authority (digital signature): ____________________

ATTACHMENT 4

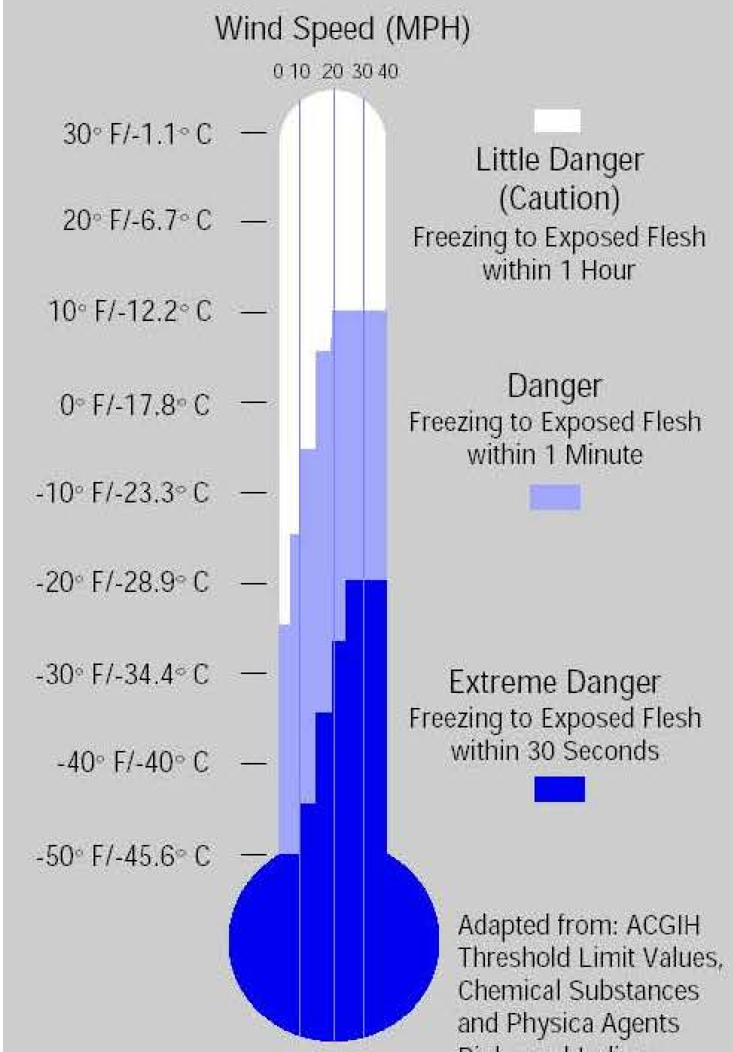
Physical Agent Data Sheets

- Cold Stress
- Hand-Arm Vibration
- Heat Stress
- Noise
- Ultraviolet Radiation

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.



Adapted from: ACGIH Threshold Limit Values, Chemical Substances and Physica Agents Biohazard Indices, 1998-1999.

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.

PHYSICAL AGENT DATA SHEET (PADS)

HAND-ARM VIBRATION

Description

Hand-arm vibration is caused by the use of vibrating hand-held tools, such as pneumatic jack hammers, drills, gas powered chain saws, and electrical tools such as grinders. The nature of these tools involves vibration (a rapid back and forth type of motion) which is transmitted from the tool to the hands and arms of the person holding the tool.

Health Hazards

Vibration Syndrome and Vibration-Induced White Finger (VWF) are the major health hazards related to the use of vibrating tools. Carpal Tunnel Syndrome is another health problem that has been linked in one study to the use of smaller hand-held vibrating tools.

Vibration Syndrome

Vibration Syndrome is a group of symptoms related to the use of vibrating tools and includes -some or all of the following: muscle weakness, muscle fatigue, pain in the arms and shoulders, and vibration-induced white finger. Many researchers believe that other symptoms--headaches, irritability, depression, forgetfulness, and sleeping problems--should also be included in descriptions of Vibration Syndrome.

Vibration-Induced White Finger

Vibration-Induced White Finger (VWF), also known as "Dead Finger" or "Dead Hand" is the result of impaired circulation (poor blood supply in the fingers, caused by the prolonged use of vibrating tools. VWF may appear after only several months on the job, or may not appear until twenty to forty years on the job.

The harmful health effects of vibrating tools are related to the length of time that a worker has been using vibrating tools and to the frequency of the vibration (how fast the tool goes back and forth). The longer a person uses a vibrating tool, and the faster the tool vibrates, the greater the risk of health effects. The length of the initial symptom-free period of vibration exposure (i.e., from first exposure to the first appearance of a white finger) is known as the latent interval. It is related to the intensity of the vibration - the shorter the latent period, the more severe the resulting VWF if vibration exposure continues.

Temporary tingling or numbness during or soon after use of a vibrating hand tool is not considered to be VWF, however tingling and numbness in the fingers lasting more than an hour after finishing work may indicate early stages of VWF. Table 1 lists the stages that Vibration White Finger may progress through if exposure continues.

Table 1 Stages of Vibration White Finger (Taylor-Pelmear System)

Stage	Condition of Fingers	Work & Social Interference
00	No tingling, numbness or blanching of fingers	No complaints
OT	Intermittent tingling	No interference with activities
ON	Intermittent numbness	No interference with activities
TN	Intermittent tingling and numbness	No interference with activities
1	Blanching of a fingertip with or without tingling and/or numbness	No interference with activities
2	Blanching of one or more fingers beyond tips, usually during winter	Possible interference with activities outside work, no interference at work
3	Extensive blanching of fingers; frequent episodes in both summer and winter	Definite interference at work, at home, and with social activities; restriction of hobbies
4	Extensive blanching of most fingers; frequent episodes in both summer and winter	Occupation usually changed because of severity of signs and symptoms

The technical name for VWF is Raynaud's Syndrome of Occupational Origin. Raynaud's Syndrome may also occur in people who do not use vibrating hand-held tools. Several different kinds of medical illnesses can cause Raynaud's Syndrome. Raynaud's Syndrome also appears in some people who are otherwise entirely healthy.

It is important that people with Raynaud's Syndrome avoid the extensive use of vibrating tools because they can develop the most severe complications of VWF very quickly.

Many of the symptoms of Vibration Syndrome will disappear shortly after a worker stops using the types of tools which transmit vibration to the hands and arms. Fatigue and muscular pain in the arms and shoulders will generally disappear. In the early stages, if a worker stops using vibrating tools, VWF will not get any worse and may get slightly better.

Carpal Tunnel Syndrome

Carpal Tunnel Syndrome (CTS) is a group of symptoms in the hand which arise from pressure on one of the nerves which passes through the palm side of the wrist. The early symptoms are similar to the early symptoms of white finger and consist of tingling in the fingers. For the most part only the thumb, index, and middle fingers are affected in CTS.

Later, symptoms can progress to numbness. Pain in the wrist and fingers may also develop. CTS may occur in people using small hand tools like pneumatic screwdrivers. Carpal Tunnel Syndrome also occurs among people having repetitive motion of the wrist or fingers, such as using a cash register, or picking fish from a net; or with forceful motion of the wrist, such as in using a wrench. Pinching or flexing with the wrist bent upwards, downwards, or sideways increases the occurrence of CTS.

The symptoms of CTS are frequently worse at night and a person may be awakened from sleep by pain or the feeling of pins and needles in fingers, hand or wrist.

Carpal Tunnel Syndrome may improve if diagnosed in the early stages and exposure to the type of activity which caused it is stopped. In moderate cases most of the symptoms of CTS can be relieved by a surgical operation which relieves the pressure on the nerve which causes the CTS symptoms. If the surgery is performed too late, only some of the symptoms may be relieved. In very severe cases the symptoms are irreversible and may include weakness of the hand due to loss of muscle function.

Preventing Hand-Arm Vibration Diseases

Job Modification to Reduce Vibration Exposure

Wherever possible, jobs should be redesigned to minimize the use of hand-held vibrating tools. Where job redesign is not feasible, ways to reduce tool vibration should be found. Where practical, substitute a manual tool for a vibrating tool. Whenever possible, high vibration tools should be replaced by improved, low vibration tools designed to absorb vibration before it reaches the handgrip.

Determine vibration exposure times and introduce work breaks to avoid constant, continued vibration exposure. A worker who is using a vibrating tool continuously should take a 10 minute break after each hour of using the tool.

Medical Evaluation

Workers whose occupations place them at risk for developing VWF should have pre-employment physicals and thereafter should be checked at least annually by doctors who know about the diagnosis and treatment of VWF. Diagnostic tests which can be used include plethysmography, arteriography, skin thermography, and sensory tests,, such as two point discrimination depth sense, pinprick touch and temperature sensation. X-rays may also be useful.

Workers that have a past history of abnormalities in blood circulation and especially workers who have Raynaudis Syndrome should not be permitted to use vibrating hand-held tools. Workers who have moderate to severe symptoms of VWF should be reassigned to work which removes them from further direct exposure to vibrating tools.

If workers develop symptoms of tingling or numbness, or if their fingers occasionally become white or blue, or painful especially when cold, they should be examined by a doctor who knows about the diagnosis and treatment of VWF and CTS.

Work Practices

Workers using vibrating hand-held tools should wear multiple layers of warm gloves and should wear anti-vibration gloves whenever possible. Before starting the job, warm the hands. This is especially important when it is cold. workers using vibrating tools should not allow the hands to become chilled. If the hands of a worker using vibrating tools become wet or chilled, he should dry them and put on dry, warm gloves before resuming exposure to vibration. Workers exposed to cold should dress adequately to keep the whole body warm because low body temperature can make a worker more susceptible to VWF.

A worker using a vibrating hand-held tool should let the tool do the work by grasping it as lightly as possible, consistent with safe work practice. The tighter the tool is held, the more vibration is transmitted to the fingers and hand. The tool should rest on a support or on the workpiece as much as possible. The tool should be operated only when necessary and at the minimum speed (and impact force) to reduce vibration exposure.

Tools should be regularly maintained to keep vibration to a minimum. Keeping chisels and chainsaws sharp, for example, will reduce vibration. Using new grinder wheels will also reduce vibration.

Education

Employees who use or will be using vibrating hand-held tools should receive training about the hazards of vibration and they should be taught how to minimize the ill effects of vibration.

Smokers are much more susceptible to VWF that non-smokers, and the VWF in smokers is usually more severe, therefore workers who use vibrating hand-held tools should not smoke.

Recommended Exposure Limits

Table 2 contains the American Conference of Governmental Industrial Hygienists (ACGIH) recommendations on the limits for exposure of the hand to vibration.

Table 2 Threshold Limit Values for Exposure of the Hand to Vibration in Either X_h, Y_h, Z_h, Directions

Total Daily Exposure Duration[a]	Values of the Dominant,[b] Frequency-Weighted, rms, Component Acceleration Which Shall Not be Exceeded a_k, (a_{keg})	
	m/s^2	g[c]
4 hours and less than 8	4	0.40
2 hours and less than 4	6	0.61
1 hour and less than 2	8	0.81
less than 1 hour	12	1.22

[a] The total time vibration enters the hand per day, whether continuously or intermittently.

[b] Usually one axis of vibration is dominant over the remaining two axes. If one or more vibration axes exceeds the Total Daily Exposure then the TLV has been exceeded.

[c] g = 9.81 m/s . d

PHYSICAL AGENT DATA SHEET (PADS)

HEAT STRESS

Description

Heat stress is caused by working in hot environments like laundries, bakeries, or around boilers or incinerators. Four environmental factors affect the amount of heat stress felt by employees in hot work areas: temperature, humidity, radiant heat (such as from the sun or a furnace), and air velocity. How well or how poorly an individual reacts to heat stress is dependent on personal characteristics such as age, weight, fitness, medical condition, and acclimatization.

The body has several methods of maintaining the proper internal body temperature. When internal body temperature increases, the circulatory system reacts by increasing the amount of blood flow to the skin so the extra heat can by given off.

Sweating is another means the body uses to maintain stable internal temperatures. When sweat evaporates, cooling results. However, sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are replaced.

Health Effects—Heat Disorders

Heat stroke, the most serious health problem for workers in hot environments is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs include: mental confusion, delirium, loss of consciousness, convulsions or coma; a body temperature of 106 degrees Fahrenheit or higher; and hot dry skin which may be red, mottled or bluish. Victims of heat stroke will die unless treated promptly. While medical help should be called, the victim must be removed immediately to a cool area and his/her clothing soaked with cool water. He/she should be fanned vigorously to increase cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs.

Heat exhaustion develops as a result of loss of fluid through sweating when a worker has failed to drink enough fluids or take in enough salt, or both. The worker with heat exhaustion still sweats, but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pale or flushed, and the body temperature normal or slightly higher. Treatment is usually simple: the victim should rest in a cool place and drink salted liquids. Salt tablets are not recommended. Severe cases involving victims who vomit or lose consciousness may require longer treatment under medical supervision.

Heat cramps, painful spasms of the bone muscles, are caused when workers drink large quantities of water but fail to replace their bodies' salt loss. Tired muscles, those used for performing the work, are usually the ones most susceptible to cramps. Cramps may occur during or after working hours and may be relieved by taking salted liqids by mouth or saline solutions intravenously for quicker relief, if medically determined to be required.

Fainting may be a problem for the worker unacclimatized to a hot environment who simply stands still in the heat. Victims usually recover quickly after a brief period of lying down. Moving around, rather that standing still, will usually reduce the possibility of fainting.

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impairs a worker's performance or even results in temporary total disability. It can be prevented by showering, resting in a cool place, and allowing the skin to dry.

Medical Conditions Aggravated By Exposure to Heat

Persons with heart or circulatory diseases or those who are on "low salt" diets should consult with their physicians prior to working in hot environments.

Preventing Heat Disorders

One of the best ways to reduce heat stress on workers is to minimize heat in the workplace. However, there are some work environments where heat production is difficult to control, such as when furnaces or sources of steam or water are present in the work area, or when the workplace itself is outdoors and exposed to varying warm weather conditions.

Acclimatization

Humans are, to a large extent, capable of adjusting to the heat. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

On the first day of work in a hot environment, the body temperature, pulse rate, and general discomfort will be higher. With each succeeding daily exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body becomes acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

Gradual exposure to heat gives the body time to become accustomed to higher environmental temperatures. Heat disorders in general are more likely to occur among workers who have not been given time to adjust to working in the heat or among workers who have been away from hot environments and who have gotten accustomed to lower temperatures. Hot weather conditions of the summer are likely to affect the worker who is not acclimatized to heat. Likewise, workers who return to work after a leisurely vacation or extended illness may be affected by the heat in the work environment. Whenever such circumstances occur, the worker should be gradually reacclimatized to the hot environment.

Lessening Stressful Conditions

Many industries have attempted to reduce the hazards of heat stress by introducing engineering controls, training workers in the recognition and prevention of heat stress, and implementing work-rest cycles. Heat stress depends, in part, on the amount of heat the worker's body produces while a job is being performed. The amount of heat produced during hard, steady work is much higher than that produced during intermittent or light work. Therefore, one way of reducing the potential for heat stress is to make the job easier or lessen its duration by providing adequate rest time. Mechanization of work procedures can often make it possible to isolate workers from the heat source (perhaps in an air-conditioned booth) and increase overall productivity by decreasing the time needed for rest. Another approach to reducing the level of heat stress is the use of engineering controls which include ventilation and heat shielding.

Number and Duration of Exposures

Rather than be exposed to heat for extended periods of time during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work-rest cycles. Work-rest cycles give the body an opportunity to get rid of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin.

Workers employed outdoors are especially subject to weather changes. A hot spell or a rise in humidity can create overly stressful conditions. The following practices can help to reduce heat stress:

- Postponement of nonessential tasks
- Permit only those workers acclimatized to heat to perform the more strenuous tasks, or
- Provide additional workers to perform the task keeping in mind that all workers should have the physical capacity to perform the task and that they should be accustomed to the heat.

Thermal Conditions in the Workplace

A variety of engineering controls can be introduced to minimize exposure to heat. For instance, improving the insulation on a furnace wall can reduce its surface temperature and the temperature of the area around it. In a laundry room, exhaust hoods installed over those sources releasing moisture will lower the humidity in the work area. In general, the simplest and least expensive methods of reducing heat and humidity can be accomplished by:

- Opening windows in hot work areas,
- Using fans, or
- Using other methods of creating airflow such as exhaust ventilation or air blowers.

Rest Areas

Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. There is no conclusive information available on the ideal temperature for a rest area. However, a rest area with a temperature near 76 degrees Fahrenheit appears to be adequate and may even feel chilly to a hot, sweating worker, until acclimated to the cooler environment. The rest area should be as close to the workplace as possible. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

Drinking Water

In the course of a day’s work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced.

Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst drive. A worker, therefore, should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 or 20 minutes to replenish the necessary fluids in the body. There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they will cool ones. whatever the temperature of the water, it must be palatable and readily available to the worker. Individual drinking cups should be provided, never use a common drinking cup.

Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets <u>should not</u> be used. CAUTION: PERSONS WITH HEART PROBLEMS OR THOSE ON A "LOW SODIUM" DIET WHO WORK IN HOT ENVIRONMENTS SHOULD CONSULT A PHYSICIAN ABOUT WHAT TO DO UNDER THESE CONDITIONS.

Protective Clothing

Clothing inhibits the transfer of heat between the body and the surrounding environment. Therefore, in hot jobs where the air temperature is lower than skin temperature, wearing clothing reduces the body's ability to lose heat into the air.

When air temperature is higher than skin temperature, clothing helps to prevent the transfer of heat from the air to the body. The advantage of wearing clothing, however, may be nullified if the clothes interfere with the evaporation of sweat.

In dry climates, adequate evaporation of sweat is seldom a problem. In a dry work environment with very high air temperatures, the wearing of clothing could be an advantage to the worker. The proper type of clothing depends on the specific circumstance. Certain work in hot environments may require insulated gloves, insulated suits, reflective clothing, or infrared reflecting face shields. For extremely hot conditions, thermally-conditioned clothing is available. One such garment carries a self-contained air conditioner in a backpack, while another is connected to a compressed air source which feeds cool air into the jacket or coveralls through a vortex tube. Another type of garment is a plastic jacket which has pockets that can be filled with dry ice or containers of ice.

Recommended Exposure Limits

These Threshold Limit Values (TLVS) refer to heat stress conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse health effects. The TLVs shown in Table I are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38 degrees Celsius (100.4 degrees Fahrenheit).

Since measurement of deep body temperature is impractical for monitoring the workers' heat load, the measurement of environmental factors is required which most nearly correlate with deep body temperature and other physiological responses to heat. At the present time, Wet Bulb Globe Temperature Index (WBGT) is the simplest and most suitable technique to measure the environmental factors. WBGT values are calculated by the following equations:

Outdoors with solar load: WBGT = 0.7 NWB + 0.2 GT + 0.1 DB

Indoors or Outdoors with no solar load: WBGT = 0.7 NWB + 0.3 GT

Where: WBGT = Wet Bulb Globe Temperature Index

NWB = Natural Wet Bulb Temperature

DB = Dry Bulb Temperature

GT = Globe Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry bulb thermometer.

Higher heat exposures that shown in Table I are permissible if the workers have been undergoing medical surveillance and it has been established that they are more tolerant at work in heat than the average worker. Workers should not be permitted to continue their work when their deep body temperature exceeds 38.0 degrees Celsius (100.4 degrees Fahrenheit).

Table 1 Permissible Heat Exposure Threshold Limit Values
(Values are given in degrees Centigrade WBGT [Fahrenheit])

	Work Load		
Work- Rest Regimen	**Light**	**Moderate**	**Heavy**
Continuous work	30.0 (86.0)	26.7 (80.1)	25.0 (77.0)
75% Work, 25% Rest/Hour	30.6 (87.1)	28.0 (82.4)	25.9 (78.6)
50% Work, 50% Rest/Hour	31.4 (88.5)	29.4 (85.0)	27.9 (82.2)
25% Work, 75% Rest/Hour	32.2 (90.0)	31.1 (88.0)	30.0 (86.0)

References

"Working in Hot Environments," US Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, 1986.

"Threshold Limit Values and Biological Exposure Indices for 1986 - 1987," American Conference of Governmental Industrial, Hygienists, 6500 Glenway Avenue, Building D-7, Cincinnati, OH 45211-4438.

PHYSICAL AGENT DATA SHEET (PADS)

NOISE

Description

Sound is created when a vibrating source (like a bell, motor or a stereo speaker) sends sound waves through the air to your ear. Every sound has two aspects: its pitch (frequency) and its loudness (intensity). On a stereo, frequency is determined by the bass/treble control. Intensity is determined by the volume control. Noise (unwanted sound) is usually made up of many frequencies. The disturbing and harmful effects of noise depend both on the loudness and the frequency of the tones making up noise.

Loudness is measured in units called decibels (dB). A conversational voice is about 65 dB. A shout is 90 dB or greater.

Frequency is measured in units called Hertz (Hz). The frequency of a locomotive horn is about 250 Hz. The frequency of a table saw is about 4,000 Hz.

Health Effects

Excessive noise can destroy the ability to hear, and may also put stress of other parts of the body, including the heart.

For most effects of noise, there is no cure, so that prevention of excessive noise exposure is the only way to avoid health damage.

Hearing

The damage done by noise depends mainly on how loud it is and on the length of exposure. The frequency or pitch can also have some effect, since high-pitched sounds are more damaging than low-pitched sounds.

Noise may tire out the inner ear, causing temporary hearing loss. After a period of time away from the noise hearing may be restored. Some workers who suffer temporary hearing loss may find that by the time their hearing returns to normal, it is time for another work shift so, in that sense, the problem is "permanent."

With continual noise exposure, the ear will lose its ability to recover from temporary hearing loss, and the damage will become permanent. Permanent hearing loss results from the destruction of cells in the inner ear, cells which can never be replaced or repaired. Such damage can be caused by long-term exposure to loud noise or, in some cases" by brief exposures to very loud noises.

Normally, workplace noise first affects the ability to hear high frequency (high-pitched) sounds. This means that even though a person can still hear some noise, speech or other sounds may be unclear or distorted.

Workers suffering from noise-induced hearing loss may also experience continual ringing in their ears, called "tinnitus." At this time, there is no cure for tinnitus, although some doctors are experimenting with treatment.

Other Effects

Although research on the effects of noise is not complete, it appears that noise can cause quickened pulse rate, increased blood pressure and a narrowing of the blood vessels over a long period of time, these may place an added burden on the heart.

Noise may also put stress on other parts of the body by causing the abnormal secretion of hormones and tensing of the muscles.

Workers exposed to noise sometimes complain of nervousness, sleeplessness and fatigue. Excessive noise exposure also can reduce job performance and may cause high rates of absenteeism.

Permissible Exposure Limit

The Action level for noise is an average noise level of 85 dB for an eight-hour day. When employees are exposed to noise levels, which exceed the Permissible Exposure Limit, the employer must install or use engineering or administrative controls to lower the noise levels. While these controls are being designed or installed employees must wear hearing protection. If the controls still do not reduce noise exposures to below 90 dB, hearing protection must continue to be worn.

Protective Measures

Suitable hearing protectors (earplugs or muffs) must be made available at no cost to employees who are exposed to an average of 85 dB or greater for an eight-hour day. Employees must be given the opportunity to select from three different types of appropriate hearing protectors.

Hearing tests (audiometric exams) must be given to employees who are exposed to an average of 85 dB or greater for an eight-hour day. Hearing tests will show whether employees are experiencing any hearing losses. Hearing tests are also useful in showing how well the earplugs and earmuffs are working. Hearing tests must be given annually.

Employees should also receive training in the effects of noise on hearing, an explanation of the hearing tests, and instruction on the proper fitting and care of earplugs or muffs.

Noise away from work can also cause hearing loss. Hearing protectors should be worn when operating noisy equipment or tools such as chain saws, brush cutters, power lawn mowers, or when using firearms.

Refer to Alaska Administrative Code, Occupational Health and Environmental Control 04.0104 for specific regulations on Noise Exposure and Hearing Conservation Programs.

PHYSICAL AGENT DATA SHEET (PADS)

ULTRAVIOLET RADIATION

Description

Ultraviolet (UV) is the name for a band of energy on the electromagnetic spectrum that lies between visible light and x-rays. UV has some of the properties of visible light and other properties of the x-rays. Like visible light, some UV is actually visible but most is invisible like x-rays. UV, like light, cannot penetrate very far into most solids. Some UV, like x-rays, can ionize atoms or molecules which visible light cannot do.

Common sources of UV include the sun (especially when reflected by water, snow or ice), sun tanning lamps, mercury discharge lamps, welding arcs, plasma torches, and some lasers.

Health Hazards

The nature and seriousness of UV injuries depend on the length of exposure, the intensity of the UV, the type or wavelength of UV, the sensitivity of the individual, and the presence of certain chemicals (photosensitizers).

Skin

UV from the sun causes sunburns and skin cancer. UV from other sources can also cause skin burns varying in degree from mild reddening of the skin (first degree burns) to more severe and painful blistering (second degree burns). Long-term skin exposure to UV can cause actinic skin (a dry, brown, inelastic wrinkled skin) and skin cancer. Fair skinned individuals are more likely to develop both sunburns and skin cancer.

Some drugs, such as the antibiotic tetracycline, can cause skin burns from UV to happen faster and to be more severe. Products containing coal tar can also cause this reaction. These substances are called photosensitizers.

UV exposure may trigger cold sores (Herpes Simplex) in some individuals.

Eyes

When UV is absorbed by the eyes and eyelids, it can cause keratoconjunctivitis or "welders' flash." This is a very painful condition that feels like grit in the eyes and may make the eyes water and very sensitive to light. The condition usually occurs 6-12 hours after exposure and may last 6-24 hours. The painful injury may make a person unwilling or unable to open his/her eyes during this time period, but most discomfort is gone within 48 hours with no lasting injury. The maximum sensitivity of the eye occurs at a UV wavelength of 270 manometers. Cataracts or clouding of the lens of the eye can occur during high exposures to wavelengths in the range of 295-300 nanometers.

Skin Safety and Health Precautions

Skin burns from high, short-term exposure to UV and skin cancer from long-term exposure can be prevented by covering exposed skin with clothing and protective equipment such as gloves and face shields. *Barrier creams or lotions with sun protection factors (SPF) of 15-18 will also help prevent skin burns.

*Welders' helmets should provide protection for the neck area as well as the face and eyes.

Eyes

Tinted goggles and/or face shields should be worn to prevent burns of the cornea and eyelids. Selection of the appropriate degree of tint should be based on the anticipated wavelength and intensity of the UV source. (see Table 1)

Table 1

Shade No. 3.0: is for glare of reflected sunlight from snow, water, sand, etc.; stray light from cutting and welding, metal pouring and work around furnaces and foundries; and soldering (for goggles or spectacles with side shields worn under helmets in arc welding operations, particularly gas-shielded arc welding operations).
Shade Nos. 4.0 and 5.0: are for light acetylene cutting and welding; light electric spot welding.
Shade Nos. 6.0 and 7.0: are for gas cutting, medium gas welding, and non-gas-shielded arc welding using current values up to 30 amperes.
Shade Nos. 8.0 and 9.0: are for heavy gas cutting and nongas-shielded arc welding and cutting using current values from 30 to 75 amperes.
Shade Nos. 10.0 and 11.0: are for arc welding and cutting using current values from 75 to 200 amperes.
Shade Nos. 12.0 and 13.0: are for arc welding and cutting using current values from 200 to 400 amperes.
Shade No. 14.0: is for arc welding and cutting using current values over 400 amperes (including carbon arc welding and cutting), and for atomic hydrogen welding.

NOTE: ordinary window glass, 1/811 in thickness, is sufficient protection for the eyes and skin against the ultraviolet radiation from ordinary sources such as sunlight. In cases of extremely intense sources of ultraviolet and visible radiation, it is not adequate.

In sunny conditions on water, snow and ice, extra precautions should be taken to protect against reflected sunlight. Sunglasses with side shields should be worn. When applying protective ointments or lotions, special attention should be paid to the nose, lips, underside of the chin, and tops of the ears.

In workplaces, operations such as welding which produce high levels of UV should be performed behind enclosures or barriers to absorb the radiation and shield nearby workers.

UV sources like mercury discharge lamps should be operated only with all safety devices in place and in accordance with manufacturer's instructions.

First Aid Procedures

Skin burns: immediate application of cold (cold water, ice, cold clean cloths) to the affected area will reduce the severity and relieve pain associated with first and second degree burns. Do not apply any burn ointments, creams, or butter to skin burns.

Eyes: place sterile dressings over the eyes of a person suffering from UV burns of the eyes and seek medical attention.

Recommended Exposure Limits[2]

The following section is very technical and is included for the use of safety and health professionals who have the skills and equipment to measure UV levels.

These threshold limit values (TLVS) refer to ultraviolet radiation in the spectral region between 200 and 400 nm and represent conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse effect. These values for exposure of the eye or skin apply to ultraviolet radiation from arcs, gas and vapor discharges, flourescent and incandescent sources, and solar radiation, but do not apply to ultraviolet lasers. These values do not apply to ultraviolet radiation exposure of photosensitive individuals or of individuals concomitantly exposed to photosensitizing agents. These values should be used as guides in the control of exposure to continuous sources where the exposure duration shall not be less that 0.1 sec (Figure 1).

These values should be used as guides in the control of exposure to ultraviolet sources and should not be regarded as a fine line between safe and dangerous levels.

Recommended Values

The threshold limit value for occupational exposure to ultraviolet radiation incident upon skin or eye where irradiance values are known and exposure time is controlled are as follows:

1. For the near ultraviolet spectral region (320 to 400 nm), total radiance incident upon the unprotected skin or eye should not exceed 1 mW/cm for periods greated than 110

seconds (approximately 16 minutes) and for exposure times less than 10 seconds should not exceed one J/cm.

2. For the actinic ultraviolet spectral region (200 to 315 nm), radiant exposure incident upon the unprotected skin or eye should not exceed the values given in Table 2 within an 8-hour period.

Table 2 Relative Spectral Effectiveness by Wavelength*

Wavelength (nm)	TLV (mJ/cm^2)	Relative Special Effectiveness S
200	100	0.03
210	40	0.075
220	25	0.12
230	16	0.19
240	10	0.30
250	7	0.43
254	6	0.5
260	4.6	0.65
270	3.0	1.0
280	3.4	0.88
290	4.7	0.64
300	10	0.30
305	50	0.60
310	200	0.015
315	1000	0.003

*See Laser TLVS.

3. To determine the effective irradiance of a broadband source weighted against the peak of the spectral effectiveness curve (270 nm), the following weighting formula should be used:

$$E_{eff} = \Sigma\, E\lambda\, S\lambda\, \Delta\, \lambda$$

where:

E_{eff} = effective irradinace relative to a monochromatic source at 270 nm in W/cm^2 [J/ (s cm^2)]

$E\lambda$ = spectral irradiance in W/(cm nm)

$S\lambda$ = relative spectral effectiveness (unitless)

$\Delta \lambda$ = band width in manometers

4. Permissible exposure time in seconds for exposure to actinic ultraviolet radiation incident upon the unprotected skin or eye may be computed by dividing 0.003 J/cm^2 by E_{eff} in W/cm^2. The exposure time may also be determined using Table 3 which provides exposure times corresponding to effective irradiances in μ W/cm^2.

Table 3 Permissible Ultraviolet Exposures

Duration of Exposure Per Day	Effective Irradiance E_{eff} (W/cm^2)
8 hrs	0.1
4 hrs	0.2
2 hrs	0.4
1 hr	0.8
30 min	1.7
15 min	3.3
10 min	5.0
5 min	10.0
1 min	50.0
30 sec	100.0
10 sec	300.0
1 sec	3,000.0
0.5 sec	6,000.0
0.1 sec	30,000.0

5. All the preceding TLVs for ultraviolet energy apply to sources which subtend an angle less than 80 degrees. Sources which subtend a greater angle need to be measured only over an angle of 80 degrees.

Conditioned (tanned) individuals can tolerate skin exposure in excess of the TLV without erythemal effects. However, such conditioning may not protect persons against cancer.

Reference

1. Sunlight and Man. Fitzpatrick et all Eds. University of Tokyo Press, Tokyo, Japan (1974).
2. Threshold Limit Values and Biological Exposures Indices for 1986 - 1987. American Conference of Governmental Industrial Hygienists, 6500 Glenway Avenue, Building D-7, Cincinnati, Ohio 45211-4438.

ATTACHMENT 5

Field Forms

Incident Report Form

Daily Inspection Log

Standard Equipment Inspection Checklist

Log of Work-Related Injuries and Illnesses
(OSHA Form 300)

Toolbox Safety Meeting Record

Immediate Report of Accident (USACE 265-E)

Accident Investigation Report (USACE ENG Form 3394)

Bristol INDUSTRIES

Date ____________________

INCIDENT REPORT FORM

(Please indicate which Bristol company the employee is working for)

BI	☐	**BCS**	☐	**BEESC**	☐	**BDBS**	☐	**BFuels**	☐	**BERS**

Name of manager or supervisor:

EMPLOYEE INFORMATION

Full Name	Last			First		Middle	
Job title							
Street			City	State		Zip	
Date of birth		Date hired		Male	☐	Female	☐

PHYSICIAN OR HEALTH CARE PROFESSIONAL INFORMATION

Name of physician or other health care professional			
Location of treatment			
Facility			
Street	City	State	Zip

Was employee treated in an emergency room?	☐	NO	☐	YES

Was employee hospitalized overnight as an in-patient?	☐	NO	☐	YES

(Please attach a release form for return to work if applicable)

Physician's comments or notes	
Indicate if employee refuses medical attention beyond first aid (Explain)	

INCIDENT REPORT

Check if time cannot be determined	☐	explain	
Date of injury/illness or fatality		Time employee began work	
Time of incident			

Pre-incident activity? *Describe the activity, as well as the tools, equipment or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials;" "spraying chlorine from hand sprayer;" "daily computer key entry."*

Incident events? *Examples: "When ladder slipped on wet floor, worker fell 20 feet;" "Worker was sprayed with chlorine when gasket broke during replacement;" "Worker developed soreness in wrist over time."*

Physical description of injury or illness.

Type of injury	
Body part	
Extent of injury (from where to where)	
Level of pain (1-10) and pain type	
Additional information	

Physical mechanics of injury? *Examples: "concrete floor;" "chlorine;" "radial arm saw." If this question does not apply to the incident, leave it blank.*

Names of witnesses if applicable

date

Name/Title (person completing report)

date

Signature (person completing report)

date

Name (employee)

date

Signature (employee)

DAILY INSPECTION LOG

Date: ______________________

Worksite ID: ______________________

SS/Lead and No. of Workers: ______________________

Activity Description: ______________________

Equipment/PPE in Use: ______________________

Work Site Observations/Issues: ______________________

Corrective Actions Taken: ______________________

Screening Data Results: ______________________

Photo: ☐ Yes ☐ No

Name: ______________________

Signature: ______________________

Standard Equipment Inspection Form

Equipment No.	Date	Inspector Name	Hours	Location

A. SERVICE CHECKS:

ITEM	*OK*	*AMT NEEDED*	*ITEM*	*OK*	*AMT ADDED*
Radiator & Freeze Protection			Batteries		
Engine			Lubrication Points		
Transmission			Fuel Level		
Hydraulic System			Drain Fuel Sediment		
Differentials			Pivot Shaft		
Planetaries / Final Drives			Air Induction & Filter		

B. EQUIPMENT INSPECTION

	CONDITION Bad/Good/ Excellent	*Attn Needed*	*Explanation*	*Corrected? (Y/N)*
Fan & Shrouds				
Belts Pulleys				
Exhaust & Rain Cap				
Battery & Cables				
Hydraulic Cylinders				
Operators Compartment				
Hoses & Lines				
Fuel / Oil Leaks				
Cracks				
Cutting Edges				
Sprockets				
Rollers & Idlers				
Tracks or Tires				
Trans Operation				
Service Brakes				
Parking Brake				
Gauges Operational				
Backup Alarm				
Wipers & Washer				
Lights				
Horn				
Seat & Seat Belts				
Windows				

Machine Damage:

Standard Equipment Inspection Form

NOTES (continued)**:**

Deficiencies noted: ☐ Yes ☐ No Explain: ____________________

Deficiencies fixed: ☐ Yes ☐ No Date: ____________________

Inspection 100% complete ☐ Yes ☐ No

USCOE Rep. Signature ____________________ Date all items passed inspection: ____________________

Bristol Representative ____________________ Date: ____________________

Year ________

U.S. Department of Labor

Occupational Safety and Health Administration

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name ________________________

City ________________ State ________________

Identify the person		Describe the case				Classify the case											
						CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
								Remained at work				(M)					
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other record-able cases (J)	Away From Work (days) (K)	On job transfer or restriction (days) (L)	Injury (1)	Skin Disorder (2)	Respiratory Condition (3)	Poisoning (4)	Hearing Loss (5)	All other illnesses (6)
					Page totals	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Injury (1) | Skin Disorder (2) | Respiratory Condition (3) | Poisoning (4) | Hearing Loss (5) | All other illnesses (6)

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year ______

U.S. Department of Labor

Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of…
(M)

(1) Injury	0	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name ______________________

Street ______________________

City ____________ State ____________ Zip ______

Industry description (e.g., Manufacture of motor truck trailers)

____

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)

___ ___ ___ ___

OR North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information

Annual average number of employees ________

Total hours worked by all employees last year ________

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

______________________ Company executive ____________ Title

______________________ Phone ____________ Date

OSHA's Form 301
Injuries and Illnesses Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related injuries and Illnesses* and the accompanying *Summary*, these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by ______________________

Title ______________________

Phone ______________ Date ______________

Information about the employee

1) Full Name ______________________

2) Street ______________________

City ______________ State ______ Zip ______

3) Date of birth ______________________

4) Date hired ______________________

5) ☐ Male
☐ Female

Information about the physician or other health care professional

6) Name of physician or other health care professional

____

____

7) If treatment was given away from the worksite, where was it given?

Facility ______________________

Street ______________________

City ______________ State ______ Zip ______

8) Was employee treated in an emergency room?
☐ Yes
☐ No

9) Was employee hospitalized overnight as an in-patient?
☐ Yes
☐ No

Information about the case

10) Case number from the Log ________ *(Transfer the case number from the Log after you record the case.)*

11) Date of injury or illness ________

12) Time employee began work ________ AM/PM

13) Time of event ________ AM/PM ☐ Check if time cannot be determined

14) **What was the employee doing just before the incident occurred?** Describe the activity, as well as the tools, equipment or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

15) **What happened?** Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

16) **What was the injury or illness?** Tell us the part of the body that was affected and how it was affected; be more specific than "hurt", "pain", or "sore." Examples: "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

17) **What object or substance directly harmed the employee?** Examples: "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, leave it blank.

18) **If the employee died, when did death occur?** Date of death

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

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

Tinker AFB, Oklahoma City, OK

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.			
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20.			
21.			
22.			
23.			
24.			

U.S. ARMY CORPS OF ENGINEERS, PACIFIC OCEAN DIVISION HEADQUARTERS

IMMEDIATE REPORT OF ACCIDENT

For use of this form, see EM 385-1-1, the proponent agency is CEPOD-SO

SOHO USE ONLY

DATE RECORDED TIME RECORDED

TO (COE OFFICE):	FROM:

1. NAME OF PERSON REPORTING ACCIDENT ______ 1a. PHONE NO. ______

2. ACCIDENT INFORMATION (CHECK ALL THAT APPLY):

- ☐ INJURY ☐ INITIAL REPORT ☐ CONTRACTOR ☐ PROPERTY DAMAGE
- ☐ ILLNESS ☐ FOLLOW UP REPORT* ☐ GOVERNMENT ☐ OTHER (explain)
- ☐ FATALITY ☐ FINAL REPORT ☐ PUBLIC ______

*A follow up report is due within 24 hours of any changes or additional information related to the accident (e.g., workers duty status)

3. CONTRACTOR/SUBCONTRACTOR	3a. CONTRACT NO.	
4. LOCATION OF ACCIDENT (be specific, include project name and number)	4a. DATE OF ACCIDENT	4b. TIME OF ACCIDENT
5. NAME OF PERSON INVOLVED/INJURED (Last name, First name)	5a. AGE	5b. OCCUPATION

6. What was the activity before the accident occurred? Describe the activity, as well as the tools, equipment, or materials the employee was using (e.g., excavating with a backhoe, electrical equipment installation, demolition of facility, erecting structural steel):

7. What Happened? Tell how the injury, illness, or property damage occurred (e.g., struck by, contacted by, cut by, strained by, fell from same or different level, stung by):

8. What was the injury, illness or property damage (e.g., contusion, bruise, muscle strain, fracture, respiratory, allergic reaction, skin disease, poisoning, collapsed crane boom, engine fire, damaged utilities)?

9. Is the injury, illness, or property damage recordable as defined in OSHA 29 CFR Part 1904 or ER 385-1-99? If yes, an ENG Form 3394 must be submitted within 10 days. Note: An injury or illness is recordable if it results in death, days away from work, transfer to another job, restricted work, medical treatment beyond first aid, loss of consciousness or other significant illness. Property damage of $2000.00 or more is recordable. ◯ Yes ◯ No

10. What medical treatment was required for the injury or illness (e.g., first aid, sutures, prescription medication, x-rays, cast)?

11. If medical treatment was given away from the work site, where was it given?

12. Was employee hospitalized overnight as an in-patient? ◯ Yes ◯ No	13. Estimated days away from work:	13a. Estimated Job Transfer or Restricted Days:	13b. Estimated days hospitalized:

15. Did accident result in property damage? ◯ Yes ◯ No	16. If yes, estimated property damage (if property damage is $2000 or greater ENG Form 3394 must be completed and submitted)
17. **Accident Board of Investigation Required? ◯ Yes ◯ No	17a. If yes, was immediate notification to the designated authorities made? District Safety Officer and Commander must be notified of all serious cases. ◯ Yes ◯ No

** A board of investigation is required if the the accident results in: A. a fatality, B. three or more people admitted to the hospital, C. permanent total or partial disability, or D. property damage of $500,000 and greater.

18. NAME AND TITLE OF INDIVIDUAL WHO WILL INVESTIGATE THIS ACCIDENT

NAME AND TITLE OF PERSON REPORTING	PHONE:	SIGNATURE	DATE

CONTINUATION PAGE

(For Safety Staff only)	REPORT NO.	EROC CODE	**UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	**REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)**

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*
b. AGE
c. SEX ☐ MALE ☐ FEMALE
d. SOCIAL SECURITY NUMBER
e. GRADE

f. JOB SERIES/TITLE

g. DUTY STATUS AT TIME OF ACCIDENT
☐ ON DUTY ☐ TDY
☐ OFF DUTY

h. EMPLOYMENT STATUS AT TIME OF ACCIDENT
☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER
☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL
☐ TEMPORARY ☐ STUDENT
☐ OTHER *(Specify)* ____________

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*
b. TIME OF ACCIDENT *(Military time)* hrs
c. EXACT LOCATION OF ACCIDENT
d. CONTRACTOR'S NAME
(1) PRIME:
(2) SUBCONTRACTOR:

e. CONTRACT NUMBER ____________
☐ CIVIL WORKS ☐ MILITARY
☐ OTHER *(Specify)* ____________

f. TYPE OF CONTRACT
☐ CONSTRUCTION ☐ SERVICE
☐ A/E ☐ DREDGE
☐ OTHER *(Specify)* ____________

g. HAZARDOUS/TOXIC WASTE ACTIVITY
☐ SUPERFUND ☐ DERP
☐ IRP ☐ OTHER *(Specify)*
____

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

a. CONSTRUCTION ACTIVITY ____________ (CODE) #
b. TYPE OF CONSTRUCTION EQUIPMENT ____________ (CODE) #

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see help menu)*

a. SEVERITY OF ILLNESS/INJURY ____________ (CODE) #
b. ESTIMATED DAYS LOST
c. ESTIMATED DAYS HOSPITALIZED
d. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED
PRIMARY ____________ (CODE) #
SECONDARY ____________ (CODE) #

f. NATURE OF ILLNESS/INJURY ____________ (CODE) #

g. TYPE AND SOURCE OF INJURY/ILLNESS
TYPE ____________ (CODE) #
SOURCE ____________ (CODE) #

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT ____________ (CODE) #
b. PERSONAL FLOATATION DEVICE USED? ☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE
☐ PICKUP/VAN ☐ AUTOMOBILE
☐ TRUCK ☐ OTHER *(Specify)*
____

b. TYPE OF COLLISION
☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END
☐ BROADSIDE ☐ ROLL OVER ☐ BACKING
☐ OTHER *(Specify)* ____________

c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
(1) FRONT SEAT			
(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	b. OWNERSHIP	c. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see help menu)*

a. TYPE OF VESSEL/FLOATING PLANT ____________ (CODE) #
b. TYPE OF COLLISION/MISHAP ____________ (CODE) #

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*					
a. (Explain YES answers in item 13)	YES	NO	a. *(CONTINUED)*	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐	CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as noise, radiation, etc., contribute to accident?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐	OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐	SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐	PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐	DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐	b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?		
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐	☐ YES *(If yes, attach a copy.)* ☐ NO		

12. TRAINING		
a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(Month) (Day) (Year)

13. **FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES** *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

b. INDIRECT CAUSE(S)

14. **ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).**

DESCRIBE FULLY:

15. **DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.**

a. BEGINNING (Month/Day/Year)		b. ANTICIPATED COMPLETION (Month/Day/Year)	
c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT CORPS ______ CONTRACTOR ______	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL

16. **MANAGEMENT REVIEW** *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. **MANAGEMENT REVIEW** *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. **SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW**

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. **COMMAND APPROVAL**

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE *(Continuation)*

13b. **INDIRECT CAUSES** *(Continuation)*

14. **ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S)** *(Continuation)*

ATTACHMENT 6

Bristol Drug and Alcohol Testing Policy

I. EMPLOYEE DRUG AND ALCOHOL TESTING POLICY

SECTION 1. INTRODUCTION AND GENERAL INFORMATION

A. DRUG AND ALCOHOL PROHIBITION POLICY

1. Policy

Bristol has a long-standing commitment to maintaining high standards for the health and safety of its employees and the public at large. The use of drugs or alcohol by Bristol employees during or prior to work time is contrary to these high standards and will not be tolerated.

2. Purpose

The purpose of this Drug and Alcohol Testing Policy is to maintain Bristol's high safety, health, and work performance standards, and to reduce work-related accidents, injuries, and damage which may be caused by drug or alcohol use. This policy is also intended to ensure the maintenance of productivity, the quality of our services, and the security of Bristol property.

3. Compliance with Alaska Law

This policy is intended to comply with Alaska Statutes (AS) 23.10.600 – 23.10.699, which is incorporated by this reference. If any provision of this policy conflicts with that law, the policy shall be applied and interpreted as the law requires so that the policy is at all times in compliance with AS 23.10.600 – 23.10.699.

4. Compliance with Federal Standards

This policy is intended to comply with applicable federal law and federal acquisition regulations regarding establishment of a Drug-Free Workplace, Federal Acquisition Regulation (FAR 52.226-6) and a Drug-Free Work Force (FAR 256.255-7004).

B. EFFECTIVE DATE OF POLICY

- This revised policy will become effective on April 1, 2009. This policy supersedes all prior Bristol employee substance abuse testing policies; and
- Upon hire, employees shall receive, read and sign a copy of this policy, indicating that they understand, and will abide by it. Copies of this policy also may be obtained from Bristol Human Resources.

C. CONSEQUENCES OF VIOLATING POLICY

- Compliance with this policy is a condition of employment; and
- Job applicants who violate this policy will not be hired by Bristol, or if hired conditionally subject to negative test results, will be discharged upon receipt of

confirmed positive test results. Employees who violate this policy are subject to disciplinary action up to and including termination of employment. Employees and job applicants who violate this policy also will be considered ineligible for hire for at least 12 months. In serious cases, as determined by Bristol at its sole discretion, the job applicant or employee involved will be considered ineligible for rehire indefinitely.

D. PERSONNEL SUBJECT TO DRUG AND ALCOHOL POLICY

This policy applies to all job applicants and Bristol employees. **Employee** and **Job Applicant** are defined in Section 6 Definitions.

E. SUBSTANCES TESTED FOR AND POSITIVE RESULTS

Bristol may test for alcohol and the following drugs:

CUT-OFF LEVELS: ALCOHOL

Alcohol will be tested for by Breath Analyzer and Q.E.D. Saliva Test:

.04 BAC (blood alcohol content)

Test results at or above the confirmation level will be considered a positive test for alcohol.

CUT-OFF LEVELS: DRUGS

SUBSTANCE	INITIAL TEST (ng/ml)	CONFIRMATION TEST (ng/ml)
Marijuana metabolites[1]	50	15
Cocaine metabolite[2]	300	150
Opiates & opiate metabolites	2,000	2,000
Morphine		2,000
Codiene		2,000
6-acetylmorphine[3]		10
Phencyclidine	25	25
Amphetamines	1,000	500
Amphetamine		500
Methamphetamine[4]		500
Alternate opiates	2,000	2,000
Alternate amphetamines	1,000	500

[1]Delta-9 – tetrahydrocaunadinol 9-carboxyloc acid

[2]Benzoylecgonine

[3]Test for 6-acetylmorphine when morphine concentration exceeds 2,000 ng/ml

[4]Specimen must also contain amphetamine at a concentration greater than or equal to 200 ng/ml

ng/ml = nanograms per milliliter

Ref: U.S. Dept. of Transportation, Drug-And-Alcohol-Testing Procedures, Title 49 Code of Federal Regulations, Part 40, Section 40.29 (2/15/94).

F. RESPONSIBILITIES

1. Administration

Administrative personnel are responsible for taking immediate and consistent action in compliance with this policy and the applicable procedures.

2. Employees

Each employee will abide by Bristol's Zero Alcohol/Drug Use Standards by being responsible for reporting to work and performing his/her work in a sober, unimpaired condition. This includes employees who are on call status. Employees are responsible for abiding by the terms of this policy and, as a condition of employment, notifying Bristol of any criminal drug statute convictions for a violation occurring in the workplace no later than five days after such conviction, or they plead nolo contendere or are sentenced; seeking appropriate assistance with chemical dependency problems; cooperating with applicable testing procedures; undergoing a professional drug/alcohol evaluation upon request subsequent to a positive test; and maintaining adequate job performance regardless of the drug/alcohol dependency. Employees who test positive for drug/alcohol use may be subject to continued testing as a condition of employment if their employment is not terminated.

If requested, the employee will sign a consent form authorizing qualified Bristol personnel or a private testing laboratory to take a urine and/or breath sample and release the results of the laboratory testing to Bristol. The samples will be sealed in the employee's presence and must be initialed by the employee. A refusal to provide either sample will constitute a presumption that the employee is under the influence of or impaired by drugs or alcohol.

G. AMENDMENT OF POLICY

Bristol reserves the right to amend this policy from time to time as circumstances warrant. Without limiting the generality of this section, Bristol may introduce new testing methodologies and procedures that it believes represent an improvement in available technology, or to comply with applicable legislation, court decisions, or other standards applicable to the subject matter of this policy.

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SECTION 2. CIRCUMSTANCES UNDER WHICH TESTING MAY BE CONDUCTED

A. Reasons for Testing

Bristol may test job applicants and employees for alcohol or drugs, or both, in the following circumstances:

1. Pre-employment Testing

Job applicants may be tested for alcohol or drugs before they are employed by Bristol, or may be hired conditionally subject to negative post-employment tests. Those employees hired conditionally subject to negative post-employment tests must complete testing within four weeks following their employment date. Those employees not meeting this criteria will be terminated. Job applicants who fail a drug or alcohol test will be denied employment with Bristol and will not be considered eligible to reapply for employment for at least 12 months. Job applicants will be required to read, complete, and sign Bristol's Applicant Alcohol and Drug Test Exam Consent and Release Form before being tested.

2. Post-accident Testing

Any employee whom Bristol reasonably believes may have contributed to an accident in the workplace or during work time may be required to undergo drug or alcohol impairment testing. The test will be conducted as soon as practical after the accident, but not later than 32 hours after the accident for drugs and not later than eight hours for alcohol. Bristol will make reasonable attempts to obtain a sample from an employee after an accident, <u>but any injury should be treated first</u>. "Accident" is defined in Section 6 Definitions.

<u>Obligations of Employee Subject to Post-accident Testing</u>:

- An employee who is subject to post-accident testing may not consume alcohol for eight hours after the accident, or until he/she has taken an alcohol test, whichever occurs first; and
- An employee who is subject to post-accident testing must remain readily available for such testing and may not take any action to interfere with the testing or the results of testing.
- Employees who do not comply with the post-accident testing requirements, or who fail or refuse to provide a sample for testing, will be considered to have refused to submit to testing and will be subject to appropriate disciplinary action, including possible termination of employment.

3. Reasonable Cause/Reasonable Suspicion Testing

Any employee whom Bristol reasonably suspects may be affected by the use of drugs or alcohol, which may adversely affect job performance, safety, or the work environment, may be required to submit to a drug or alcohol test. This includes instances when an employee demonstrates behavior that leads to the conclusion that he/she has used alcohol or drugs prior to work time. Reasonable suspicion testing is done to identify drug- and alcohol-affected employees who may pose a danger to themselves or others in their job performance.

- Two supervisors will make the decision whether there is reasonable suspicion to believe an employee is impaired by or under the influence of a drug or alcohol while on duty and in violation of this policy. In making a determination of reasonable cause, the factors to be considered include, but are not limited to, the following:

    - Adequately documented pattern of unsatisfactory work performance, for which no apparent reason exists, or a change in an employee's prior pattern of work performance, especially where there is some evidence of alcohol- or drug-related behavior on or off the work site;

      Example: Reliable reports of heavy drinking on the weekends or evenings followed by tardiness, no-shows, apparent hangover, etc., the next workday;

    - Physical signs and symptoms consistent with substance abuse;

      Example: Observed slurred speech, blurred vision, smell of alcohol or marijuana on the person's breath, sleeping on the job, staggered gait, or other physical lack of coordination; or

    - Evidence of illegal substance use, possession, sale, or delivery while on duty.

      Example: Observed drinking from a container concealed in a bag, or conversation overheard regarding sale of drugs.

Events After Determination is Made

When a determination is made that reasonable suspicion exists that an employee is under the influence of drugs or alcohol in violation of this policy, the employee shall be immediately relieved of his/her duties pending further action.

The observing supervisor shall immediately notify the department head or other appropriate supervisor if reasonable suspicion is found to exist. Upon review, the department head or other appropriate supervisor may direct or authorize that the employee in question immediately submit to a drug or alcohol test.

Reports of Violation by Supervisory Personnel

If a non-supervisory employee has reason to believe that a co-worker or supervisor subject to this policy is under the influence of drugs or alcohol at work in violation of this policy, then he/she shall report such potential violation to the CEO, who will thereafter take appropriate action. Anonymity of the non-supervisory employee will be protected to the extent feasible and retaliation by the supervisor or others will not be permitted.

PROCEDURAL NOTE FOR BRISTOL SUPERVISORS:

Transport the employee. The potentially affected employee should not be allowed to proceed alone to or from the collection site, or to operate a motor vehicle or other dangerous equipment. The supervisor should make all necessary transportation arrangements for the employee. If the employee under reasonable suspicion refuses transportation and insists on operating his/her own motor vehicle, local law enforcement authorities should be notified immediately. In addition to the safety concerns for the employee, accompanying the employee also assures that there is no opportunity en route to the collection site for the employee to ingest anything that could affect the test result or to acquire "clean" urine from another person. Refusal to accept transportation arranged by Bristol may result in termination of employment.

4. Follow-up Testing

Upon completion of drug or alcohol rehabilitation, the employee will be subject to three additional tests for drugs or alcohol without prior notice, with two tests to occur within six months of the employee's return to employment, and the third test to occur within six to 12 months after the employee's return to work. A positive test result in any of these follow-up tests shall be grounds for discipline up to and including termination of employment.

5. Random Testing

Certain employees shall be subject to unannounced and random drug testing only. The primary purposes of unannounced random testing are to deter illegal drug use that may affect work performance or safety and to ensure a drug-free workplace.

Bristol contracts with clients that require, as a part of the contractual relationship, random drug testing for employees working on that particular project. The sampling rate may vary depending upon the project and/or contract under which work is performed. Affected employees will be given 30 days' notice of the random drug testing requirement. Refusal to accept an assignment because of the drug testing requirement may be cause for immediate termination.

In addition:

- Random tests will only be administered just before, during, or shortly after an employee's work time;
- Employees must remain in the random selection pool at all times, regardless of whether or not they have been previously selected for testing;
- Employees shall be selected for testing by using a computer-based random number generator; and

- No advance warning will be given to employees regarding the dates and times of random testing.

B. Refusal to Submit to Testing and Use of Adulterants

A refusal to submit to testing will be treated as if it were a positive test. Bristol will not employ an employee or job applicant who refuses to submit to testing at least every 12 months.

A sample containing an adulterant (i.e., a substance used to hinder the detection of a drug) will be treated the same as a positive test. Tampering with a sample or substituting another person's sample for one's own are acts also considered refusal to submit to testing. An employee or job applicant who is found to have adulterated, tampered with, or substituted another person's sample for their own will be considered indefinitely ineligible for employment with Bristol.

SECTION 3. SAMPLE COLLECTION AND TESTING PROCEDURES

A. COLLECTION OF SAMPLES

- Testing under this policy is by urinalysis and instant testing for drugs. Evidential breath testing devices and Q.E.D. saliva tests are used for testing for alcohol. All tests are administered under conditions and procedures conducted for the sole purpose of detecting drugs or alcohol.
- The testing will be conducted by a Bristol-appointed medical laboratory and paid for by Bristol. Qualified Bristol employees may also collect samples. Sample collection and testing will be performed under reasonable and sanitary conditions.
- The collection site shall have all necessary personnel, materials, equipment, facilities, and supervision to provide for the collection, security, temporary storage, and shipping or transportation of samples to a certified drug-testing laboratory designated by Bristol. An independent medical facility may also be used as a collection site.
- All test samples will be collected by the split sample collection method. The “A” bottle is sent to the laboratory for testing. The “B” bottle shall be maintained under the chain-of-custody specified in Section 3 (below).
- The person collecting the sample will document and label the sample to preclude to a reasonable extent the possibility of misidentification of the person tested in relation to the test result provided.
- The person collecting the sample shall provide the person whose sample is taken with an opportunity to provide medical information that may be relevant to the test, including identifying current or recently used prescription and non-prescription drugs.
- Sample collection, storage, and transportation to the testing place shall be performed in a manner reasonably designed to preclude the possibility of sample contamination, adulteration, or misidentification.
- An employee designated for testing may be required to provide photo identification to the person collecting the sample.
- Drug and alcohol tests will normally be scheduled during, or immediately before or after, the employee’s regular work period or work time. Testing under this policy is considered work time and will be compensated at the employee’s normal rate of pay.
- Sample collection will be performed in a manner which ensures the individual employee’s privacy to the maximum extent consistent with ensuring that the sample is not contaminated, adulterated, or misidentified.
- Bristol will pay the actual costs for drug and alcohol testing required of employees and job applicants.

B. Testing Procedures

- Bristol shall use a drug-testing laboratory approved or certified by the Substance Abuse and Mental Health Services Administration (SAMHSA) or the College of American Pathologists, American Association of Clinical Chemists.
- The laboratory shall permit inspections by Bristol's Human Resources representative.
- Bristol may at times use an on-site drug test. An on-site drug test provides results immediately. If on-site testing is used, Bristol will follow these protocols:
  - The on-site testing will be conducted by a supervisor or other Bristol representative who has received training and certification for such testing, as described in Section 3 (D);
  - Bristol will use only testing products approved by the U.S. Food and Drug Administration;
  - The sample to be tested on site will, at all times, be kept in sight of the job applicant or employee who is subject to the test;
  - The job applicant or employee will be allowed to observe the testing procedure and the results thereof;
  - Sample documentation (i.e., labeling) shall be performed in the presence of the job applicant or employee;
  - The job applicant or employee shall be provided an opportunity to provide medical information that may be relevant to the test, including identifying current or recently-used prescription and non-prescription drugs;
  - A written report regarding the on-site test results shall be prepared in the presence of the job applicant or employee;
  - No permanent employment action (e.g., termination of employment) shall be taken at the conclusion of the on-site test. Temporary employment action (e.g., suspension of employment pending the results of the confirmatory test) may be taken in the case of a positive on-site test. The suspension will be converted to suspension with pay if the confirmatory test is negative or the person tested demonstrates that the positive test result was caused by drugs taken in accordance with a valid prescription of the employee or by lawful non-prescription drugs; and
  - All on-site test samples will be sent to an approved laboratory for confirmatory testing.
- Positive initial drug tests will be confirmed by gas chromatography/mass spectrometry. Bristol will not rely on a positive drug test unless the confirming drug test results have been reviewed by the Medical Review Officer (MRO).

- Alcohol testing will be performed by a breath alcohol technician (BAT). If the result of an alcohol-screening test is an alcohol concentration of 0.04 BAC or greater, a confirmation test will be performed. The confirmation test will generally be done within 15, but not more than 30, minutes of the screening test. The results of these tests will be reported directly to Bristol.
- A saliva alcohol test, referred to as a Q.E.D., may be used in place of a BAT for all forms of testing. BATs will be used as confirmation in the case of positive Q.E.D.s.

C. REVIEW OF DRUG TEST RESULTS

1. MRO

Bristol shall provide or contract for the services of a Medical Review Officer (MRO). The MRO shall be a licensed physician or doctor of osteopathy. The MRO shall review all confirmed positive drug test results and interview individuals tested positive to verify the laboratory report. The MRO may interview the individual tested over the telephone, as circumstances warrant.

2. Reporting and Review of Results

- An employee may obtain a copy of the written test results only upon written request made within six months of the date of the test. Bristol will provide the written test results to the employee pursuant to that request within five working days of its receipt.
- The MRO shall review confirmed positive test results. This review shall be performed by thermo prior to the transmission of results to Bristol's Human Resources.
- The MRO shall contact the employee within 48 hours after receiving the test results from the laboratory and offer the employee an opportunity in a confidential setting to discuss the confirmed test result. The MRO shall interpret and evaluate the test result for possible legal use. If the MRO determines that the test results were caused by prescription medication, the MRO shall report the test result to Bristol as negative.
- The MRO also will inform the employee that he/she has the right within 72 hours after being informed of the positive results to request a test of the "B" bottle of the split sample. This process is an analysis of the second split sample bottle. The "B" bottle will be sent to a laboratory approved or certified by the SAMHSA or the College of American Pathologists, American Association of Clinical Chemists, of the employee's choice. The employee will be responsible for the costs of the test of the "B" bottle and will be reimbursed by Bristol only if the sample is negative.

3. Verification for Opiates

Before the MRO verifies a confirmed positive result for opiates, the MRO shall **either** determine that there is clinical evidence in addition to the urine test of unauthorized use of any opium, opiate, or opium derivative (e.g., morphine/ codeine) **or** confirm the presence of 6-monoacetylmorphine through a separate test.

4. Prescription Drug Use

- An employee must notify his/her supervisor, before beginning work, that he/she is taking medications or drugs that may interfere with the safe and/or effective performance of duties. Employees under prescribed medication from a physician are expected to educate themselves about any potential side effects of such medication. Where the pharmacist's information sheet indicates that a medication prescribed for the employee may cause drowsiness, loss of mental alertness, or otherwise impair abilities to perform job duties, the employee must advise his/her supervisor. The employee need only disclose the impairment, not the drug or the underlying condition.
- If the prescription drug use could cause production or safety problems, a supervisor may grant the employee sick leave or temporarily assign the worker different duties, if such work is available.
- In the case of prescriptive or legal drug use that results in a positive drug test result, the employee may be subject to disciplinary action when:
  - The employee failed to notify the employee's supervisor, before beginning work, that the employee was taking medications or drugs which might interfere with the safe and/or effective performance of duties;
  - Verification of valid current prescription or legal use of such drug is not provided upon request by the next scheduled work day; and/or
  - There is misuse of the prescription or recommended drug.

5. Regarding Medical Use of Marijuana for Persons Suffering from Debilitating Medical Conditions Act

- An employee who tests positive for marijuana will be allowed to explain the positive test and provide evidence (i.e., a Department of Health and Human Services registry identification card) that he/she is lawfully using marijuana for medical purposes. If the employee provides sufficient evidence, and there is otherwise no evidence of on-the-job use or impairment, the employee will not be terminated.
- In this case, the employee's position will be evaluated as to the degree with which it is safety sensitive. If it is determined that the employee, while under the influence of marijuana, presents a safety threat to his/her self or others, the employee will be removed from the position. The employee may be given a suitable position for which he/she is qualified, if available, or discharged.

6. Use of Hemp Products

- Bristol does not condone the use of over-the-counter hemp products. These products may cause positive test results for marijuana use, which cannot be distinguished from actual marijuana use. In such a case, the MRO will consider the test positive for marijuana use.
- Hemp products include, but are not limited to: hemp seed snacks, hemp oil, and hemp beer.

7. Results Consistent with Legal Drug Use

If the MRO determines there is a legitimate medical explanation for the positive test result, the MRO shall report the test result to Bristol as negative.

The Decision of the MRO is Final.

D. SUPERVISOR TRAINING

Supervisory and/or other Bristol personnel will receive training regarding the Drug and Alcohol Testing Policy. Special additional training will be provided for all supervisors or other Bristol personnel who may be asked to determine whether an employee will be drug- and alcohol-tested for reasonable suspicion. This special training shall include at least 60 minutes of training on the use of controlled substances, and at least 60 minutes of training on alcohol misuse.

If Bristol conducts on-site testing, each supervisor or other Bristol representative who is responsible for conducting the on-site drug or alcohol tests shall also:

- Receive training by the manufacturer of the test or its representative regarding the proper procedure for administering the test and for accurate evaluation of on-site test results;
- Obtain certification from the manufacturer of the test or its representative of competency to administer and evaluate the on-site test;
- Receive training to recognize sample adulteration; and
- Sign a statement in which the supervisor or other Bristol representative agrees to maintain confidentiality as to all information related to any phase of the drug test.

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SECTION 4. SELF-DISCLOSURE AND REHABILITATION

A. POLICY

Bristol employees who suffer drug- or alcohol-related problems are strongly encouraged to seek counseling and/or rehabilitation. Bristol supports the employee in the decision to request diagnosis and accept treatment for alcoholism and/or substance abuse. Bristol strongly encourages employees to seek assistance before their drug or alcohol use renders them unable to perform their essential job functions, or jeopardizes the health and safety of themselves or others.

Bristol recognizes that drug or alcohol addictions are illnesses for many people and that treatment can be successful if the person afflicted with the illness is committed to treatment. Counseling and rehabilitation, therefore, are important components of Bristol's policy. These goals must be balanced against Bristol's overriding commitment to health and safety. Due to the serious risks of injury or death that may arise if employees are impaired or under the influence while at work, employee and public safety are at all times paramount considerations.

An employee will not be penalized for disclosing a drug or alcohol problem to Bristol as long as the employee is not then subject to discipline for violation of this policy.

B. PROCEDURES

The following procedures apply to employees who disclose drug or alcohol abuse problems:

- An employee who discloses a drug or alcohol problem to Human Resources will be referred to a qualified Substance Abuse Professional (SAP) for enrollment in a qualified and Bristol-approved treatment program. Bristol may provide insurance coverage for treatment and the employee should contact Human Resources for assistance in evaluating possible insurance coverage.
- Employees may continue working as long as the SAP indicates to Human Resources that the employee is capable of working without risk to the employee or to others, while undergoing treatment. If the SAP determines the employee is not capable of working while in treatment, the employee will be placed on an unpaid leave of absence, or the employee may use paid time off and other leave benefits available to employees suffering non-alcohol or non-drug-related illnesses. This leave shall continue until the SAP indicates to Human Resources that the employee is able to return to work.
- A written release from the SAP that the employee is fit to return to work generally is required before the employee will be considered fit for return to duty.

ATTACHMENT 7

Bristol Respiratory Protection Program

SECTION 6
HEALTH AND SAFETY PROGRAMS

Program 2
Bristol Respiratory Protection Program

As required by

The OSHA Hazard Communication Standard 29 CFR 1910.134

APPROVAL

Health and Safety Manager

APRIL 2005

TABLE OF CONTENTS

APPENDICES

ACRONYMS AND ABBREVIATIONS

APR	Air Purifying Respirators
Bristol	Bristol Industries and all affiliated companies controlled by Bristol
IDLH	Immediately Dangerous to Life or Health
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
QLFT	Qualitative Fit Test
QNFT	Quantitative Fit Test
SOP	Standard Operating Procedures

1.0 PROGRAM ADMINISTRATION

This Respiratory Protection Program (Program) is consistent with federal regulations pertaining to the use of respirators. Respiratory protection will be used when engineering and administrative controls cannot reduce airborne contaminants below the Occupational Safety and Health Administration (OSHA) permissible exposure limit, or other applicable exposure levels; and is required when conditions in the workplace must be used to protect the health of the employee. Any required respiratory protection will be provided at no cost to Bristol Industries (Bristol) employees.

The Bristol Health and Safety Manager, Project Managers, and Site Supervisors will administer this Respiratory Protection Program. Bristol will provide training at least annually to review the contents of this program and to satisfy the training requirements of Part 29, Code of Federal Regulations, Section 1910.134 (29 CFR 1910.134). The Project Manager and other managers of a project will evaluate each feature of that project to determine the respiratory protection requirements and will incorporate measures to meet the requirements into the project work plan. Bristol will provide training in respiratory protection to employees who will work on a project that may require respiratory protection and who have not yet received training in respiratory protection. No employee of Bristol, or its subcontractors, will work in environments where respiratory protection is required without evidence that he or she has received the following:

- A current (within 12 months) occupational physician's certification indicating the worker is fit to wear a respirator,
- Adequate training in respiratory protection, and
- A current (within 12 months) respiratory fit test.

Bristol Employees and subcontractors are responsible for complying with this Bristol *Respiratory Protection Program* and with the Standard Operating Procedures (SOPs) of this program (Appendix A).

This *Respiratory Protection Program* represents the minimum acceptable standards for employees of Bristol and its subcontractors. Generally, Bristol projects will never require respiratory protection above Level C (air purifying respirators). If project conditions require use of air supplying respirators, additional procedures and requirements may be required beyond the practices described here. The Health and Safety Manager will be consulted prior to planning and use of air supplying respirators.

2.0 RESPIRATOR SELECTION

Special training in the selection and use of the appropriate respirators is required for any work requiring respiratory protection that meets the following criteria:

- The work is described as Immediately Dangerous to Life or Health (IDLH); and
- The work could cause irreversible adverse health effects, or could present conditions under which an individual's ability to escape from a dangerous atmosphere would be impaired.

Work that is IDLH must be approved by the Health and Safety Manager. In addition, certification must be provided that any required special training has been completed for the IDLH work condition, before work is performed.

For non-IDLH work, a respirator certified by the National Institute for Occupational Safety and Health (NIOSH) will be selected, based on the following considerations:

- Nature of the known hazards,
- Extent of hazards,
- Best fit of the selected respirator,
- Work requirements, and
- Characteristics and limitations of respirators.

The Bristol Project Manager will consider the following to identify the type of respirator and work conditions requiring respiratory protection:

- Analytical methodologies used to determine respirator selection;
- Exposure assessment method and results;
- Atmospheric testing results;
- On-scene site assessment, as required;
- Regulatory requirements;
- Respiratory protection factors; and
- Selection consistent with the intended use.

Appendix A, Section A-1 contains the SOP for selecting a respirator, and Section A-2 provides a respirator selection checklist.

3.0 EMPLOYEE RESPIRATOR TRAINING REQUIREMENTS

Employee training for respirator protection will include, but is not limited to, the following:

- Location and contents of the written Respiratory Protection Program;
- Government regulations that apply to the use of respirators;
- Responsibilities of various personnel as prescribed by this Respiratory Protection Program;
- Refresher training and surveillance requirements;
- Discussion of atmospheric hazards, including particles (dust, fumes, mist, fibers), oxygen deficiency, vapors, and gases;
- Terminology and expressions for concentrations of harmful airborne contaminants from OSHA, NIOSH, Mine Safety and Health Administration (MSHA), and American

Conference of Governmental Industrial Hygienists;

- Chemical, physical, and toxicological properties of airborne contaminants;
- Rationale and reasons for respirator use;
- Instruction for inspecting, maintaining, cleaning, disinfecting, and storing respirators;
- Instructions for donning, performing self-fit check, and proper techniques for wearing respirators;
- Selection, limitations, and replacement schedules for cartridges;
- Recognition and ways to cope with emergencies;
- Medical approval requirements;
- Fit testing requirements and documentation; and
- Limitations of respirators by type.

Records of training will be maintained in the Bristol training management system.

4.0 RESPIRATOR USE AND LIMITATION GUIDELINES

Air purifying respirators (APRs) are designed to protect workers from inhaling airborne contaminants. Each type of respirator has its own unique protective characteristics. In selecting a particular type of respirator, the following statements are appropriate to any work condition:

- APRs *are not* for use in oxygen-deficient atmospheres.
- APRs *are not* for use in IDLH atmospheres.
- Bristol requires specialized and certified training for work in IDLH conditions.
- Bristol *will not* intentionally subject employees to work in IDLH conditions without specialized training, the appropriate respiratory protection equipment, and explanations of methods for use of that equipment.

5.0 RESPIRATOR CARE AND MAINTENANCE REQUIREMENTS

Bristol employees and subcontractors who are in possession of a respirator for work they are performing must maintain their respirator in accordance with specifications of the manufacturer, NIOSH, MSHA, and OSHA. The following subsections describe cleaning, disinfection, storage, and inspection.

5.1 CLEANING AND DISINFECTING REQUIREMENTS

After using a respirator, the employee is responsible for cleaning and disinfecting the respirator before it is stored. The preferred method for respirator cleaning and disinfecting can vary with the manufacturer. The Bristol preferred method is warm water with a mild soap for cleaning. Disinfecting can be accomplished by using a combination bactericide and fungicide soak, followed by a fresh water rinse. The SOP for cleaning and disinfecting of respirator is included in Appendix A, Section A-5.

5.2 STORAGE REQUIREMENTS

Respirators must be stored while not in use. After using a respirator, the employee is responsible for cleaning the respirator (as described above), inspecting it (as described below), and storing it in an appropriate condition. The respirator must be stored in a manner that will protect it from dust, sunlight, heat, excessive cold or moisture, and damaging chemicals, and in a manner that will prevent the respirator from deforming. The respirator must be dry and placed into a plastic bag with a zipper-locking closure. Storage of respirators must not damage or compromise the integrity of the face and face piece seal.

5.3 INSPECTION REQUIREMENTS

Bristol will periodically inspect respirators that are available for use and those in use. Respirators that are not serviceable will be turned in for repair or disposal.

Each employee with a respirator is responsible for inspecting the respirator both before and after its use. Any defects must be reported to the Site Supervisor, and repairs or replacements must be made before the respirator is used. Section A-3 of Appendix A provides the SOP for inspecting a respirator.

6.0 MEDICAL REQUIREMENTS AND PHYSICIAN APPROVAL

Any Bristol employee or subcontractor who anticipates use of a respirator as part of his or her job must first have received a favorable opinion from an occupational physician indicating the person is fit to wear a respirator as part of work duties. The physician's opinion will be based on the following:

- Information similar to that found in the Questionnaire included as Appendix B that the employee provides the physician; and
- The results of a pulmonary function test that the physician will evaluate.

Following receipt of a copy of the physician's favorable opinion, the employee is qualified to receive a respiratory fit test. When the following items have been documented, the employee is considered eligible to wear a respirator:

- Physician's signed statement, completed annually, indicating the employee is fit to wear a respirator; and
- Fit test certificate, completed annually, indicating the name and affiliation of the employee tested; date of test; type of test; specific model, style, and size of respirator tested; and passing test results.

7.0 RESPIRATORS FIT TESTING REQUIREMENTS

The Bristol policy allows for the use of either the Quantitative Fit Test (QNFT), which is the fit test of choice, or the Qualitative Fit Test (QLFT), which may be administered in the field when necessary. The fit test must be administered by a qualified person. Bristol does not perform the QNFT, and the employee must make arrangements with the Project Manager to receive the QNFT, at the company's expense.

The QLFT may be administered in the field by the Project Manager, Site Superintendent, or an appointee of the Site Superintendent. When qualified Bristol persons administer the respiratory fit test in the field (the QLFT), the results of testing must be noted in the project's field book.

Appendix A, Section A-4 is the SOP for donning a respirator, and Section A-6 of Appendix A is the SOP for performing a QLFT.

The respiratory fit test is valid for a period of no more than 1 year. If an employee's physical condition is substantially different than when the fit test was taken during the period of 1 year when the fit test is valid, additional fit testing may be deemed to be warranted. On the basis of work conditions, the employee may select the type of respirator from a reasonable selection variety that offers the employee the ability to identify a respirator providing the best fit.

8.0 WORKPLACE SURVEILLANCE

Each workplace will be evaluated periodically by safety personnel. The scope of this evaluation will be to determine whether the selected level of respiratory protection is appropriate. When changes to the work environment that raise the level of respiratory protection have occurred, changes in respiratory protection will be made immediately to reflect a level that protects the worker. When conditions in the work area warrant a lower level of respiratory protection, the Site Manager may make the change at his or her discretion.

9.0 PERIODIC PROGRAM EVALUATION

The Health and Safety Manager will review this Respiratory Protection Program annually, and make any additions or deletions that may be required to maintain its compliance with federal regulations. At any time, any Bristol employee may recommend changes to this program to the Health and Safety Manager.

10.0 SPECIFIC STATE REGULATIONS

Each state may have additional regulations that pertain to respiratory protection. Every Bristol work plan must include any additional regulations or requirements consistent with those of the state where the work will be performed.

11.0 REFERENCES

U. S. Department of Health and Human Services (USDHHS). 1987. NIOSH Respirator Decision Logic. NIOSH, Cincinnati, OH.

U.S. Department of Labor (USDOL). ______. 29 CFR 1910.134, Respiratory Protection. *Code of Federal Regulations*.

APPENDIX A

RESPIRATORY PROTECTION PROGRAM
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE A-1

Respirator Selection

Respirators will be selected by the Project Manager, Site Superintendent, or a qualified appointee of the Site Superintendent in conjunction with the Bristol Project Manager. The following factors must be considered in making this selection:

1. The identity of the substance(s) present in the work environment for which protection is needed.
2. The physical state of the contaminant (gas, vapor, dust, mist, etc., or combination).
3. The permissible exposure limit or toxicity of the substance and cartridge usable life. See the checklist in Section A-2 of this Appendix.
4. Exposure measurements or professional judgment assessing the concentrations likely to be encountered.
5. The assigned protection factor listed for the respirator type.
6. The need for eye and face protection.
7. The possibility of oxygen deficiency.
8. Any limitations or restrictions applicable to the types of respirators being considered that could make them unsafe in the environment involved.
9. At no time will a respirator be selected that offers less protection than required for the particular conditions under which it is to be used. If desired, however, a respirator type offering a greater protection factor than needed may be selected.
10. Measurements to determine or predict the potential exposure concentrations will be made by the Project Manager, Site Superintendent, or a qualified appointee of the Site Superintendent in consultation with the Bristol Project Manager.

STANDARD OPERATING PROCEDURE A-2

Respirator Selection Checklist

FACILITY ___________________________ Date ___________________

Chemical Substance (MSDS product name)	Physical State	Anticipated Concentration

Any changes in the operations that might significantly increase anticipated contaminant level?

______Yes ______No

Is environment potentially immediately dangerous to life to health? ______Yes ______No

Can contaminant be absorbed through skin? ______Yes ______No

Is the contaminant an eye irritant? ______Yes ______No

Cartridge should be replaced at ____ hour intervals.

On the basis of the above information, the following respirator(s) have been selected and approved for the area or operation listed above:

Manufacturer's Name	Model Name/Number (incl. filter)	Approval No.

Signed ________________________________ Date _____________

STANDARD OPERATING PROCEDURE A-3

Respirator User Inspection Guide

A. Check face piece for:

(1) Dirt
(2) Cracks, tears, or deterioration
(3) Distortion
(4) Inflexibility
(5) Cracked or badly scratched lens
(6) Incorrectly mounted lens

B. Check straps for:

(1) Breaks or tears
(2) Loss of elasticity
(3) Broken or missing hardware
(4) Worn serration's or missing tabs on head harness

C. Check exhalation and inhalation valves for:

(1) Presence of valves
(2) Dirt, hairs, holes, tears, or warpage
(3) Exhaust valve cover in place
(4) Exhaust valve seat in good condition

D. Check filters or cartridges for:

(1) Secure attachment with gaskets in place
(2) Absence of damage, rust, or corrosion
(3) Design and labeling for intended use on cartridges
(4) Absence of rattling of agents in charcoal-filled cartridges
(5) Suitable match of cartridges to type of respirator to be used

STANDARD OPERATING PROCEDURE A-4

Respirator User Guide—Donning Procedures

General. The following will *not* be permitted to protrude under the sealing surface of any face-fitting respirator because they interfere with the face-to-face piece seal and cause the respirator to leak:

1. Facial hair, such as long sideburns, mustaches or beards;
2. Temple bars on glasses protruding under full face piece seal; and
3. Head covers, such as hoods, projecting underneath the face piece.

Air Purifying Respirator Donning. Don the respirator and adjust for comfort as described below:

A. Half Mask:

(1) Fasten bottom strap at back of neck.
(2) Position respirator on face with wider portion under the chin.
(3) Fasten top or cradle strap at the crown of the head.
(4) Adjust straps for comfortable fit.

B. Full Face:

(1) Start with straps of head harness fully open.
(2) Place chin in chin cup.
(3) Adjust bottom straps by pulling back (*not* out to the sides). This will reduce friction and help secure chin in chin cup.
(4) Adjust temple straps next.
(5) Adjust top strap(s) last.
(6) Straps should be adjusted snuggly. Overtightening may affect user comfort.

Positive and Negative Pressure Checks. The following user checks test the face seal and the condition of inlet exhaust check valves.

A. Negative Pressure Check:

(1) Cover the inlet of the canister, cartridge(s), or filter (s) with the palms.
(2) Inhale gently so that the face piece collapses slightly.
(3) Hold breath for ten seconds.
(4) If the face piece remains slightly collapsed and no inward leakage is detected, the respirator is properly donned and the exhaust valve is functioning.

B. Positive Pressure Check:

(1) Close off the opening of the exhalation valve by covering with the palm.
(2) Exhale gently into the face piece.
(3) If slight positive pressure can be built up inside the face piece without any evidence of outward leakage, the respirator is properly donned, and the intake valves are functioning.

STANDARD OPERATING PROCEDURE A-5

Respirator Cleaning and Disinfecting

Methods. Respirators may be cleaned by one of the following methods.

A. Manual Cleaning. A generalized cleaning procedure is:

(1) Remove canisters, filters, valves, and speaking diaphragms from the face piece.

(2) Wash the face piece and accessories in warm soapy water. Gently scrub soil off with a soft brush. A mild detergent is acceptable, but do not use petroleum solvents or corrosive substances.

(3) Rinse parts thoroughly in clean water. For sanitizing, use only manufacturer-recommended products and procedures.

(4) Air dry in a clean place or wipe dry with a lintless cloth.

(5) Reassemble.

Alternatively, use a commercially available respirator cleaner, following the manufacturer's instructions.

B. Machine Cleaning. Machines may be used to expedite the cleaning, sanitizing, rinsing, and drying of a large numbers of respirators.

(1) Take care to prevent excessive tumbling and agitation, or exposure to temperatures above those recommended by the manufacturer (usually 120 degrees Fahrenheit).

(2) Ultrasonic cleaners, clothes-washing machines, dishwashers, and clothes dryers have been specially adapted and successfully used for cleaning and drying respirators.

C. Disinfection. Disinfect respirators used by more than one person. Disinfection procedures recommended by National Institute for Occupational Safety and Health (NIOSH) are as follows:

- Immerse the respirator body for 2 minutes in 50 parts per million chlorine solution (about 2 milliliters of bleach to 1 liter of water). Rinse thoroughly in clean water and dry.

OR:

- Immerse the respirator body for 2 minutes in an aqueous solution of iodine (add 0.8 milliliters of tincture iodine to 1 liter of water). The iodine is about 7 percent ammonium and potassium iodine, 45 percent alcohol, and 48 percent water. Rinse thoroughly in clean water and dry.

For either procedure, immersion times must be limited to minimize damage to respirator. The solutions can age rubber and rust metal parts. Rinse thoroughly to prevent dermatitis.

An alternative method is to purchase a commercially prepared solution for cleaning and disinfection and follow the manufacturer's directions.

Lubricants must be applied before disinfecting "rubber" components of the respirator. Food-grade lubricants such as silicon spray should be used.

STANDARD OPERATING PROCEDURE A-6

Respirator Fit Test Procedure—Qualitative Fit Test

The Qualitative Fit Test will only be administered to individuals who have a physician's current (within the past 12 months) written recommendation that the employee's medical status allows the employee to use a respirator. When the employee has passed the respirator fit test, the test administrator will provide the employee with a certification of the test results, indicating the name of the employee, date of test, and type and manufacturer's make of the respirator. In addition, the Site Superintendent will note the test in the field notebook. The following procedure will be used to administer the Qualitative Fit Test. A valid fit test requires that both parts A and B of this procedure be administered.

A. Banana Oil (Isoamyl Acetate) Protocol

1. A fit test chamber consisting of a hood or bag suspended inverted over a frame is used. The top of the hood should be about 6 inches above the test subject's head.
2. In a room separate from the one containing the test chamber, verify that the test subject can detect the odor of the banana oil without a respirator.
3. The respirator used for the fit test must be equipped with organic vapor cartridges.
4. Instruct the test subject to place respirator over his or her face so that the mask fits snugly, but comfortably, touching all points. Have test subject perform positive and negative fit test (SOP A-4).
5. When the test subject has entered the test chamber, hand him or her a piece of paper towel, or other absorbent material, wetted with banana oil. Instruct the test subject to hold the wet towel in front of his or her face.
6. Instruct the test subject to indicate to the test administrator if he or she detects the odor of the banana oil at any point during the test. If the odor is detected, the test has failed.
7. Allow 2 minutes for the banana oil concentration to stabilize before starting the fit test exercises.
8. Test 1: Instruct the test subject to breathe normally for 1 minute.
9. Test 2: Instruct the test subject to breathe deeply for 1 minute.
10. Test 3: Instruct the test subject to move head side to side for 1 minute.
11. Test 4: Instruct the test subject to move head up and down for 1 minute.
12. Test 5: Instruct the test subject to talk for 1 minute.
13. Test 6: Instruct the test subject to smile or frown for 15 seconds.
14. Test 7: Instruct the test subject to jog in place for 1 minute.
15. Test 8: Instruct the test subject to breathe normally for 1 minute.

B. Qualitative Fit Test–Irritant Smoke (Stannic Chloride) Protocol

1. Break both ends of the smoke tube and attach one end to a low-flow air pump. Attach a short length of tubing to the other end to avoid injury.
2. Allow the test subject to smell a weak concentration of the irritant smoke without a respirator to determine whether he or she can detect it.
3. Instruct the test subject to enter the test chamber.
4. The respirator used for the fit test must be equipped with high-efficiency particulate air (HEPA) filters.
5. Instruct the test subject to place the respirator over his or her face so that the mask fits snugly, but comfortably, touching all points. Have test subject perform positive and negative fit test (SOP A-4).
6. Instruct the test subject to keep his or her eyes closed
7. Direct the stream of irritant smoke toward the face of the subject. Start 12 inches away and move the smoke stream around the entire perimeter of the mask, moving to within 6 inches.
8. Continue to direct the smoke stream at the face of the subject for the following tests. If the smoke is detected at any point, the test has failed.
9. Test 1: Instruct the test subject to breathe normally for 1 minute.
10. Test 2: Instruct the test subject to breathe deeply for 1 minute.
11. Test 3: Instruct the test subject to move head side to side for 1 minute.
12. Test 4: Instruct the test subject to move head up and down for 1 minute.
13. Test 5: Instruct the test subject to talk for 1 minute.
14. Test 6: Instruct the test subject to smile or frown for 15 seconds.
15. Test 7: Instruct the test subject to bend over at the waist for 1 minute.
16. Test 8: Instruct the test subject to breathe normally for 1 minute.

APPENDIX B

FORMS

Respirator Medical History Questionnaire
Source: Appendix C, 29 CFR 1910.134: OSHA Respirator Medical Evaluation Questionnaire (Mandatory)

RESPIRATOR MEDICAL HISTORY
QUESTIONNAIRE

To the employer:

Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee:

Can you read (circle one): Yes/No

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date:____

2. Your name:____

3. Your age (to nearest year):____

4. Sex (circle one): Male/Female

5. Your height: __________ feet __________ inches

6. Your weight: ____________ pounds (lbs.)

7. Your job title:____

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): ____________________

9. The best time to phone you at this number: ________________

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No

11. Check the type of respirator you will use (you can check more than one category):
    a. ______ N, R, or P disposable respirator (filter-mask, non-cartridge type only).
    b. ______ Other type (for example, half- or full-face piece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No

If "yes," what type(s): ____

____

Part A. Section 2. (Mandatory)

Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator. Please circle "yes" or "no."

1. Do you **currently** smoke tobacco, or have you smoked tobacco in the last month? Yes/No

2. Have you **ever had** any of the following conditions?

   Seizures (fits): Yes/No
   Diabetes (sugar disease): Yes/No
   Allergic reactions that interfere with your breathing: Yes/No
   Claustrophobia (fear of closed-in places): Yes/No
   Trouble smelling odors: Yes/No

3. Have you **ever had** any of the following pulmonary or lung problems?

   a. Asbestosis: Yes/No
   b. Asthma: Yes/No
   c. Chronic bronchitis: Yes/No
   d. Emphysema: Yes/No
   e. Pneumonia: Yes/No
   f. Tuberculosis: Yes/No
   g. Silicosis: Yes/No
   h. Pneumothorax (collapsed lung): Yes/No
   i. Lung cancer: Yes/No
   j. Broken ribs: Yes/No
   k. Any chest injuries or surgeries: Yes/No
   l. Any other lung problem that you have been told about: Yes/No

4. Do you **currently** have any of the following symptoms of pulmonary or lung illness?

   a. Shortness of breath: Yes/No
   b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: Yes/No
   c. Shortness of breath when walking with other people at an ordinary pace on level ground: Yes/No
   d. Have to stop for breath when walking at your own pace on level ground: Yes/No
   e. Shortness of breath when washing or dressing yourself: Yes/No
   f. Shortness of breath that interferes with your job: Yes/No
   g. Coughing that produces phlegm (thick sputum): Yes/No
   h. Coughing that wakes you early in the morning: Yes/No

i. Coughing that occurs mostly when you are lying down: Yes/No
j. Coughing up blood in the last month: Yes/No
k. Wheezing: Yes/No
l. Wheezing that interferes with your job: Yes/No
m. Chest pain when you breathe deeply: Yes/No
n. Any other symptoms that you think may be related to lung problems: Yes/No

5. Have you **ever had** any of the following cardiovascular or heart problems?
   a. Heart attack: Yes/No
   b. Stroke: Yes/No
   c. Angina: Yes/No
   d. Heart failure: Yes/No
   e. Swelling in your legs or feet (not caused by walking): Yes/No
   f. Heart arrhythmia (heart beating irregularly): Yes/No
   g. High blood pressure: Yes/No
   h. Any other heart problem that you have been told about: Yes/No
6. Have you ever had any of the following cardiovascular or heart symptoms?
   a. Frequent pain or tightness in your chest: Yes/No
   b. Pain or tightness in your chest during physical activity: Yes/No
   c. Pain or tightness in your chest that interferes with your job: Yes/No
   d. In the past two years, have you noticed your heart skipping or missing a beat: Yes/No
   e. Heartburn or indigestion that is not related to eating: Yes/ No
   f. Any other symptoms that you think may be related to heart or circulation problems: Yes/No
7. Do you currently take medication for any of the following problems?
   a. Breathing or lung problems: Yes/No
   b. Heart trouble: Yes/No
   c. Blood pressure: Yes/No
   d. Seizures (fits): Yes/No
8. If you have used a respirator, have you ever had any of the following problems? (If you have never used a respirator, check the following space and go to question 9) ____________
   a. Eye irritation: Yes/No
   b. Skin allergies or rashes: Yes/No
   c. Anxiety: Yes/No
   d. General weakness or fatigue: Yes/No
   e. Any other problem that interferes with your use of a respirator: Yes/No
9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire? Yes/No

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-face piece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

10. Have you ever lost vision in either eye (temporarily or permanently)? Yes/No
11. Do you currently have any of the following vision problems?
    a. Wear contact lenses: Yes/No
    b. Wear glasses: Yes/No
    c. Color blind: Yes/No
    d. Any other eye or vision problem: Yes/No
12. Have you ever had an injury to your ears, including a broken ear drum? Yes/No
13. Do you currently have any of the following hearing problems?
    a. Difficulty hearing: Yes/No
    b. Wear a hearing aid: Yes/No
    c. Any other hearing or ear problem: Yes/No
14. Have you ever had a back injury? Yes/No
15. Do you currently have any of the following musculoskeletal problems?
    a. Weakness in any of your arms, hands, legs, or feet: Yes/No
    b. Back pain: Yes/No
    c. Difficulty fully moving your arms and legs: Yes/No
    d. Pain or stiffness when you lean forward or backward at the waist: Yes/No
    e. Difficulty fully moving your head up or down: Yes/No
    f. Difficulty fully moving your head side to side: Yes/No
    g. Difficulty bending at your knees: Yes/No
    h. Difficulty squatting to the ground: Yes/No
    i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: Yes/No
    j. Any other muscle or skeletal problem that interferes with using a respirator: Yes/No

Part B. Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen? Yes/No

   If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions? Yes/No
2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals? Yes/No

If "yes," name the chemicals if you know them: ______________________________________
____
____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below?

   Asbestos: Yes/No

   Silica (for example, in sandblasting): Yes/No

   Tungsten/cobalt (for example, grinding or welding this material): Yes/No

   Beryllium: Yes/No

   Aluminum: Yes/No

   Coal (for example, mining): Yes/No

   Iron: Yes/No

   Tin: Yes/No

   Dusty environments: Yes/No

   Any other hazardous exposures: Yes/No

   If "yes," describe these exposures: ____
   ____
   ____

4. List any second jobs or side businesses you have: ______________________________
   ____

5. List your previous occupations: ____
   ____

6. List your current and previous hobbies: ____________________________________
   ____

7. Have you been in the military services? Yes/No

   If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes/No

8. Have you ever worked on a Hazardous Materials (HAZMAT) team? Yes/No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications)? Yes/No

If "yes," name the medications if you know them: ______________________________

10. Will you be using any of the following items with your respirator(s)?

    a. High-efficiency Particulate Air (HEPA) Filters: Yes/No
    b. Canisters (for example, gas masks): Yes/No
    c. Cartridges: Yes/No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?

a. Escape only (no rescue): Yes/No
b. Emergency rescue only: Yes/No
c. Less than 5 hours per week: Yes/No
d. Less than 2 hours per day: Yes/No
e. 2 to 4 hours per day: Yes/No
f. Over 4 hours per day: Yes/No

12. During the period you are using the respirator(s), is your work effort:

a. **Light** (less than 200 kilocalories (kcal) per hour): Yes/No
If "yes," how long does this period last during the average shift: ____________ hours ____________ minutes
Examples of a light work effort are sitting while writing, typing, drafting, or performing light assembly work; or standing while operating a drill press (1 to 3 lbs.) or controlling machines.

b. **Moderate** (200 to 350 kcal per hour): Yes/No
If "yes," how long does this period last during the average shift: ____________ hours ____________ minutes.
Examples of moderate work effort are sitting while nailing or filing; driving a truck or bus in urban traffic; standing while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; walking on a level surface about 2 miles per hour (mph) or down a 5-degree grade about 3 mph; or pushing a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. **Heavy** (above 350 kcal per hour): Yes/No
If "yes," how long does this period last during the average shift: ____________ hours ____________minutes.
Examples of heavy work are lifting a heavy load (about 50 lbs.) from the floor to your waist or shoulder; working on a loading dock; shoveling; standing while bricklaying or chipping castings; walking up an 8-degree grade about 2 mph; climbing stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you are using your respirator? Yes/No

If "yes," describe this protective clothing and/or equipment: ____________________________
____

14. Will you be working under hot conditions (temperature exceeding 77 degrees Fahrenheit)? Yes/No

15. Will you be working under humid conditions? Yes/No

16. Describe the work you will be doing while you are using your respirator(s): ______________
____
____

17. Describe any special or hazardous conditions you might encounter when you are using your respirator(s) (for example, confined spaces, life-threatening gases): ______________________
____

18. Provide the following information, if you know it, for each toxic substance that you will be exposed to when you are using your respirator(s):

    Name of the first toxic substance: ____________________

    Estimated maximum exposure level per shift: ____________________

    Duration of exposure per shift: ____________________

    Name of the second toxic substance: ____________________

    Estimated maximum exposure level per shift: ____________________

    Duration of exposure per shift: ____________________

    Name of the third toxic substance: ____________________

    Estimated maximum exposure level per shift: ____________________

    Duration of exposure per shift: ____________________

    The name of any other toxic substances that you'll be exposed to while using your respirator:

    ____

    ____

    ____

19. Describe any special responsibilities you will have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security):

    ____

ATTACHMENT 8

Bristol Bloodborne Pathogens Program

SECTION 6
SAFETY AND HEALTH PROGRAMS

Program 6
Bristol Bloodborne Pathogens Program

As required by

The OSHA Bloodborne Pathogens Standard 29 CFR 1910.1030

APPROVAL

____
Health and Safety Manager

APRIL 2005

Bristol INDUSTRIES

TABLE OF CONTENTS

APPENDIX

ACRONYMS AND ABBREVIATIONS

Bristol	Bristol Industries and all affiliated companies controlled by Bristol
CPR	cardiopulmonary resuscitation
PPE	personal protective equipment

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

The purpose of the Bristol Industries (Bristol) Bloodborne Pathogens Program is to provide the employee with adequate written guidance concerning exposure control and personal protective equipment (PPE).

The scope of the Bristol Bloodborne Pathogens Program dictates requirements for exposure control to include all Bristol employees, regardless of work locations. These work locations include any temporary work sites.

Bristol client's written Bloodborne Pathogens Programs may be used in conjunction with that of Bristol's. However, at no time shall any program be adopted that is less stringent than that of Bristol.

1.2 PROGRAM ADMINISTRATION

Management, oversight and training of the Bristol Bloodborne Pathogens Program are the responsibility of the Health and Safety Manager.

The Bristol Bloodborne Pathogens Program shall be reviewed at least annually. Any changes to the written program shall be relayed to the effected employees.

Employees are responsible to follow the provisions of the Bristol Bloodborne Pathogens Program.

1.3 EMPLOYEE INFORMATION AND TRAINING

All employees with the potential for occupational exposure to blood or other potentially infectious material shall receive Bloodborne Pathogen training initially, then annually. Employees trained in First Aid and cardiopulmonary resuscitation (CPR) shall have Bloodborne Pathogen training. This training shall cover:

- Exposure determination,
- Methods of compliance,
- Hepatitis B vaccination and post-exposure evaluation and follow-up,
- Communication of hazards to employees,
- Recordkeeping,
- Evaluation of circumstances surrounding exposure incidents, and
- Accessibility to the Bloodborne Pathogen Program.

1.4 OCCUPATIONAL EXPOSURE DETERMINATION

Employees that have a primary job function to treat injured workers or others could possibly be occupationally exposed. Those who have a current CPR/First Aid certificate, or are assigned as the supervisor, as described in Chapter 29, Code of Federal Regulations, Part 1910.120 (29 CFR 1910.120), may be incidentally exposed if they choose to render aid to another worker or injured individual. Examples of contacting potentially infectious materials include the following:

- Another person's blood,
- Blood soaked bandages, and
- Improperly bagged potentially infectious materials.

Note: Any contact with another person's blood without observation of universal precautions shall be deemed an exposure incident.

1.5 METHODS OF COMPLIANCE

Precautions and practices include the following:

- Treat all blood and bodily fluids as if they are contaminated.
- Use proper cleanup and decontaminationUse Engineering and Work Practice Controls when feasible:
  - Hand washing facilities or an equivalent system, and
  - Sharps containers for any needles, to include diabetic needles.
- Use Administrative Controls:
  - Labeled sharps containers, and
  - Color code material bags.
- Use PPE – The Site Supervisor shall carry a small Bloodborne Pathogen kit (with first aid supplies) at all times when at the work location. Other suggested PPE for certain conditions include:
  - Bleeding control – latex gloves.
  - Spurting blood – latex gloves, protective clothing (smocks or aprons), respiratory mask, eye/face protection (goggles, glasses, or face shield).
  - Post-accident cleanup – latex gloves.
  - Janitorial work – latex gloves.
- Maintain Safe Work Practices, including:
  - Remove contaminated PPE or clothing as soon as possible,
  - Clean and disinfect contaminated equipment and work surfaces,

– Thoroughly wash up immediately after exposure, and
– Properly dispose of contaminated items.

1.6 Hepatitis B Vaccination and Post-exposure Evaluation and Follow Up

Hepatitis B Vaccination and vaccination series are available to employees at no cost to the employee. Screening will be conducted during the annual Hazardous Waste Operations and Emergency Response physical.

- If a worker declines the vaccination, it should be documented in the medical files. Any worker that declines the vaccination is still eligible to receive the treatment in the future if they desire.
- Post exposure-evaluation and followup are available to any occupationally or incidentally exposed employee.

1.7 Communication of Hazards to Employees

Employees will be trained initially and annually on the Bristol Bloodborne Pathogens Program.

1.8 Recordkeeping

Bristol will maintain all records of exposure incidents, and record them in the Occupational Safety and Health Administration Form 300, when applicable.

1.9 Personal Protective Equipment

Proper PPE must worn during the administration of any First Aid.

2.0 ACCESSIBILITY TO THE BLOOD BORNE PATHOGENS PROGRAM

A copy of this Bloodborne Pathogens Program is available in the Bristol Anchorage office. Employees are encouraged review this program as often as needed.

2.1 Program Review

The Bloodborne Pathogens Program shall be reviewed annually.

APPENDIX A

Letter for Hepatitis Vaccination

111 West 16th Ave
Anchorage, AK 99501
907-563-0013 Phone
907-563-6713 Fax

October 25, 2005

Bristol Industries (Bristol) offers each of our employees that may be working in conditions where they might be exposed to the Hepatitis virus the opportunity to receive a vaccination at no cost to the employee. It is the right of the company's employees to determine whether or not they wish to receive the vaccination. If the employee declines the hepatitis vaccination, he or she must acknowledge their refusal by signing the lower portion of this document and returning it to the Bristol Health and Safety Manager. If an employee initially chooses not to receive the vaccination, he/she may receive the vaccination at any later time.

_________________________________ _________________________

Health and Safety Representative Date

I understand I have the right to receive a Hepatitis B Vaccination at no cost to me, and I decline the vaccination at this time. I also understand that I have a right to receive the vaccination at a later time of employment, and at no cost.

Employee Name: ____________________________ Date: ___________________

Employee Signature: ______________________________

ATTACHMENT 9

OSHA Sloping and Benching Standard

United States Department Labor

Occupational Safety & Health Administration

Part Number:	1926
Part Title:	Safety and Health Regulations for Construction
Subpart:	P
Subpart Title:	Excavations
Standard Number:	1926 Subpart P App B
Title:	Sloping and Benching

(a) ***Scope and application***. This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in § 1926.652(b)(2).

(b) ***Definitions***.

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and ravelling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) ***Requirements*** -- (1) ***Soil classification***. Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.

(2) ***Maximum allowable slope***. The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of this appendix.

(3) ***Actual slope***. (i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least ½ horizontal to one vertical (½H:1V) less steep than the maximum allowable slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with § 1926.651(i).

(4) ***Configurations***. Configurations of sloping and benching systems shall be in accordance with Figure B-1.

TABLE B-1
MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR EXCAVATIONS LESS THAN 20 FEET DEEP(3)
STABLE ROCK	VERTICAL (90º)
TYPE A (2)	3/4:1 (53º)
TYPE B	1:1 (45º)
TYPE C	1 ½:1 (34º)

Footnote(1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

Footnote(2) A short-term maximum allowable slope of 1/2H:1V (63º) is allowed in excavations in Type A soil that are 12 feed (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53º).

Footnote(3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

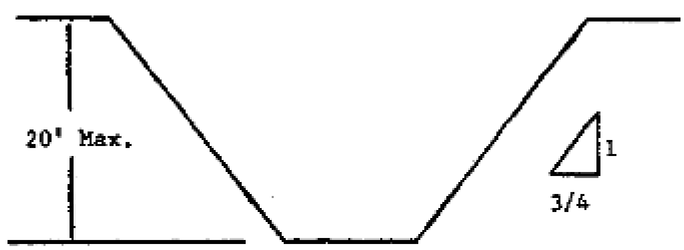
Figure B-1

Slope Configurations

(All slopes stated below are in the horizontal to vertical ratio)

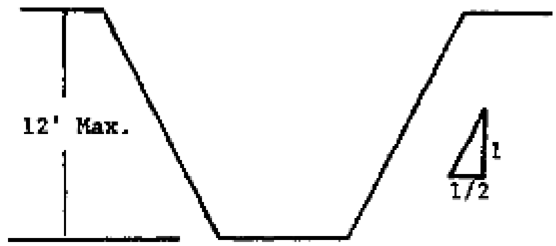
B-1.1 Excavations made in Type A soil.

1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾:1.



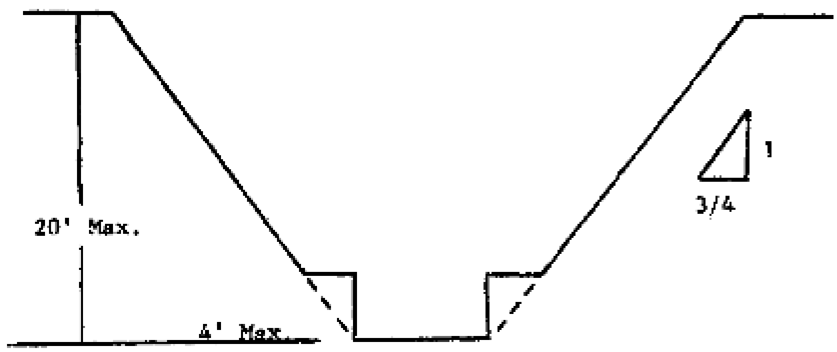
SIMPLE SLOPE -- GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of ½:1.

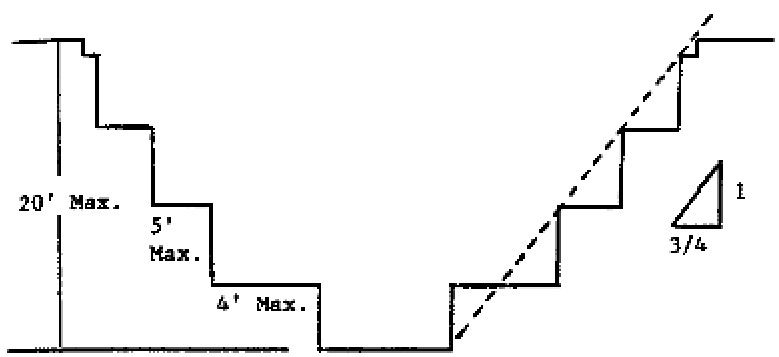


SIMPLE SLOPE -- SHORT TERM

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4 to 1 and maximum bench dimensions as follows:

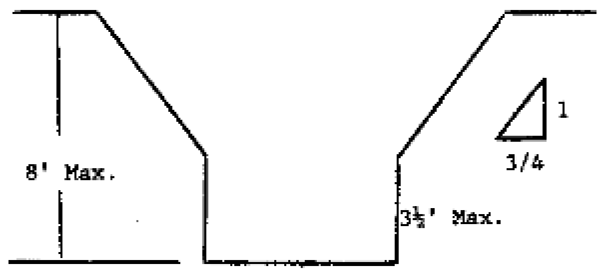


SIMPLE BENCH



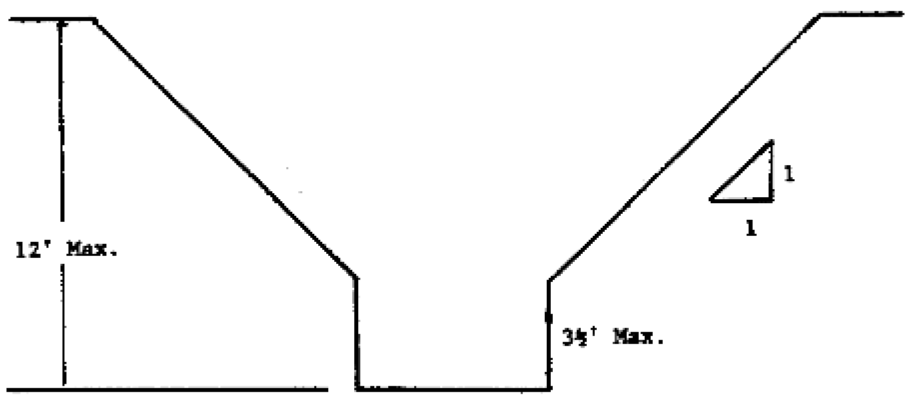
MULTIPLE BENCH

3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3½ feet.



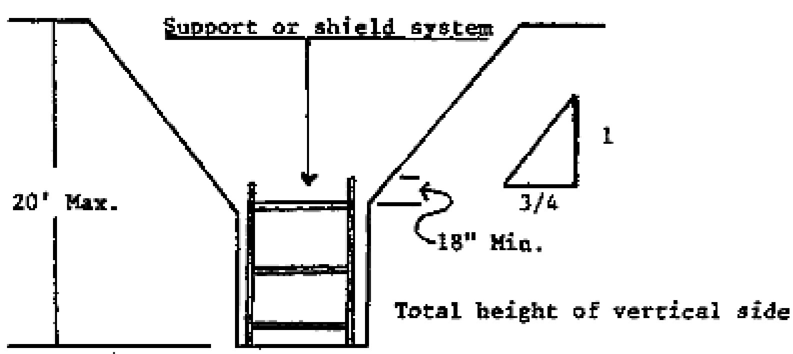
UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 8 FEET IN DEPTH)

All excavations more than 8 feet but not more than 12 feet in depth with unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.



UNSUPPORTED VERTICALLY SIDED LOWER PORTION -- MAXIMUM 12 FEET IN DEPTH)

All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of ¾:1. The support or shield system must extend at least 18 inches above the top of the vertical side.

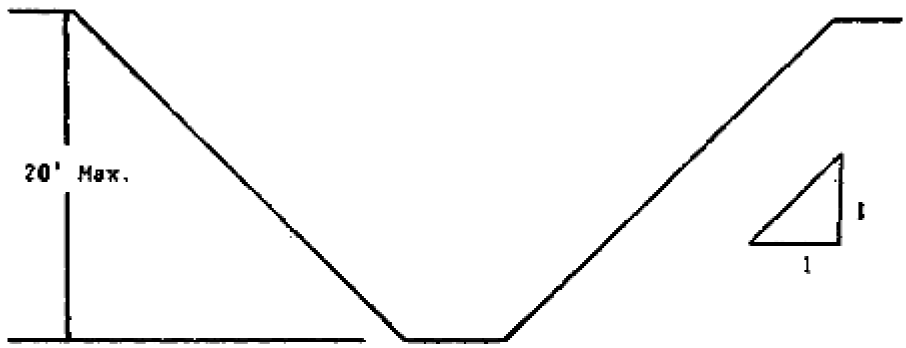


SUPPORTED OR SHIELDED VERTICALLY SIDED LOWER PORTION

4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under § 1926.652(b).

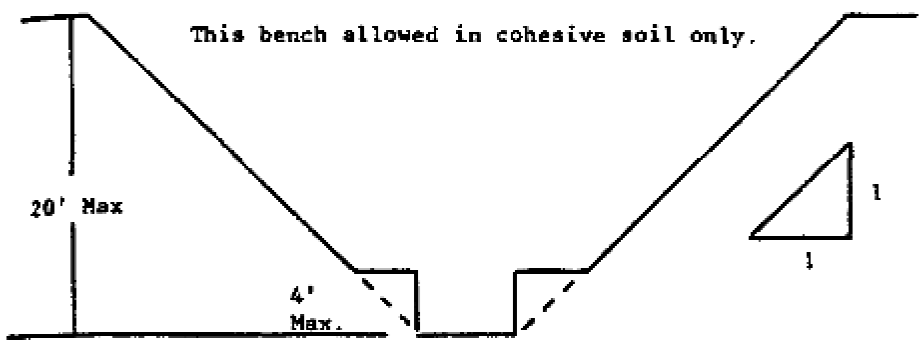
B-1.2 Excavations Made in Type B Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

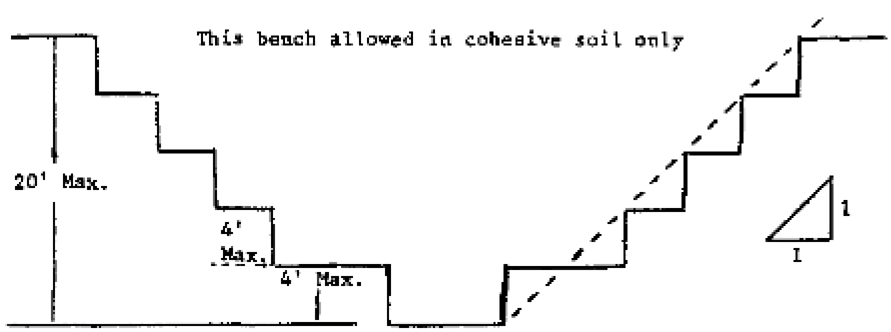


SIMPLE SLOPE

2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:

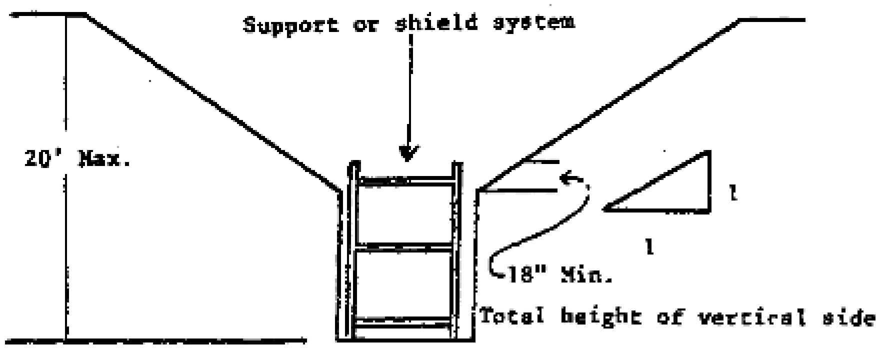


SINGLE BENCH



MULTIPLE BENCH

3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

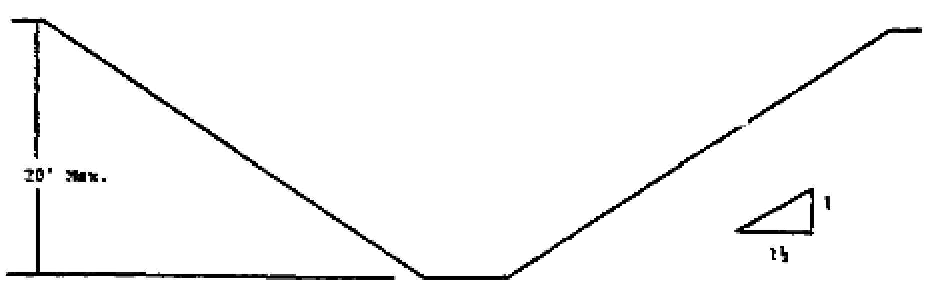


VERTICALLY SIDED LOWER PORTION

4. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

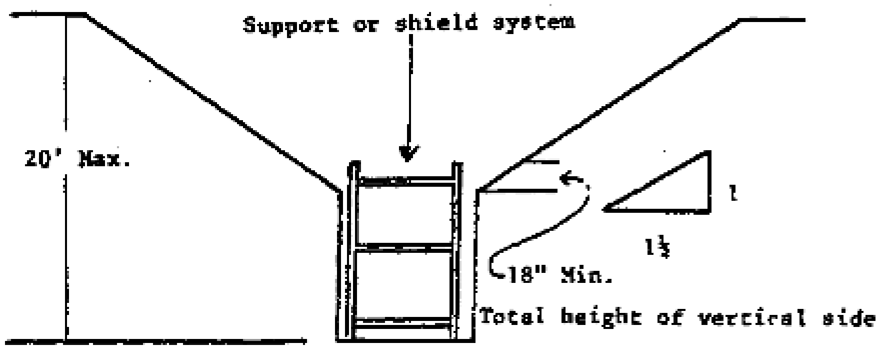
B-1.3 Excavations Made in Type C Soil

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½:1.



SIMPLE SLOPE

2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.

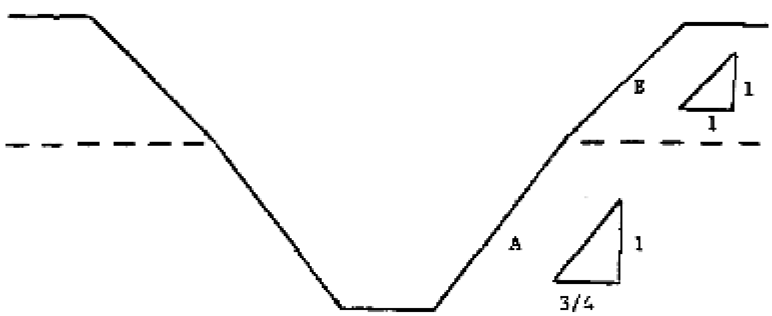


VERTICAL SIDED LOWER PORTION

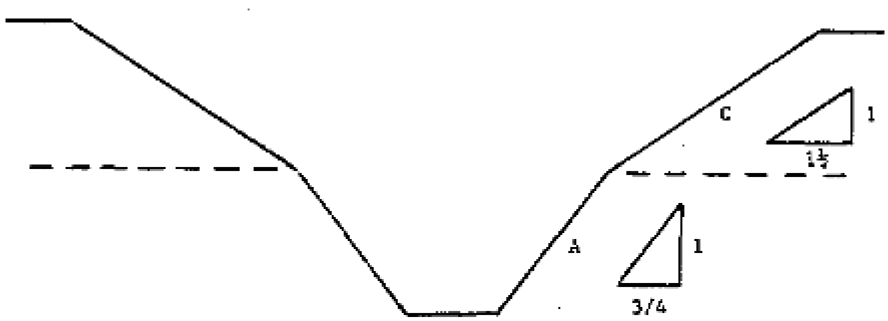
3. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

B-1.4 Excavations Made in Layered Soils

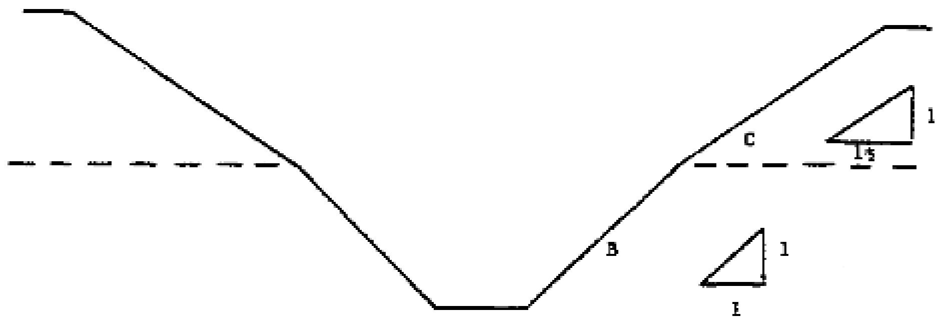
1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



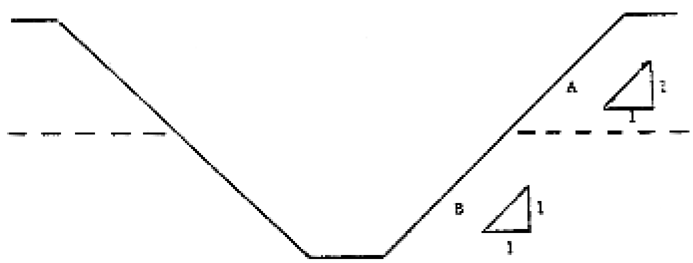
B OVER A



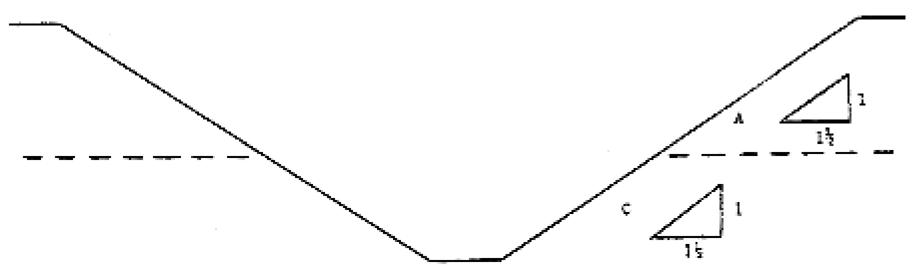
C OVER A



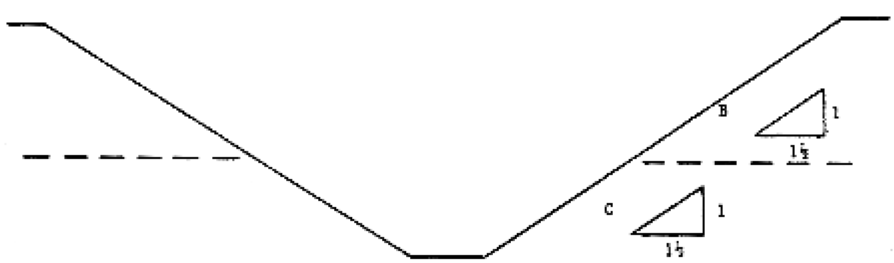
C OVER B



A OVER B



A OVER C



B OVER C

2. All other sloped excavations shall be in accordance with the other options permitted in § 1926.652(b).

APPENDIX D

Uniform Federal Policy-Quality Assurance Project Plan

2012 NORTHEAST CAPE HTRW REMEDIAL ACTIONS
Northeast Cape, St. Lawrence Island, Alaska

Contract No. W911KB-12-C-0003

UNIFORM FEDERAL POLICY
QUALITY ASSURANCE PROJECT PLAN

Prepared for

US Army Corps of Engineers, Alaska District
CEPOA-EN-EE
P.O. Box 6898
JBER, Alaska 99506-0898
W911KB-12-C-0003

Prepared by

Bristol Environmental Remediation Services, LLC
111 W. 16th Avenue, Third Floor
Anchorage, Alaska 99501

Jo Jurell for	August 20, 2012
Molly Welker Project Manager	Date
	August 20, 2012
Marty Hannah Quality Assurance/Quality Control Manager	Date

TABLE OF CONTENTS

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TABLES

ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

%D	percent difference
%R	percent recovery
′	minutes
°	degrees
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AK	Alaska Test Method
amu	atomic mass unit
ANCSA	Alaska Natives Claim Settlement Act
ASTs	aboveground storage tanks
BFB	bromofluorobenzene
bgs	below ground surface
Bristol	Bristol Environmental Remediation Services, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes (total)
CCC	calibration check compound
CCV	continuing calibration verification
CESCL	Certified Erosion and Sediment Control Lead
CFR	Code of Federal Regulations
COCs	contaminants of concern
COD	coefficient of determination
COELT	Corps of Engineers Loading Tool
conc.	concentration
COPC	compounds of potential concern
CPR	cardiopulmonary resuscitation
CQCP	Contractor Quality Control Plan
CQCSM	Contractor Quality Control System Manager
CVAAS	cold vapor atomic adsorption spectroscopy

ACRONYMS AND ABBREVIATIONS (continued)

DDT	dichlorodiphenyltrichloroethane
DFTPP	decaflourotriphenylphosphine
DL	detection limit
DO	dissolved oxygen
DoD	U.S. Department of Defense
DoD QSM	U.S. Department of Defense Quality Systems Manual
DOT	U.S. Department of Transportation
DQCR	Daily Quality Control Report
DQI	data quality indicator
DQO	data quality objective
DRO	diesel range organics
DUs	decision units
ECD	electron capture detector
EDD	electronic data deliverables
EDQW	Environmental Data Quality Workgroup
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
ESRI	Environmental Systems Research Institute
FID	flame-ionization detector
FPD	flame photometric detector
FUDS	formerly used defense sites
g	gram
GC/FID	gas chromatography/flame-ionization detector
GC/MS	gas chromatography/mass spectrometry
GIS	Geographic Information System
GPS	Global Positioning System
GRO	gasoline range organics
HazMat	hazardous materials
HCL	hydrochloric acid
HDPE	high-density polyethylene
HNO_3	nitric acid

ACRONYMS AND ABBREVIATIONS (continued)

HSM	Health Safety Manager
HTRW	hazardous, toxic, and radioactive waste
IATA	International Air Transport Association
ICP/MS	inductively coupled plasma mass spectrometer
ICS	interference check solution
ICV	initial calibration verification
IDQTF	Intergovernmental Data Quality Task Force
IDW	investigation-derived waste
IS	internal standard
ISCO	in-situ chemical oxidation
LCD	liquid crystal display
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LIF	Laser-Induced Fluorescence
LOD	limit of detection
LOQ	limit of quantitation
MDL	method detection limit
MeOH	methanol
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MI	*MULTI INCREMENT*
mL	milliliter
MNA	monitored natural attenuation
MOC	Main Operations Complex
MS	matrix spike
MSD	matrix spike duplicate
MWH	Montgomery Watson Harza
NA	not applicable
NDAI	No DoD Action Indicated
NE Cape	Northeast Cape
NOM	naturally occurring material

ACRONYMS AND ABBREVIATIONS (continued)

NPDL	North Pacific Division Laboratory
ORP	oxidation reduction potential
OSHA	Occupational Safety & Health Administration
PAHs	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	petroleum-contaminated soil(s)
pH	potential hydrogen
PM	Project Manager
POC	point of contact
POL	petroleum, oil, and lubricants
PQO	project quality objective
QA	quality assurance
QAPP	Quality Assurance Project Plan
QAR	Quality Assurance Representative
QC	quality control
QLs	quantitation limits
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RF	response factor
Rh	rhodium
RIs	remedial investigations
RL	reporting limit
RPD	relative percent difference
RRO	residual range organics
RSD	relative standard deviation
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SDSFIE	Spatial Data Standards for Facilities, Infrastructure, and Environment
SEDD	staged electronic data deliverable
SIM	selected ion monitoring

ACRONYMS AND ABBREVIATIONS (continued)

SOPs	Standard Operating Procedures
SPCC	system performance check compound
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SVOCs	semivolatile organic compounds
SW	EPA Solid Waste Test Method
TCD	thermal conductivity detector
TCLP	Toxicity Characteristic Leaching Procedure
TCMX	Tetrachloro-M-xylene
TestAmerica	TestAmerica Laboratories, Inc.
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TSA	technical systems audit
TSCA	Toxic Substances Control Act
UFP	Uniform Federal Policy
USACE	US Army Corps of Engineers
USTs	underground storage tanks
UVOST	Ultra-Violet Optical Screening Tool
VOA	volatile organic analysis
VOCs	volatile organic compounds
WMP	Waste Management Plan

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1.0 INTRODUCTION

1.1 PURPOSE

This Quality Assurance Project Plan (QAPP) has been developed for acceptance by the US Army Corps of Engineers (USACE), Alaska District, as a quality control (QC) mechanism for the work to be performed under Contract No. W911KB-12-C-0003 for Hazardous, Toxic, Radioactive Waste (HTRW) remedial action (RA) activities at Northeast Cape (NE Cape), St. Lawrence Island, Alaska. The USACE has contracted with Bristol Environmental Remediation Services, LLC (Bristol), and its team of subcontractors to accomplish the proposed work. The objective of this project is to implement selected remedies for the NE Cape site, as detailed in the Final Decision Document for the NE Cape HTRW Project (USACE, 2009).

This QAPP describes the quality assurance (QA) and QC procedures and other technical field sampling and laboratory analytical procedures to be conducted as part of the HTRW RAs selected for NE Cape. This document meets the requirements and elements set forth in the Intergovernmental Data Quality Task Force (IDQTF) Uniform Federal Policy (UFP) for QAPPs (U.S. Environmental Protection Agency [EPA], 2005) and EPA Requirements for Quality Assurance Project Plans EPA QA/R-5 (EPA, 2001).

The 37 UFP-QAPP worksheets follow this introduction. References used in the preparation of the QAPP are provided following the QAPP worksheets. The figures and tables are provided following the references. Attachment 1 contains Bristol's Standard Operating Procedures (SOPs) for conducting the 2012 RAs. Attachment 2 includes the field forms required to implement the field procedures. Attachment 3 contains the TestAmerica Laboratories, Inc. (TestAmerica) Quality Assurance Manual and current Defense Environmental Laboratory Accreditation Program (ELAP) and ADEC Contaminated Sites Laboratory certifications. The TestAmerica SOPs for analytical methods specified in this QAPP are provided in Attachment 4. The field laboratory SOPs are provided in Attachment 5.

1.2 BACKGROUND

Environmental investigations and cleanup activities at NE Cape began in the mid 1980s with the goal of locating and identifying areas of contamination and gathering enough information to develop a cleanup plan. Remedial investigations (RIs) were initiated at NE Cape during the summer of 1994. Additional sampling was performed during subsequent investigations: Phase II RI (Montgomery Watson, 1996 and 1999); Phase III RI (Montgomery Watson Harza, 2003); and Phase IV RI (Shannon &Wilson, Inc., 2005). The studies divided the concerns among 34 separate sites. The results of the RI showed that contaminants were present at some, but not all, sites. Site-specific historical information is presented in the Work Plan, Section 3.2 Site Descriptions, for the sites that will be remediated in 2012.

Bristol performed several removal actions at NE Cape in 2003 and 2005. In 2009, Bristol capped the Site 7 Cargo Beach Landfill and conducted a Phase I In-Situ Chemical Oxidation (ISCO) Treatability Study at the Main Operations Complex (MOC).

In 2010, Bristol performed the following tasks at NE Cape: (1) constructed a landfill cap at Site 9; (2) excavated and disposed of polychlorinated biphenyl- (PCB-); petroleum, oil, and lubricants- (POL-), and arsenic-contaminated soil; (3) collected and disposed of debris; (4) removed poles from various areas around the site; (5) sampled nine MOC monitoring wells; (6) initiated the Site 8 monitored natural attenuation (MNA) study; (7) sampled tundra at Site 3 for petroleum hydrocarbons and biogenic interference; and (8) utilized an Ultra-Violet Optical Screening Tool (UVOST™) to measure Laser-Induced Fluorescence (LIF) in diesel range organics- (DRO-) contaminated soil at the MOC.

In 2011, Bristol returned to the site and performed the following tasks: Excavated and disposed of PCB-, POL-, and arsenic-contaminated soil, excavated and disposed of tar and tar-contaminated soil from an area south of the MOC, removed 34 tons of miscellaneous metal debris from various areas across the site, conducted soil sampling to determine background arsenic concentrations at Site 21, sampled nine MOC monitoring wells, collected surface water and soil samples at Site 8 in an ongoing study to monitor natural attenuation at the site, collected soil and sediment samples from the Site 28 drainage basin to characterize the extent of soil and sediment contamination, added fertilizer and grass seed to the Sites 7 and 9 landfills (which were capped in 2009 and 2010, respectively), and conducted a stabilization analysis of borrow pit material to ensure that it met state regulations.

Numerous organizations are involved in the RAs for NE Cape including:

- USACE Geographic District Alaska District
- Federal agency (EPA, Region 10)
- State agency (Alaska Department of Environmental Conservation [ADEC])
- Current land owners/users (Village of Savoonga)
- Bristol Engineering Services Corporation

The objectives and the approach of the RAs are discussed below.

1.3 OBJECTIVES AND APPROACH

The 2012 Scope of Work is addressing specific selected remedies described in the Decision Document for the HTRW at NE Cape (USACE, 2009). The HTRW RAs proposed for the site are as follows:

- Excavation and disposal of petroleum-contaminated soils (PCS) at MOC Sites 10, 11, 13, 15, 19 and 27. These sites approximately correlate to Areas A2, B1, B2, C, E1, E2, E3, E4, F, G2, and I1 on the MOC excavation plan.

- Excavation and disposal of PCB-contaminated soils from Site 13 (Heat and Power Plant) and Site 31 (White Alice Communications Station).
- Continued MNA of petroleum-contaminated sediment and surface water at Site 8 POL Spill Site.
- Continued MNA of groundwater from monitoring wells in the vicinity of the MOC.
- Sediment mapping and Phase I removal of contaminated sediment at Site 28 Drainage Basin.
- Confirmation soil sampling at Site 28 (up to 30 samples) following Phase I sediment RAs (optional task currently not awarded).
- Excavation and disposal of arsenic-contaminated soil from Site 21 Wastewater Treatment Tank.
- Excavation and disposal of drums, drum liquids, and associated contaminated soil at the MOC, specifically Site 10.
- *MULTI INCREMENT*®[1] (MI) soil sampling for DRO and PCBs at the following bulk bag staging areas: Cargo Beach, Site 6, and the three areas near the Bristol refueling area (ISO tanks).
- MI soil sampling for POL at the present-day refueling area (optional task currently not awarded).
- Soil sampling alongside the road leading to the former radar dome on top of Kangukhsam Mountain.
- Removal and disposal of dangerous debris, drums, and poles from tundra areas site-wide where clearly identified.

[1] *MULTI INCREMENT*® is a registered trademark of EnviroStat, Inc.

QAPP Worksheet #1
Title and Approval Page

Site Name/Project Name:	Northeast Cape HTRW Remedial Actions
Site Location:	Northeast Cape, St. Lawrence Island, Alaska
Document Title:	UFP-QAPP for NE Cape HTRW Remedial Actions, Northeast Cape, St. Lawrence Island, Alaska
Lead Organization:	US Army Corps of Engineers, Alaska District
Preparer's Name and Organizational Affiliation:	Molly Welker, Senior Project Manager Bristol Environmental Remediation Services, LLC (Bristol)
Preparer's Address, Telephone, Number and E-mail address:	Bristol Environmental Remediation Services, LLC 111 W. 16th Avenue, Third Floor Anchorage, Alaska 99501 (907) 563-0013 mwelker@bristol-companies.com
Preparation Date (Month/Year):	August 2012
Investigative Organization's Project Manager/Date:	for
Printed Name/Organization:	Molly Welker/Bristol
Investigative Organization's Project QA/QC Manager/Date:	
Printed Name/Organization:	Marty Hannah/Bristol
Lead Organization's Project Manager/Date:	
Printed Name/Organization:	Carey Cossaboom/USACE
Other Approval Signatures/Date:	
Printed Name/Title:	Curtis Dunkin/ADEC
Document Control Numbering System:	FUDS Information Improvement Program (FIIP) Numbers

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QAPP WORKSHEET #2
QAPP IDENTIFYING INFORMATION

Site Name/Project Name: Northeast Cape HTRW Remedial Actions

Site Location: Northeast Cape, St. Lawrence Island, Alaska

Title: UFP-QAPP for Northeast Cape HTRW Remedial Actions, Northeast Cape, St. Lawrence Island, Alaska

Site Number/Code: FUDS Site F10AK096903

Revision Number: 2

Operable Unit: NA

Revision Date: August 2012

Contractor Name: Bristol Environmental Remediation Services, LLC

Contract Title: Northeast Cape HTRW Remedial Actions

Contractor Number: W911KB-12-C-0003 **Work Assignment Number:** NA

1. Identify regulatory program: Defense Environmental Restoration Program, U.S. Code Title 10, Section 2701, et seq. and Title 18 Alaska Administrative Code, Chapter 75 (18 AAC 75.300-396)

2. Identify acceptance entity: USACE – Alaska District

3. The QAPP is (select one): ______ Generic __X__ Project Specific

4. List dates of scoping sessions that were held: None to date.

5. List dates and titles of QAPP documents written for previous site work, if applicable:

Title	Acceptance Date
2009 In-Situ Chemical Oxidation (Phase I) and Intrusive Drum Removal/Landfill Cap Sampling and Analysis Plan (Revision 1) F10AK096905_07.04_0501_a	July 2009
2010 Northeast Cape HTRW Remedial Actions Sampling and Analysis Plan (Revision 1) F10AK096993_07.04_0503_p	July 2010
Northeast Cape HTRW Remedial Actions, Northeast Cape, St. Lawrence Island, Alaska Contract Quality Assurance Project Plan (Revision 1) No. W911KB-06-D-0007, F10AK096903_07.04_0502_p	July 2011

6. List organization partners (stakeholders and connection with lead organization):

Partners	Connection
USACE Headquarters	Sponsor organization
USACE, Alaska District	Lead organization
USACE, Alaska District	Technical oversight organization
USACE, Alaska District	Contracting organization
Kukulget, Inc., in Savoonga, AK	Landowner
Sivuqaq, Inc., in Gambell, AK	Landowner
U.S. Environmental Protection Agency (EPA) Region 10	Federal regulatory agency
Alaska Department of Environmental Conservation	State regulatory agency

7. List data users: Same as above

8. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the following QAPP Worksheet #2 table. Provide an explanation for their exclusions below:

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	QAPP Worksheet Number
Project Management and Objectives		
2.1 Title and Approval Page	Title and Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format	Table of Contents QAPP Identifying Information	Preface 2
2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	Document Control System	Not included
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List	Distribution List	3
2.3.2 Project Personnel Sign-Off Sheet	Project Personnel Sign-Off Sheet	4
2.4 Project Organization	NW Cape HTRW Project Organization Chart	5
2.4.1 Project Organizational Chart 2.4.2 Communication Pathways	Communication Pathways	6

Required QAPP Element(s) and Corresponding QAPP Section(s)		Required Information	QAPP Worksheet Number
Project Management and Objectives			
2.4.3	Personnel Responsibilities and Qualifications	Personnel Responsibilities and Qualifications Table	7
2.4.4	Special Training Requirements and Certification	Special Personnel Training Requirements Table	8
2.5	Project Planning/Problem Definition	Project Planning Session Documentation (Refer to Work Plan)	
2.5.1	Project Planning (Scoping)	Project Scoping Session Participants Sheet	9
2.5.2	Problem Definition, Site History, and Background	Problem Definition, Site History, and Background	10
		Site Maps (Historical and Present)	Work Plan
2.6	Project Quality Objectives and Measurement Performance Criteria	Site-Specific Project Quality Objectives (presented as DQOs during the Technical Project Planning [TPP] Meeting)	11
2.6.1	Developing of Project Quality Objectives Using the Systematic Planning Process		
2.6.2	Measurement Performance Criteria	Measurement Performance Criteria Tables	12
2.7	Secondary Data Evaluation	Sources of Secondary Data and Information	13
		Secondary Data Criteria and Limitations Table	13
2.8	Project Overview and Schedule	Summary of Project Tasks	14
2.8.1	Project Overview	Reference Limits and Evaluation Table (includes Evaluation Criteria)	15
2.8.2	Project Schedule		
		Project Schedule/Timeline Table	Work Plan
Measurement/Data Acquisition			
3.1	Sampling Tasks	Sampling Design and Rationale	11, 17
3.1.1	Sampling Process Design and Rationale	Sample Location Map	Work Plan
3.1.2	Sampling Procedures and Requirements	Sampling Locations and Methods/ Standard Operating Procedure (SOP) Requirements Table	11, 18, 21
3.1.2.1	Sampling Collection Procedures	Analytical Methods/SOP Requirements Table	19

Required QAPP Element(s) and Corresponding QAPP Section(s)		Required Information	QAPP Worksheet Number
Measurement/Data Acquisition			
3.1.2.2	Sample Containers, Volume, and Preservation	Field Quality Control Sample Summary Table	11, 20, 21, 28
3.1.2.3	Equipment/Sample Containers Cleaning and Decontamination Procedures	Sampling SOPs Project Sampling SOP References Table	21 11. 20, 28
3.1.2.4	Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	22
3.1.2.5	Supply Inspection and Acceptance Procedures		
3.1.2.6	Field Documentation Procedures		
3.2	Analytical Tasks	Analytical SOPs	
3.2.1	Analytical SOPs	Analytical SOP References Table	23
3.2.2	Analytical Instruction Calibration Procedures	Analytical Instrument Calibration Table	24
3.2.3	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	25
3.2.4	Analytical Supply Inspection and Acceptance Procedures		
3.3	Sample Collection Documentation, Handling, Tracking, and Custody Procedures	Sample Collection Documentation, Handling, Tracking, and Custody SOPs	26
3.3.1	Sample Collection Documentation	Sample Container Identification	11, 17
3.3.2	Sample Handling and Tracking System		
3.3.3	Sample Custody	Sample custody requirements	27
3.4	Quality Control Samples	Quality Control Samples Table	11, 28
3.4.1	Sampling Quality Control Samples	Screening/Confirmatory Analysis Decision Tree	
3.4.2	Analytical Quality Control Samples		
3.5	Data Management Tasks		
3.5.1	Project Documentation and Records	Project Documents and Records Table	29
3.5.2	Data Package Deliverables	Analytical Services Table	11, 19, 30

Required QAPP Element(s) and Corresponding QAPP Section(s)	Required Information	QAPP Worksheet Number
Measurement/Data Acquisition		
3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management		
3.5.5 Data Tracking and Control		
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	 Planned Project Assessments Table Assessment Findings and Corrective Action Responses Table	 31 32
4.2 Quality Assurance Management Reports	Quality Assurance Management Reports Table	33
4.3 Final Project Report		NA
Data Review		
5.1 Overview		NA
5.2 Data Review Steps 5.2.1 Step I: Verification	 Verification (Step I) Process Table	 34
5.2.2 Step II: Validation	Validation (Steps IIa and IIb) Process Table	35
5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment	Validation (Steps IIa and IIb) Summary Table Usability Assessment	36 37
5.2.3.1 Data Limitations and Actions From Usability Assessment 5.2.3.2 Activities		
5.3 Streamlining Data Review 5.3.1 Data Review Steps to be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Type of Data Appropriate for Streamlining	Verification (Step I) Process Table	34

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QAPP WORKSHEET #3
DISTRIBUTION LIST

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address
Carey Cossaboom	Project Manager	USACE	(907) 753-2689	(907) 384-7441	Carey.c.cossaboom@usace.army.mil
Ron Broyles	Contracting Officer's Representative	USACE	(907) 753-5789	(907) 384-7441	Ronald.s.broyles@usace.army.mil
Lisa Geist	Project Scientist	USACE	(907) 753-5742	(907) 384-7441	Lisa.k.geist@usace.army.mil
Aaron Shewman	Project Engineer	USACE	(907) 753-5558	(907) 384-7441	Aaron.f.shewman@usace.army.mil
Teresa Lee	Project Chemist	USACE	(907) 753-2788	(907) 384-7441	Teresa.a.lee@usace.army.mil
Jeremy Craner	Project Quality Assurance Representative (QAR)	USACE	(907) 753-2628	(907) 384-7441	Jeremy.d.craner@usace.army.mil
Curtis Dunkin	ADEC Project Manager	ADEC	(907) 269-3053	(907) 269-7649	Curtis.dunkin@alaska.gov
Steve Johnson	Program Manager	Bristol	(907) 563-0013	(907) 563-6713	sjohnson@bristol-companies.com
Molly Welker	Project Manager	Bristol	(907) 563-0013	(907) 563-6713	mwelker@bristol-companies.com
Greg Jarrell	Project Manager	Bristol	(907) 563-0013	(907) 563-6713	gjarrell@bristol-companies.com
Martin (Marty) Hannah	Analytical Task Manager/Senior Technical Review Chemist – Project Quality Assurance/Quality Control (QA/QC) Manager	Bristol	(907) 563-0013	(907) 563-6713	mhannah@bristol-companies.com
Clark Roberts	Safety Manager	Bristol	(210) 490-5877	(210) 490-5877	croberts@bristol-companies.com
Chuck Croley	Site Superintendent, Site Safety and Health Officer (SSHO)	Bristol	(907) 563-0013	(907) 563-6713	ccroley@bristol-companies.com

QAPP Recipients	Title	Organization	Telephone Number	Fax Number	E-mail Address
Russell James	Field Team Leader/Contractor Quality Control System Manager (CQCSM)	Bristol	(907) 563-0013	(907) 563-6713	rjames@bristol-companies.com
Terri Torres	Laboratory Project Manager-Tacoma	TestAmerica	(253) 922-2310	(253) 922-5047	Terri.torres@testamericainc.com
Dave Wunderlich	Laboratory Quality Assurance Manager-Tacoma	TestAmerica	(253) 922-2310	(253)-922-5047	Dave.wunderlich@testamericainc.com
Michelle Johnston	Laboratory Project Manager-Denver	TestAmerica	(303)-736-0100	(303)-431-7171	Michelle.Johnston@testamericainc.com
Karen Kuoppala	Laboratory Quality Assurance Manager-Denver	TestAmerica	(303)-736-0100	(303)-431-7171	Karen.Kuoppala@testamericainc.com

QAPP Worksheet #4
Project Personnel Sign-Off Sheet

Organization: Bristol Environmental Remediation Services LLC

Project Personnel	Title	Telephone Number	Signature	QAPP Read Date
Molly Welker	Project Manager	(907) 563-0013	[illegible] james for	
Russell James	Field Team Leader, CQCSM	(907) 563-0013		
Marty Hannah	Analytical Task Manager/Senior Technical Review Chemist- Project QA/QC Manager	(907) 563-0013	Marty E. Hannah	
Chuck Croley	Site Superintendent, Site Safety Officer	(907) 563-0013	Charles L. Croley	
Terri Torres	TestAmerica Project Manager	(253)-922-2310		
Dave Wunderlich	TestAmerica QA Manager	(253)-922-2310		
Eric Barnhill	Field Team Member	(907) 563-0013	Eric Barnhill	
Emily Conway	Field Team Member	(907) 563-0013		
Carey Cossaboom	USACE Project Manager	(907) 753-2689		
Teresa Lee	USACE Project Chemist	(907) 753-2788		
Ron Broyles	Contracting Officer's Representative (COR)	(907) 753-5789		
Lisa Geist	Project Scientist	(907) 753-5742		
Aaron Shewman	Project Engineer	(907) 753-5558		
Curtis Dunkin	ADEC Project Manager	(907) 269-3053		

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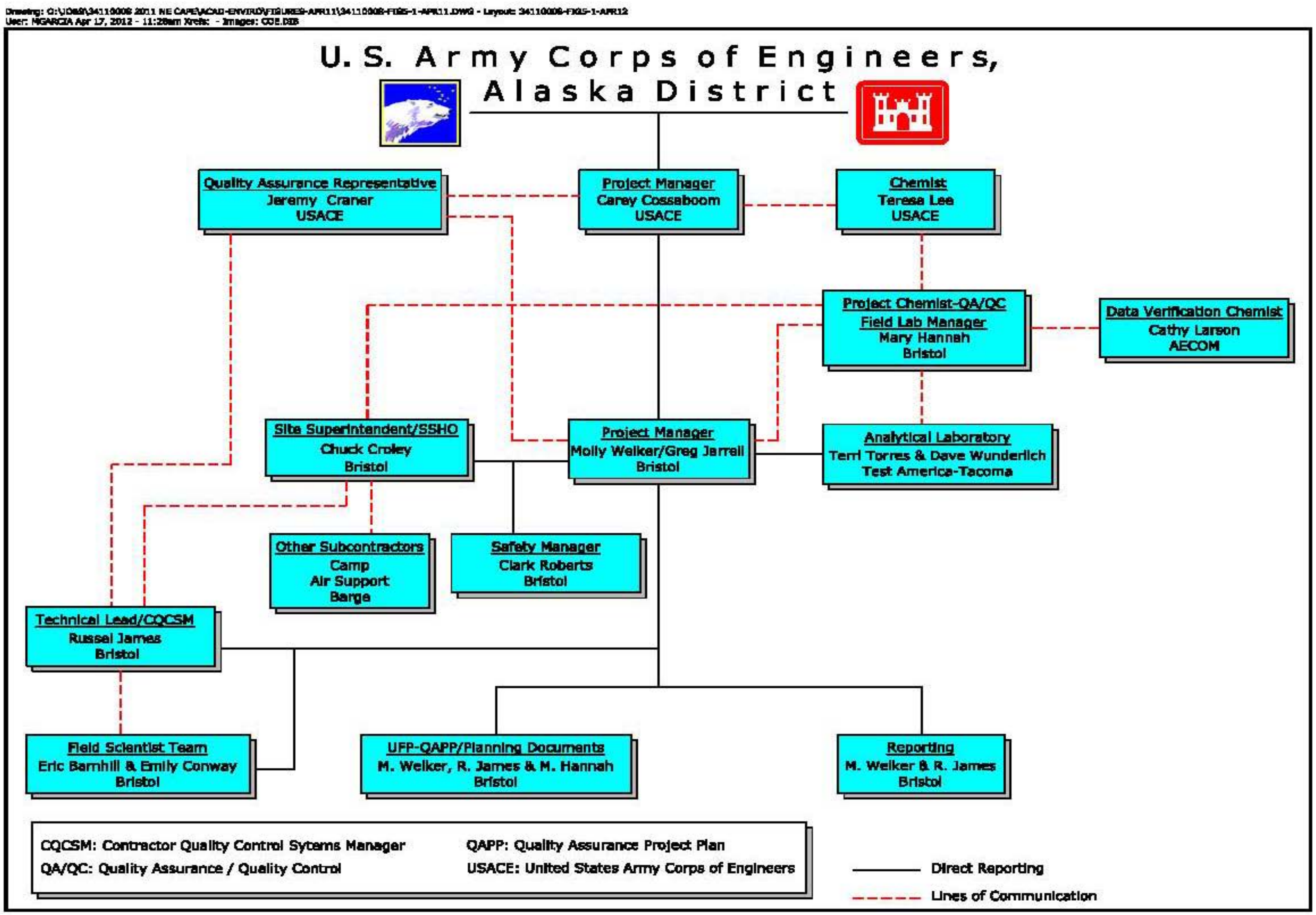
QAPP WORKSHEET #5
NE CAPE HTRW PROJECT ORGANIZATION CHART



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QAPP WORKSHEET #6
COMMUNICATION PATHWAYS

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Modifications to HTRW Remedial Actions Program	USACE Project Manager	Carey Cossaboom	(907) 753-2689	The USACE Project Manager (PM) will contact the Bristol PM via email or telephone with any programmatic information or coordination issues.
Modifications to contractual responsibilities	USACE Contracting Officer	Christine Dale	(907) 753-5618	The USACE Contracting Officer will contact the Bristol PM via email or telephone with any contracting issues.
Proposed modifications to accepted documents	Bristol Project Manager	Molly Welker	(907) 563-0013	Bristol PM will contact all stakeholders and explain proposed modifications to documents. If modifications are deemed acceptable by stakeholders, Bristol will collect approval signatures (if required) and distribute revised documents. Planning documents will have final acceptance prior to start of field activities.
Significant Issues communication between the QAR and COR	USACE QAR	Jeremy Craner	(907) 753-2628	The on-site QAR will contact the COR when significant or undiscovered issues need to be addressed.
Field issues that may result in variations to the Work Plan	Field Team Leader/CQCSM	Russell James	(907) 563-0013	If the field team encounters issues that may result in variations to the Work Plan, the CQCSM will discuss the issue with the Site Superintendent and then inform the on-site QAR. The CQCSM will keep the QAR up to date on these issues on a daily basis, through the Daily Quality Control Report (DQCR) system. If the QAR determines that the issue is significant, he or she will contact the USACE PM to discuss the issue and will pass on any direction from the USACE PM to the Bristol PM. In addition, ADEC will be notified and ADEC approval will be obtained prior to implementing any Work Plan variations.

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathways, etc.)
Cooler Receipt Form	TestAmerica-Bristol	Terri Torres	253-922-2310	A cooler receipt form will be sent by the laboratory within 24 hours to the USACE via email to receipt.cooler@usace.army.mil. Bristol will be copied to ensure that the cooler receipt form was sent. NPDL #12-043 will appear on the Cooler Receipt Form.
Laboratory performance issues	Analytical Laboratory Project Manager	Terri Torres	(253)-922-2310	The TestAmerica PM will report all project nonconformance issues to Bristol's Analytical Task Manager in a timely manner. Ms. Torres will communicate with Mr. Hannah regarding any laboratory coordination or issues that arise during the course of the project. Mr. Hannah will communicate any issues with the USACE chemist.
Elevated limits of quantitation (LOQs)	Bristol's Project Chemist	Marty Hannah, Molly Welker	907-563-0013	The Bristol Project Chemist or PM will notify the USACE Chemist (Teresa Lee) when sample LOQs are greater than project stated LOQs listed in Worksheet #15.

QAPP Worksheet # 7
Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Carey Cossaboom	Project Manager	USACE	Management of project responsibilities. Reviews and Accepts QAPP and other planning documents, including the Work Plan, Site Safety Health Plan (SSHP), Contractor Quality Control Plan (CQCP), and Waste Management Plan (WMP).	B.S., M.S., Geology 26 years experience
Teresa Lee	Chemist	USACE	Review of QAPP, review of chemical data, chemistry liaison with regulatory agencies and laboratories.	B.S., Biology Over 10 years experience in the environmental sciences including management of a materials laboratory, management of field operations, wetland delineation, asbestos inspector, SWPPP preparation and compliance, environmental sampling, site assessments, and remediation.
Aaron Shewman	Project Engineer	USACE	Technical Lead. Reviews and accepts QAPP and planning documents.	B.S., Environmental Engineering 19 years experience.
Jeremy Craner	Project Scientist/Quality Assurance Representative	USACE	Field representative that will verify the contractor performs the technical requirements of the contract, performs inspections, maintains communications with the contractor, reports to COR and Project Delivery Team.	B.S. Geology M.S. Hydrogeology 8 years experience.

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Ron Broyles	Contract Officer Representative	USACE	Verifies the contractor performs the technical requirements of the contract, performs inspections, maintains communications with the contractor, evaluates contractor, and is POC for any incident reporting or contract deficiencies.	B.S., Mechanical Engineering 20 years experience.
Terri Torres	Project Manager/ Client Services Manager	TestAmerica Laboratories, Inc.	Oversees all facets of laboratory services portion of this project as provided by TestAmerica Laboratories, Inc. Responsible for overall implementation of client services such as the development of client relationships, client contracts, preparation of bids and proposals, and management of large-scale client projects/contracts with clients that include the USACE and many environmental engineering firms supplying services to either USACE or U.S. Navy; functions as liaison between clients and the laboratory to achieve client satisfaction through laboratory performance.	B.S. in Biology - Evergreen State College (1993); over 16 years experience in the analytical services field. This experience includes a wide variety of both organic and inorganic analysis, as well as quality assurance management. Ms. Torres' instrumentation experience includes GS/MS, GC, AA, ICAP, IR, and auto-analyzers. Ms. Torres' diversified experience has provided her with broad-based familiarity with regulatory protocols and methodologies, including WA State DOE, State of CA DOH, NELAP, U.S.Army Corps of Engineers, U.S.Navy and others.

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Kathy Kreps	Laboratory Director	TestAmerica Laboratories, Inc.	Responsibilities include technical and administrative management of the analytical laboratory and program management staff of the facility, including approximately 30 chemists, scientists and project managers; functional groups of the facility include sample control, sample preparation, organic chemistry, metals, general inorganic chemistry, project management, customer service management, QA/QC, information technology and report generation; other responsibilities include adherence to budget, staff development, quality assurance and quality control, scheduling, client support/liaison, as well as profit and loss responsibility for the Seattle facility.	B.A. in Chemistry – Whitman College (1978); over 30 years experience in the fields of analytical and environmental laboratory analyses. Ms. Kreps has held positions as Laboratory Director and Laboratory Manager for over 16 years. In addition to managing daily laboratory operations, she is responsible overseeing budgets and capital expenditures, proposal writing, project management, data validation, method development and evaluation, troubleshooting, consulting, and SOP writing and editing skills. She is well versed in current hazardous waste regulations, including RCRA and TSCA, and their associated analytical requirements. Prior to those positions, Ms. Kreps spent many years as a chemist performing trace organic, environmental, and inorganic analyses, as well as identification techniques and process chemistry. Ms. Kreps has also worked as a senior project manager, responsible for project management of a wide variety of projects involving full laboratory services for private and government contracts, including AFCEE, NFESC, EPA, and USACE.

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Dave Wunderlich	QA Manager	TestAmerica Laboratories, Inc.	Responsible for developing and implementing the quality systems at the TestAmerica laboratory in Seattle and for verifying the laboratory's compliance with those systems with responsibilities including writing, revising, and implementing QA policies and procedures and internal auditing, administering the performance evaluation program, coordinating the laboratory's certification and accreditation activities and associated company website updates, directing the preparation for external audits and the ensuing corrective action process, conducting in-house training, presenting seminars on analytical and regulatory topics, interfacing with clients on QA/QC issues, and summarizing the activities of his department in regular reports to laboratory management.	B.S. in Chemistry and Math - Duquesne University (1984); more than 24 years of environmental laboratory experience, including 14 years as a QA manager and over nine years with TestAmerica. Mr. Wunderlich's past experience also includes roles as laboratory director, project manager, department manager, supervisor, and bench chemist. He has performed many of the EPA methods associated with SDWA, NPDES, RCRA, and CLP programs and has prepared data deliverables for environmental projects governed by various government agencies, including the EPA and the Department of Defense (Army Corps of Engineers, NEESA, and AFCEE).

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Molly Welker	Project Manager	Bristol	Responsible for the following activities: project technical direction; coordination of technical and logistical aspects of the project; resolving issues; development and maintenance of detailed project schedule; review of all reports before submittal to USACE; representation of the project team at meetings; and preparation of the final remedial action reports. Submission of QAPP and any QAPP revisions and amendments to appropriate personnel for review and acceptance. Maintains the official accepted QAPP version with support from the QA/QC Project Officer. Also responsible for ensuring that the documents (QAPP, SSHP, CQCP, and WMP) meet USACE objectives, regulatory requirements, and quality standards.	B.S., Earth Sciences, Montana State University, Bozeman, MT (1982); M.S., Geology, Texas A&M University, College Station TX (1985); over 20 years in the environmental sciences field and over 6 years of experience in managing, coordinating, and performing all aspects of project activities for large environmental projects in Alaska. Her experience includes contracting, budgeting, and directing field activities. Ms. Welker has conducted hazardous materials removal and disposal, site investigations, soil and groundwater remediation, water quality and groundwater studies, and environmental compliance assessments. Ms. Welker has extensive experience in writing environmental planning documents, including remedial action plans, site characterization reports, technical memorandums, and final reports.

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Greg Jarrell	Project Manager	Bristol	Responsible for the following activities: project technical direction; coordination of technical and logistical aspects of the project; resolving issues; development and maintenance of detailed project schedule; review of all reports before submittal to USACE; representation of the project team at meetings; preparation of the final remedial action reports, and submission of QAPP and any QAPP revisions and amendments to appropriate personnel for review and acceptance. Maintains the official accepted QAPP version with support from the QA/QC Project Officer. Also responsible for ensuring that the documents (QAPP, SSHP, CQCP, and WMP) meet USACE objectives, regulatory requirements, and quality standards.	Mr. Jarrell has been managing and performing environmental and construction projects throughout Alaska and the western United States for 14 years. His experience includes fuels infrastructure construction and repair, large-scale demolition, HTRW investigation and removal, facilities sustainment, restoration, and modernization (SRM), groundwater quality monitoring, surface water sampling and analysis, monitoring well installation, soil sampling and analysis, groundwater modeling, fate transport modeling, AutoCAD, site investigations, bioremediation design and operations and maintenance, proposal and cost estimate preparation, and work plan preparation. As Environmental Division Manager of Bristol Fuel Systems, LLC, Mr. Jarrell's responsibilities include operations planning and oversight, ensuring compliance with all company policies and procedures, and budgetary oversight and understanding of the company's financial performance and reporting requirements. Additional duties include resource management and oversight, business development, contract management, implementation of strategic business and/or operational plans, and ensuring that the company is in compliance with local, state, and federal regulations.

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Russell James	Construction CQCSM	Bristol	Responsible for compliance with the CQCP.	B.S., Environmental Geography, Valdosta State University. Mr. James has 8 years of experience in Geographic Information Systems (GIS) and Geographic Positioning Systems (GPS). 5 years experience in environmental investigations. 3 years experience in Construction Quality Control Systems Management (CQCSM).
Chuck Croley	Site Superintendent, Site Safety Officer	Bristol	Responsible for execution of all HTRW activities and compliance with the SSHP and the CQCP. Responsible for day-to-day field coordination, activities, procedures, and modifications.	Mr. Croley has over 35 years of experience with construction, mining, and environmental projects at remote sites. Mr. Croley is an experienced Site Superintendent, Health and Safety Officer, and CQCSM for projects encompassing construction, aboveground and belowground fuel tank installations and removals, monitoring well drilling, sampling for a variety of media, reserve pit closures, demolition projects, and oil field investigations.
Emily Conway	Project Scientist	Bristol	Field sampling duties, including field screening and confirmation samples, guiding the MOC excavation based on the 2010 UVOST data and sampling the MOC groundwater wells.	B.S. in Geology from University of Alaska Anchorage (2011) 2 years of professional experience.
Eric Barnhill	Project Scientist/Certified Erosion and Sediment Control Lead (CESCL)	Bristol	Field sampling duties, including field screening and confirmation samples, MNA samples at Site 8. Acts as project CESCL and will coordinate inspections with the Site Superintendent.	B.S. in Biology from Eastern Washington University (1999). Environmental Scientist. Over 4 years of experience in environmental science, with emphasis on water and soil sampling.

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Martin Hannah	Project Quality Control/Quality Assurance Manager Senior Technical Review Chemist	Bristol	Overall Project Quality Manager. Responsible for auditing and implementation of QA program in conformance with demands of the specific investigations and policies. Specific functions and duties include: Ensuring internal assessments are conducted on the sampling and laboratory processes, as required; preparing, reviewing and/or approving QA plans and procedures; providing QA technical assistance to project staff; reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the Project Manager. Responsible for data quality in conformance with the QAPP, and interfacing directly with TestAmerica and AECOM for the Chemical Data Quality Review report. Senior Technical Review Chemist with technical oversight of TestAmerica and AECOM. Field screening laboratory manager/chemist.	M.S. in Environmental Quality Science from University of Alaska Anchorage (2005); B.S. in Biology from Mankato State University (1992); over 13 years of environmental experience, including four years in environmental remediation and 9 years laboratory experience. Expertise includes site assessment and remediation projects, site investigations, QA/QC requirements, and project chemistry, as well as management and transportation of hazardous waste materials at remote arctic project sites; worked on projects for federal and state agencies and is familiar with the standards and procedures for compliance with these agencies.

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Clark Roberts	Health & Safety Manager (HSM)	Bristol	Acts as the Project Safety and Health Officer to ensure compliance with internal and federally regulated safety and health procedures.	M.S., Public Health, University of Illinois, Chicago, (1983); B.S., Chemistry and Biology, Heidelberg College, Ohio (1978); Certified Industrial Hygienist, 1988 (#3957); Certified Hazardous Materials Manager, 2007 (#14467); Registered Environmental Assessor, California, 1990 (#3000); Licensed Asbestos Consultant, Texas, 2004 (#105654); more than 23 years of progressive experience in developing solutions to client needs in the areas of regulatory, operational, and liability risk management. He is experienced in developing specifications for hazard abatement and managing technical and professional personnel. Mr. Roberts has developed national policies and programs for the U.S. Navy and DOE in management of occupational health issues. Mr. Roberts has performed over 500 occupational workplace investigations and reviews, including asbestos, lead and chemical exposure investigations, accident/fatality investigations, regulatory compliance assessments, remedial site investigations, and a variety of performance based evaluations. As a former compliance officer for the Occupational Safety & Health Administration (OSHA), Mr. Roberts has significant experience with determining potential exposure to health and safety hazards, setting appropriate exposure limits, recommending controls, and assessing the effectiveness of existing program efforts. Mr. Roberts is also an EPA-Accredited asbestos building inspector, management planner, and abatement designer.

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QAPP WORKSHEET #8
SPECIAL PERSONNEL TRAINING REQUIREMENTS TABLE

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/Organizational Affiliation	Location of Training Records/Certificates[1]
40-Hour HAZWOPER Training	40-Hour HAZWOPER 8-Hour HAZWOPER Refresher	Various	Single Event and Annual Refresher	All field staff	All field staff	Provided in Work Plan Appendix G
8-Hour HAZWOPER Supervisory Training	8-Hour HAZWOPER Supervisory Training	Various	Single Event	Supervisory staff	Project Manager CQCSM, Site Superintendent	Provided in Work Plan Appendix G
30-Hour OSHA Construction Safety	30-Hour OSHA Construction Safety	Various	Single Event	Supervisory and Health and Safety Staff	Site Superintendent and SSHO	Provided in Work Plan Appendix G
CQCSM Training	16 Hour, Construction Quality Management for Contractors	USACE	Every 5 years	CQCSM	Project Manager CQCSM, Site Superintendent	Provided in Work Plan Appendix G
First Aid/CPR	First Aid/Cardiopulmonary Resuscitation	Various	Various	All field staff	All field staff	Provided in Work Plan Appendix G
HAZMAT Shipping	DOT/IATA Hazardous Materials Shipping	Various	Various	All field staff	All field staff	Provided in Work Plan Appendix G
UTV Operation	UTV Operation	Various	Various	All staff operating UTVs	All staff operating UTVs	On-Site roster following UTV training.

Project Function	Specialized Training – Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/Organizational Affiliation	Location of Training Records/Certificates[1]
Health and Safety Manager (HSM)	Certified Industrial Hygienist	American Board of Industrial Hygiene	July 1988	HSM	HSM	Provided in Work Plan Appendix G

[1]Copies of all current required training certificates (as specified in the Site Safety and Health Plan [Bristol, 2011a]) will be available on site during execution of the field project. All team members will have training updated prior to certificate expiration.

QAPP Worksheet #9
Project Scoping Sessions

Site Name/Project Name:	2012 Northeast Cape HTRW Remedial Actions
Site Location:	Northeast Cape, St. Lawrence Island, Alaska
Projected Date(s) of Sampling:	July – September 2012
PM:	Molly Welker/Greg Jarrell
Date of Session:	5/16/2012
Scoping Session Purpose:	2012 UFP-QAPP Discussion

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Comments

The UFP-QAPP meeting for the NE Cape project was held May 16, 2012, at the Bristol offices in Anchorage, Alaska. The purpose of the meeting was to discuss a pre-draft of the 2012 UFP-QAPP and get input from ADEC and USACE so that a Draft Work Plan can be submitted by Wednesday, May 23, and we can get an approved Draft Work Plan prior to start of field work. A full description of the meeting is presented in *NE Cape UFP-QAPP Meeting, Minutes of Meeting* (Bristol, 2012).

QAPP WORKSHEET #10
PROBLEM DEFINITION

PROJECT BACKGROUND

St. Lawrence Island is located in the Bering Sea, near the territorial waters of Russia, approximately 135 air miles southwest of Nome, Alaska (Figure 1 of the Work Plan). The project site, which originally encompassed 4,800 acres located near NE Cape, falls between Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south (Figure 2 in Work Plan). The site is located at 63 degrees (°) 20 (') minutes north latitude, 168° 59′ west longitude, in Township 25 South, Range 54 West, Kateel River Meridian.

In 1982, transfer of the White Alice Station area, south of the MOC, to the U.S. Department of the Navy was initiated. However, this transaction was not formally completed and was superseded by the Alaska Natives Claim Settlement Act (ANCSA). The U.S. Navy conducted a removal action under its Comprehensive Long-Term Environmental Action Navy program. The action included removal of specified hazardous items and containerized HTRW. In 2000, the White Alice Station was reclassified as a Formerly Used Defense Sites (FUDS)-eligible property, and, in response, the USACE, included the area in the ongoing cleanup program for NE Cape (USACE, 2002).

Environmental investigations and cleanup activities at NE Cape began in the mid 1980s with the goal of locating and identifying areas of contamination and gathering enough information to develop a cleanup plan. Remedial investigations were initiated at NE Cape during the summer of 1994. Additional sampling was performed during subsequent investigations: Phase II RI (Montgomery Watson, 1996 and 1999); Phase III RI (Montgomery Watson Harza, 2003); and Phase IV RI (Shannon &Wilson, Inc., 2005). The studies divided the concerns among 34 separate sites. The results of the RI showed that contaminants were present at some, but not all sites. Site-specific historical information is presented in the Work Plan, Section 3.2 Site Descriptions.

Bristol performed several removal actions at NE Cape in 2003 and 2005. In 2009, Bristol capped the Site 7 Cargo Beach Landfill and conducted a Phase I ISCO Treatability Study at the MOC. In 2010, Bristol performed the following tasks at NE Cape: Constructed a landfill cap at Site 9, excavated and disposed of PCB-, POL-, and arsenic-contaminated soil, collected and disposed of debris, removed poles from various areas around the site, sampled nine MOC monitoring wells, continued the Site 8 MNA study, sampled tundra at Site 3 for petroleum hydrocarbons and biogenic interference, and conducted a UVOST investigation to delineate the extent of DRO-contaminated soil at the MOC.

In 2011, Bristol returned to the site and performed the following tasks: Excavated and disposed of PCB-, POL-, and arsenic-contaminated soil, excavated and disposed of tar and tar-contaminated soil from an area south of the MOC, removed 34 tons of miscellaneous metal debris from various areas across the site, conducted soil sampling to determine background arsenic concentrations at Site 21, sampled nine MOC monitoring wells, collected surface water and soil samples at Site 8 in an ongoing study to monitor natural attenuation at the site, collected soil and sediment samples from the Site 28 drainage basin to characterize the extent of soil and sediment contamination, added fertilizer and grass seed to the Sites 7 and 9 landfills (which were capped in 2009 and 2010, respectively), and conducted a stabilization analysis of borrow pit material to ensure that it met state regulations.

THE PROBLEM TO BE ADDRESSED BY THE PROJECT

The primary contaminants of concern (COCs) in soil at NE Cape are chemicals associated with petroleum hydrocarbon releases, metals (including arsenic), and PCBs. Detailed information on the past uses and compounds of concern present at the site have been documented in previous investigation reports [Phase II RI (1996 and 1998); Phase III RI (2001 and 2002); and Phase IV RI (2004)]. The primary sources of contamination at the site were the aboveground storage tanks (ASTs), underground storage tanks (USTs), and associated piping that contained fuel products; the secondary source of contamination was residual subsurface, fuel-contaminated soil resulting from historical spills and leaks. Other sources of contamination include electrical transformers (PCBs), 55-gallon drums, and other miscellaneous activities during facility operations. The largest documented spill with historical certainty was 30,000 gallons of fuel from the center tank, which was punctured during snow removal activities in the 1960s (Shannon & Wilson, 2005), though larger spill volumes have been estimated based on public testimony.

The following are the objectives for the 2012 project:

- Excavation and disposal of PCS at MOC Sites 10, 11, 13, 15, 19 and 27. These sites approximately correlate to Areas A2, B1, B2, C, E1, E2, E3, E4, F, G2, and I1 on the MOC excavation plan.
- Excavation and disposal of PCB-contaminated soils from Site 13 (Heat and Power Plant) and Site 31 (White Alice Communications Station).
- Continued MNA of petroleum-contaminated sediment and surface water at Site 8 POL Spill Site.
- Continued MNA of groundwater from monitoring wells in the vicinity of the MOC.
- Excavation and disposal of arsenic-contaminated soil from Site 21 Wastewater Treatment Tank.
- Surface water sampling at Site 21.
- Sediment mapping, sampling, and characterization at Site 28 (Drainage Basin) and subsequent Phase I removal of contaminated sediment.
- Confirmation soil sampling at Site 28 following Phase I sediment removal actions (optional task currently not awarded).
- Excavation and disposal of drums, drum liquids, and associated contaminated soil at the MOC, specifically Site 10.

- Soil sampling for DRO and PCBs at bulk bag staging areas Cargo Beach, Site 6, and the areas south of the Bristol ISO tanks.
- Soil sampling alongside the road leading to the former radar dome on top of Kangukhsam Mountain.
- Removal and disposal of dangerous debris, drums, and poles from tundra areas site-wide where clearly identified.
- Backfilling of excavations where contaminant concentrations remain above ADEC cleanup level(s).
- Off-site removal of overwintered sacks containing contaminated soil.
- Miscellaneous correlation sampling.

THE ENVIRONMENTAL QUESTIONS BEING ASKED

Have all the POL-contaminated soils above the cleanup levels been removed from the MOC? Has all the PCB contamination in soils above 1.0 milligrams per kilogram (mg/kg) been removed at Site 13 and Site 31? Is natural attenuation occurring in surface water and soil at Site 8? Is natural attenuation occurring in groundwater at the MOC? Where is sediment present at Site 28, what is the extent of sediment contamination, and what are the best remedial methods for sediment? Have all the arsenic-contaminated soils that are not attributable to background conditions at Site 21 been removed? Is ground/surface water contaminated with arsenic above cleanup levels, and is it migrating and/or does it have the potential to migrate? Are drums containing POL present between excavation J1A and Site 10 at the MOC, and if so, have they impacted the soil? Have the bulk bag staging areas been impacted from the contaminated soil that have been staged there? Is the lack of vegetation along the road/trail at the top of the mountain leading to the location of the former radar dome attributable to contamination in the soil?

OBSERVATIONS FROM SITE RECONNAISSANCE REPORTS

The remedies discussed in the Decision Document (USACE, 2009) and the following site maps and summary of sample results from previous remedial investigations and removal actions will be reviewed: Phase II RI (Montgomery Watson, 1996 and 1999); Phase III RI (Montgomery Watson Harza, 2003); Phase IV RI (Shannon &Wilson, Inc., 2005); removal actions performed by Bristol in 2003 and 2005; and the HTRW RAs performed by Bristol in 2009, 2010, and 2011.

The POL-contaminated soil was delineated by the 2010 UVOST investigation at the MOC; PCB contamination above cleanup levels remain at Sites 13 and 31 based on field-screening and confirmation samples analyzed in 2011 by Bristol; arsenic contamination above cleanup levels remains at Site 21 based on confirmation samples analyzed in 2011 by Bristol.

A SYNOPSIS OF SECONDARY DATA OR INFORMATION FROM ALL SITE REPORTS

Main Operations Complex (MOC)

The MOC at the NE Cape installation included the majority of the site infrastructure, including buildings, heat and power supply, fuel storage tanks, maintenance, and housing quarters. Individual sites were grouped together to evaluate an overall response action for the known contamination. These sites are located on the northeast portion of the main complex gravel pad and include Sites 10, 11, 13, 15, 19, and 27. See Figure 3 in the Work Plan for site locations.

All of the MOC structures have been demolished including backfill of utilidors. Tanks and piping have been removed. Contaminated concrete, PCB-contaminated soils, and fuel-stained soils were also excavated and transported off site during removal actions from 2000 to 2005. Concrete pads in proposed dig areas were removed in 2011, and only inert, out-of-the-way concrete foundations and pads remain. The concrete from the former

Building 110 foundation (adjacent to Site 13) was sampled for PCBs in 2011 prior to being used as backfill. In addition to the two buildings, 108 and 110, concrete from a utilidor that extended south from former Building 110 was sampled for PCBs, removed, and utilized as backfill in POL excavations in 2011.

The primary COC in soil at the MOC is DRO. Surface and subsurface soils are contaminated with petroleum to depths exceeding 15 feet below ground surface (bgs).

Shallow groundwater is also contaminated throughout the northeast portion of the MOC, over an area of approximately 175,000 square feet. The primary COCs in groundwater are DRO, gasoline range organics (GRO), residual range organics (RRO), benzene, and naphthalene. The depth to groundwater across the northeast portion of the MOC varies significantly. In some areas, a perched aquifer is present (likely due to precipitation events), with shallow groundwater encountered between 4 and 7 feet bgs. A potentially confined aquifer is also present, with water encountered from 10 to 25 feet bgs.

Remedial investigations were conducted in 1994, 1996, 1998, 2001, 2002, and 2004. The sampling results indicate soils and groundwater contain petroleum compounds at elevated levels. The ISCO pilot test was completed at the MOC in 2009. Results indicated ISCO was not an effective means of remediating the petroleum-contaminated, peat-rich soil present at the MOC. As a result, excavation and removal is the preferred alternative. Additional data were collected at the MOC during the 2010 field season. Specifically, UVOST technology was used to evaluate the extent and magnitude of PCS. The 2009 ISCO study found that the fuel contamination was most heavily concentrated within a layer of peat and silt near Sites 13 and 27, and may have created a smear zone along the shallow groundwater interface. The 2010 UVOST investigation indicates highest POL concentrations in the low-lying marshy areas north of the Site 11 tank footprints. The UVOST results also indicate the MOC pad area has contamination above cleanup levels in the subsurface. Refer to Figure 8 in the Work Plan for graphical representation of UVOST LIF responses above 9.2 % RE. The tank footprints at Site 11 were excavated first at the MOC in 2011.

Site 8 – POL Spill

The Pipeline Break Site is located southwest of the intersection of Cargo Beach Road and the Airport Access Road. A fuel pipeline extended from the pump house at Cargo Beach to the bulk storage tanks at the MOC. A reported break in the pipeline was located on the west side of the main road embankment and north of the Suqitughneq River. The fuel pipeline was drained and removed in 2000.

The site is a wetland with thick surface vegetation, typical of locations along roads and the airstrip where the tundra mat was removed before construction. The roughly 40-foot-wide wetland slopes southward for approximately 300 feet toward the Suqitughneq River. The wetland narrows as it approaches the river and a spring of flowing water is present. The wetland consists of dense, grassy vegetation and roots with little soil or peat development. This vegetation does not appear stressed, though petroleum odor is evident when a person walks across the vegetative mat. Some sand is present between cobbles under the vegetation mat.

Two soil samples and one surface water sample were collected in 2004 to assess possible fuel impacts at the site. Diesel range organics were detected in the soil at concentrations ranging from 6,700 to 19,500 mg/kg. No contaminants were detected in the surface water. The two soil samples were spaced 50 feet apart. The pipeline break was 50 feet upgradient of the first sample, based on field observations.

Baseline MNA sampling of soil and surface water was conducted during 2010 and 2011. The sampling plan involved creating three decision units (DUs) at Site 8, the upper unit was above gradient of the pipeline break and represented a non-impacted area, the upper boundary of the middle DU started near the pipeline break and represented the most likely impacted area, and the lower DU represented a less impacted area, which terminated at the Suqitughneq River. A random number generator was used to select eight cells for sampling out of 40 possible cells in each DU. The 24 primary locations at Site 8 had water samples field analyzed for MNA parameters, with the exception of methane in water which was analyzed at TestAmerica. Manganese, ferrous iron, sulfate, nitrate, and alkalinity were analyzed with a Hach field spectrometer. Temperature, specific conductivity, pH oxidation-reduction potential (redox), and dissolved oxygen (DO) were measured with a YSI 556 multi-parameter water quality meter. The MNA results represent a baseline to determine if natural attenuation is occurring at the site. Though DO levels indicate that conditions are amenable for oxidative degradation of hydrocarbons, MNA results did not conclusively indicate whether or not natural attenuation is occurring at the site; the results will be used to establish a trend for further evaluation.

Soil samples were also composited from the eight selected cells in each DU and analyzed for DRO/RRO (with and without silica gel), polynuclear aromatic hydrocarbons (PAHs), and total organic carbon (TOC) at Site 8. The 2010 soil sample results indicated that the site had some impacted soil slightly above cleanup levels at the middle decision unit for 2-methylnaphthalene (7,600 mg/kg) and DRO without silica gel cleanup (9,300 mg/kg). In 2011, contaminant concentrations for all analytes were either not detected or were below site-specific cleanup levels. Silica gel cleanup results in 2011 indicate that biogenics may be contributing to the DRO and RRO results in the upper decision unit (UDU), but not contributing to the DRO and RRO results in the middle decision unit (MDU) and lower decision unit (LDU). The 2011 TOC results in all DUs support the presence of naturally occurring materials (NOM) at concentrations far exceeding DRO concentrations.

Three surface water samples were collected during 2010 and 2011 at two locations near the terminus of Site 8 and one surface water sample was collected from a spring-generated stream that flowed into the Suqitughneq River. The samples were submitted to TestAmerica and analyzed for DRO/RRO and PAHs. Concentrations for all analyses were below cleanup levels.

Site 13 – Power and Heat Building

Site 13 consisted of the Heat and Electrical Power Building (Building 110). Several ASTs, USTs, diesel generators, and power transformers were formerly located at this site.

Soil samples collected during the 2003 demolition of the wooden utilidor corridor south of Building 110 also indicated two discrete hits of PCBs ranging from 2.4 to 16.9 mg/kg, at depths of 4 to 5 feet bgs. The utilidor trenches were backfilled with clean fill.

Surface and subsurface soil samples were collected over several years to evaluate the extent of PCB contamination surrounding Building 110 and the transformer pads. During 2005, 141 tons of PCB-contaminated soils were excavated and removed from Site 13. Soil-screening and laboratory confirmation samples following the 2005 removal action indicated residual PCB concentrations up to 37.1 mg/kg at one location (excavation 13B-2). Three excavations (13C, 13D, and 13E) conducted north of Building 110 during the 2005 field season successfully removed PCB contamination to below 1.0 mg/kg at these locations.

In 2010, approximately 592 tons of PCB-contaminated soil was removed from Site 13. The 2010 field season ended with three PCB excavations in progress. In 2011, excavation resumed in these three areas. At the end of the 2011 field season, Bristol was working in four distinct excavation areas, two of which were new excavations that were opened because of elevated PCB concentrations in the soils sampled from underneath the lined overburden stockpile area southwest of the concrete pad of the former Heat and Power

Plant. Sixty-eight locations remain at Site 13 with PCB concentrations greater than the cleanup level; additional RAs are required at Site 13 in order to remove the remaining PCB-contaminated soils. Approximately 2,420 tons of additional PCB-contaminated soil was removed from Site 13 during 2011, for a total volume of 3,151 tons removed since 2005.

Site 21 – Wastewater Treatment Tank

Site 21 included the wastewater treatment system for the MOC. The facility was located west of the perimeter road and consisted of a concrete septic settling tank which discharged via an 8-inch insulated cast iron pipe to the wetland area approximately 450 feet to the west.

Soil, sediment, surface water, and shallow groundwater samples were collected at Site 21 throughout the various phases of remedial investigation. Arsenic and PCBs were identified as primary COC during the investigations. During the 1994 investigation, PCBs were detected in surface soils at one location (SS168) due west of the septic tank. The sample was analyzed in triplicate and the results ranged from 0.93 to 4.2 mg/kg. PCBs were not detected in the other soil or sediment samples. Sludge from within the septic tank was sampled in 1999 and contained total PCBs at a concentration of 120 mg/kg. Additional samples were collected from soils surrounding the tank and outfall pipe in 2001, and PCBs were detected at a maximum concentration of 0.18 mg/kg.

The septic tank compartments were cleaned and decommissioned during the 2003 removal action. The utilidor corridor from the main complex to the septic tank and the wooden utilidor outfall line were also removed in 2003. The concrete sidewalls and floor of the tank were sampled prior to demolition. All PCB sampling results from the concrete were equal to or less than 1.0 mg/kg. The concrete tank was broken up and buried in place. Confirmation soil samples were collected in 2003 after decontamination and decommissioning of the septic tank. The sampling results indicated PCBs had not migrated through the concrete. Confirmation soil samples were collected from underneath the inlet and outfall lines, adjacent to and below the lowest level of the septic tank, and from beneath the wooden utilidor corridor. A total of 17 samples were collected from beneath the concrete tank, beneath the outfall pipe adjacent to the tank, and from the bottom of the wooden utilidor corridor. PCBs were not detected in the samples collected from beneath the concrete tank and the wooden utilidor. PCBs were detected at 1.7 mg/kg in only one sample (03NEC21SB01), which was collected immediately beneath the outfall piping adjacent to the septic tank.

In 2010, Bristol excavated at historical sample locations 94NE21168SS and 03NEC21SB01, where PCB contamination had previously been noted at depths of approximately 0.5 feet bgs and 5 feet bgs, respectively. Bristol exposed soils at these depths and collected field-screening samples. Field-screening samples from the excavation in the vicinity of 03NEC21SB01 did not show PCBs present in the soil above site cleanup levels. Field-screening samples collected from the excavation associated with historical sample 94NE21168SS indicated that PCBs were present above cleanup levels. Soil from these field-screening locations associated with 94NE21168SS was removed and placed into bulk bags for disposal. Approximately 10 tons of PCB-contaminated soil was containerized within two bulk bags. Subsequent field-screening samples were collected, and results indicated that the PCB contamination had been removed. The final excavation at 94NE21168SS was approximately 6 feet in depth, and the final excavation at 03NEC21SB01 was approximately 3 feet in depth. No water was encountered in either PCB excavation.

Arsenic was detected at a single location (SS170) at an anomalous concentration of 170 mg/kg in surface soil downgradient of the septic tank outfall during the 1994 investigation. Other surface soil and subsurface soil samples collected in 1994 at Site 21 contained arsenic at levels ranging from 2.8 to 39 mg/kg. One groundwater sample and one surface water sample were collected at Site 21 in 1994 and analyzed for dissolved metals; analytical results for both samples were non-detect.

Additional surface soil and sediment samples were collected from the surrounding tundra near the septic tank outfall in 2001, and arsenic concentrations ranged from 4.5 to 14.7 mg/kg and were within the range of ambient levels for the NE Cape site. Two surface water samples were collected in 2001, and dissolved metals were not detected in either sample. During the 2003 removal action, arsenic was detected in tundra soil samples collected from immediately beneath the demolished utilidor corridor at concentrations ranging from 11.4 to 35.2 mg/kg. Although these concentrations generally exceed the background arsenic level of 11.49 mg/kg, these arsenic detections are likely attributable to naturally-occurring minerals in the tundra soils. The quartz monzonitic (granitic) rocks on Kangukhsam Mountain are known to have fracture surfaces with quartz, pyrite, and arsenopyrite mineralization.

Approximately 17 tons of arsenic-contaminated soil was removed from Site 21 during 2010. Residual arsenic-contaminated soil (17 mg/kg arsenic) remains above the site-specific cleanup level of 11 mg/kg.

Background sampling was performed in July 2011 to determine if the arsenic present at Site 21 is due to natural occurrence, as described in the ADEC *Arsenic in Soil* Technical Memorandum (ADEC, 2009). Based on analytical results from the background samples, it was determined that the arsenic at Site 21 was not naturally occurring, and that additional arsenic-contaminated soil should be removed. Approximately 15 tons of arsenic-contaminated soil were excavated from Site 21 in August 2011. Confirmation samples collected from the excavation exceeded the 11 mg/kg cleanup level, with concentrations ranging from 22 mg/kg to 180 mg/kg. Therefore, it is logical to conclude that these arsenic concentrations are anthropogenic. Sludge samples collected in 2011 from the manhole within the western drainage below Site 28 revealed arsenic concentrations around 40 mg/kg.

Site 28 – Drainage Basin

The Drainage Basin lies north of the MOC and flows north into the Suqitughneq River. This site has been impacted by fuel releases from the bulk fuel storage tanks, and other spills and releases. Surface water run-off and subsurface water seeps from the MOC gravel pad drain into this tundra/wetland area. Primary COCs for Site 28 include chromium, lead, zinc, PCBs, PAHs, DRO, and RRO.

Three discrete drainages originate from the MOC gravel pad and contribute flow to the Drainage Basin (Figure 13 of Work Plan). The western drainage is adjacent to Site 13, the middle drainage originates from where a culvert previously directed flow from the former diesel fuel pump island at Site 27, and the eastern drainage flows from the area adjacent to Sites 10 and 11.

The western drainage contains a manhole and small concrete supporting structure just north of the perimeter access road, which emptied into an artificially created swale. The manhole likely served as the drain for Building 110 Heat and Electric Power. The drainage swale is approximately 10 feet wide and 40 feet long. The presence of standing surface water is intermittent, depending on seasonal rainfall. Sediments in this area have been noted as stained dark brown- and black-stained, and produce a sheen when disturbed. Stained soils have also been observed along the drainage embankment. Grassy vegetation currently grows throughout the drainage. The manhole and small concrete supporting structure were removed and disposed of during 2010.

The middle drainage originates as a small swale south of the perimeter access road. Surface water runoff from the MOC was formerly routed under the road via a culvert to this swale. An area of ponded water periodically existed immediately north of the culvert outlet. Stained soils exist on the banks of this drainage swale. The area is generally heavily vegetated with grasses. The culvert was cut-off and plugged during 2010.

The eastern drainage is a vegetated area north of the former fuel tanks. Soil staining has been observed near the head of this drainage and downgradient of the tank footprints.

Previous sampling activities occurred in 1994, 1996, 1998, and 2001. The primary COCs in sediment are chromium, lead, zinc, PCBs, PAHs, DRO, and RRO. The highest concentrations of these compounds were predominantly located upgradient and closest to the edge of the MOC. Metals-contaminated sediments were found in two discrete locations. The maximum concentrations of chromium, lead, and zinc were detected in 2001 in a single sample from the head of the western drainage, near the culvert. Zinc was also elevated at one location (01NE28SD119) approximately 1,450 feet downstream.

Surface water samples were collected in the drainage basin in 1994, 1996, and 2001. Concentrations of DRO, total petroleum hydrocarbons (TPH), PCBs, and lead were above cleanup levels in 1994. Surface water samples were collected in 2001 and analyzed for DRO, RRO, and PCBs. The samples were not analyzed for lead. DRO was detected at concentrations ranging from 0.39 to 2.3 milligrams per liter (mg/L); the cleanup level was 2.2 mg/L. PCBs and RRO were not detected.

The shallow groundwater was also investigated during the 1994 investigation. Two monitoring wells were installed within the eastern drainage of Site 28; the exact locations of these wells are unknown to Bristol. The 1994 sampling results indicated DRO and lead contamination was present above cleanup levels. Subsequent sampling in 2001 indicated the levels of DRO and lead were below groundwater cleanup levels. No volatile organic compound (VOC) samples were collected from the shallow wells at the MOC.

In 2011, sediment and soil sampling was conducted along transects and at discrete locations between the upper end of Site 28 and its confluence with the Suqitughneq River to delineate the extent and magnitude of contamination at the site. The transect locations and discrete sample points were chosen to confirm the sample results from 1994, 1996, and 2001, as well as to gather additional information to fill data gaps within Site 28.

Based on the results from the 2011 characterization, the most concentrated areas of fuel contamination were located in the southern portion of Site 28 near the MOC, particularly in the western and middle drainages. The fuel contamination extends from the southern edge of Site 28 along low-lying areas and drainage channels in a northerly direction along the drainage channel. PCB contamination appeared within 700 feet of the MOC pad, with the exception of one sample approximately 1,500 feet from the MOC. The samples that exceeded one or more of the metals cleanup levels were scattered throughout the entire Site 28 drainage basin and not confined to one particular area. Arsenic and chromium were the primary metals detected above cleanup levels at Site 28.

<u>Site 31 – White Alice Communications Station</u>

The White Alice Complex is located southeast and uphill from the MOC in a glacial valley at the base of Mt. Kangukhsam. The site included four large billboard antennas, a central main electronics building, other supporting structures, and seven ASTs.

Surface water samples were collected in 2001 and no COCs were identified.

Surface and subsurface soil samples were collected in 2001, 2003, and 2004 to evaluate the extent of petroleum hydrocarbon contamination associated with former fuel tanks and piping. Specifically, soil samples were collected from beneath fuel pipelines, fuel tanks, and tank impoundments. Samples were also collected to evaluate the extent of PCB contamination near transformer pads and a septic outfall. There is no longer any POL-contaminated soil remaining above the cleanup level at Site 31. Three previously identified PCB-contaminated areas were excavated in 2005. Confirmation samples indicated that PCB concentrations remained above cleanup levels in one of the three areas adjacent to the former transformer pad.

The antennas, buildings, and ASTs were demolished and removed during the 2003 field season. A total of 118 tons of PCB-contaminated soil was excavated from three locations: 1) south and west of the former Main Electronics Building (Building 1001); 2) adjacent to a former transformer pad; and 3) at the septic tank outfall during the 2005 field season. PCB-contaminated concrete (79 tons) was removed from portions of the Building 1001 foundation. Confirmation soil samples were collected in 2005 after the removal of PCB-contaminated soil and concrete.

Confirmation soil sample results indicated PCBs remained in subsurface soil at concentrations above 1.0 mg/kg (ranging from 1.53 to 7.09 mg/kg) adjacent to the former transformer pad. Excavations west of the former Main Electronics Building and at the septic tank outfall successfully removed all PCB-contaminated soil to below 1.0 mg/kg.

In 2010, approximately 638 tons of PCB-contaminated soil was removed from Site 31. Residual PCB-contaminated soil remained in the subsurface at Site 31 at the end of the 2010 field season. Excavation resumed during 2011 in which the Site 31 excavation was expanded in all directions. At the end of the 2011 field season, field screening and analytical results indicated that PCB contamination remains throughout the Site 31 excavation in concentrations ranging from 1.0 mg/kg to 250 mg/kg; additional RAs are required at Site 13 in order to remove the remaining PCB-contaminated soils.

Approximately 1,418 tons of additional PCB-contaminated soil were removed from Site 31 during 2011, for a total volume of 2,176 tons removed since 2005.

THE CLASSES OF CONTAMINANTS AND THE AFFECTED MATRICES (SOURCE MATERIAL)

Potential chemical COCs present at the project areas are metals (including arsenic), benzene, toluene, ethylbenzene, and total xylenes (BTEX), GRO, DRO, RRO, PAHs, and PCBs. The media impacted are groundwater, surface water, sediment, subsurface soil. The concrete has also potentially been impacted by PCBs at Sites 13 and 31.

THE RATIONALE FOR INCLUSION OF CHEMICAL AND NONCHEMICAL ANALYSIS

The chemical contaminants identified for inclusion in this QAPP are based on previous investigation results. Tables 11-1 and 11-2 summarize the analytical groups and locations for soil and groundwater samples at each site. Tables 15-1 and 15-2, soil and groundwater respectively, state the specific analytes and site-specific cleanup levels.

Soil confirmation samples will be collected at the MOC POL site for DRO/RRO analysis following excavation when field screening indicates that soil above the cleanup level have been removed. Confirmation samples will be collected from the excavation areas after they have been excavated. Stockpile areas will be field screened by the mobile lab before and after any temporary stockpile area is constructed. Surface water samples will be collected at three locations before, during, and after the MOC excavation and analyzed for DRO/RRO.

Confirmation soil samples will be collected at Site 13 and Site 31 for PCBs following removal activities to ensure that all PCBs have been removed above site cleanup levels of 1.0 mg/kg. If necessary, concrete PCB wipe samples will be collected at Site 13 to ensure that no PCBs are present in the concrete that will be used as backfill.

For groundwater sampling at the MOC and surface water sampling at Site 8, general water quality indicators will be collected in the field and include conductivity, pH, turbidity, oxidation-reduction potential (ORP), temperature, and DO. Additionally, samples will be collected and field analyzed for MNA parameters except methane, which will be submitted for laboratory analyses. The MNA parameters are: nitrate, sulfate, ferrous iron, alkalinity, and dissolved manganese. Additionally, MOC groundwater samples will be analyzed for BTEX, GRO, DRO, RRO, PAHs, PCBs, total metals, and dissolved metals. Soil samples at Site 8 will be analyzed for DRO/RRO (with and without silica gel cleanup), TOC, and PAHs from composite samples collected at each DU. The purpose of the TOC analysis is to determine the amount of TOC in the matrix; TOC data will not be utilized to determine an alternative cleanup level. Water samples will also be collected at the outfall of Site 8 before it enters the Suqitughneq River. The water samples will be analyzed for DRO/RRO and PAHs.

Sediment samples will be collected throughout the Site 28 drainage basin to further delineate the extent of sediment contamination. Up to 54 sediment samples will be collected from streams and ponds between the upper end of Site 28 near the MOC and its confluence with the Suqitughneq River; samples will be analyzed for GRO, BTEX, DRO/RRO (with and without silica gel cleanup), PAHs, PCBs, the 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) plus nickel, vanadium, zinc, and TOC. The TOC data will be used to determine the amount of TOC in the matrix, and not to determine an alternative cleanup level.

Results from the sediment mapping and characterization efforts will be discussed and evaluated with the on-site Quality Assurance Representative (QAR), other USACE personnel, and ADEC personnel to determine the best approach for a mechanical removal of sediment at the Site 28 drainage basin. Part of the consideration will be an assessment to determine the potential for further environmental impact due to sediment removal activities. Once the project team has reached a consensus on the appropriate course of action at Site 28, Bristol will proceed with a Phase I contaminated sediment removal effort. Sediment will be dewatered in Geotubes prior to offsite transport and disposal, and water produced during sediment removal and dewatering will be captured, treated, and disposed of on site. Pre- and post-treatment water samples will be collected in order to verify that the treated water may be discharged to the ground. Two representative dewatered sediment samples will be collected and submitted to a geotechnical laboratory (DOWL HKM) to determine moisture content and density, and one of the samples will also be subjected to sieve-test analysis. Four sediment samples will be collected for waste characterization purposes and submitted to the analytical laboratory for analysis of GRO, BTEX, DRO/RRO (with and without silica gel cleanup), PAHs, PCBs, 8 RCRA metals plus nickel, vanadium and zinc, and TOC. Surface water samples will be collected at three locations before, during, and after the sediment removal process. Sample locations will be downstream of the sediment removal operations and will be analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals plus nickel, vanadium, and zinc. Surface water samples will also be analyzed for field turbidity. If the contract option is exercised, up to 30 confirmation soil samples may be collected after the Phase I sediment removal effort for analysis of GRO, BTEX, DRO/RRO (with and without silica gel cleanup), PAHs, PCBs, 8 RCRA metals plus nickel, vanadium and zinc, and TOC.

Confirmation samples will be collected at Site 21 for arsenic analysis following soil removal activities to ensure that arsenic-contaminated soil that exceeds the site cleanup level of 11 mg/kg has been removed. Since the excavation floor is currently beneath water, it is anticipated that only sidewall samples will be collected in 2012. One surface water sample (plus a duplicate and a matrix spike/matrix spike duplicate [MS/MSD]) will be collected from the Site 21 excavation area and analyzed for total and dissolved arsenic.

It is believed that drums containing POL liquid may be present in the vicinity of Site 10. If any drums are located, Bristol will collect samples of the POL liquid for waste characterization purposes. POL liquid characterization samples will be analyzed for DRO, RRO, Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP 8 RCRA metals, and TCLP semivolatile organic compounds (SVOCs), as well as ignitability and corrosivity. If POL-contaminated soil is excavated from Site 10, confirmation samples will be collected and analyzed for a full suite of potential contaminants (GRO/BTEX, DRO/RRO, PAHS, PCBs, and metals)to ensure that contamination above cleanup levels has been removed.

MI soil samples will be collected from the bulk bag staging areas to determine if the staging areas have been impacted from the bulk bags of contaminated soil. Samples will be analyzed for DRO and PCBs. If the contract option is exercised, *MI* samples may be collected from the present-day refueling area and analyzed for DRO, RRO, GRO, and BTEX to determine whether the area has been impacted by fuel storage activities.

Six discrete soil samples will be collected from random locations along the radar dome road at the top of the mountain where stressed or absent vegetation is observed to determine whether contamination above site cleanup levels is present. A sample will also be collected at a location where vegetative growth is observed to be vigorous. Samples will be analyzed for petroleum hydrocarbons (DRO/RRO, GRO, BTEX, and PAHs), PCBs, and the 8 RCRA metals plus nickel, vanadium, and zinc.

Information Concerning Environmental Indicators (Source-Receptor Interaction)

Human receptors are expected to include site visitors, seasonal subsistence users, and future permanent residents. Several potential exposure scenarios were identified in the conceptual site model in the 2009 Decision Document (USACE):

- Incidental ingestion of soil/sediment

- Dermal contact with soil/sediment/surface water
- Inhalation of dust from soil or VOCs from groundwater
- Ingestion of surface water or groundwater
- Consumption of subsistence food items

The potential affected biological resources evaluated included vegetation, birds, fish, shellfish, terrestrial mammals, marine mammals, and special status species. The ecological risk evaluation focused on three selected indicator receptors, the tundra vole, cross fox, and glaucous-winged gull.

PROJECT DECISION CONDITIONS ("IF..., THEN..." STATEMENTS):

If the analytical results for the confirmation samples from the MOC and Sites 13 and 31 are below the evaluation criteria, and the data are found to be usable, the USACE may issue a finding of No DoD [U.S. Department of Defense] Action Indicated (NDAI) for a given site.

If the 2012 characterization activities indicate that contamination remains above the evaluation criteria in a given project area, and the data are found to be usable, then the USACE will develop a remedial plan to discuss further remedial activities that need to be completed to bring a site to closure.

If the analytical results for Site 8 and the MOC groundwater wells indicate that natural attenuation is occurring at a rate that is determined to be acceptable by ADEC and the project team, then natural attenuation may be the prescribed remedy for achieving cleanup goals for impacted soil and groundwater at Site 8. The attenuation study has only been documented for two seasons, so no rate trend has been established yet. Preliminary results suggest a reduction in COCs, with minor exceptions.

If sediment analytical results are above evaluation criteria for the Site 28 Drainage Basin and the results are found to be usable data, a Phase I sediment removal action will be conducted to test effective strategies for sediment removal from Site 28. Before the Phase I sediment removal action takes place, the project team will discuss and evaluate potential strategies for the sediment removal to determine the best approach. Bristol will proceed with the Phase I removal actions as recommended by the project team once a consensus has been reached. The results from the Phase I contaminated sediment removal will be used to develop a future Site 28 remedial plan.

QAPP WORKSHEET #11
PROJECT QUALITY OBJECTIVES / SYSTEMATIC PLANNING PROCESS STATEMENTS

An integral part of a UFP-QAPP is the formulation of the project quality objectives (PQOs). The PQOs incorporate the elements of an EPA data quality objective (DQO) process, which in turn consists of a series of seven planning steps that are designated to ensure that the type, quantity, and quality of the environmental data used in the decision making are appropriate for their intended application. The DQO process is outlined in the EPA guidance document entitled *"Guidance on Systematic Planning Using the Data Quality Objectives Process"* (EPA, 2006).

The PQOs for this site are defined by covering the following elements: (1) who will use the data, (2) what will the data be used for, (3) what types of data are needed, (4) matrix, (5) how '"good" the data need to be in order to support the environmental decision, (6) how much data are needed, (7) where, when, and how should the data be collected/generated, (8) who will collect and generate the data, (9) how will the data be reported, and (10) how will the data be archived.

The specific QA/QC requirements developed for NE Cape are consistent with those presented in the DoD Quality Systems Manual (QSM), Version 4.2 (DoD, 2010).

WHO WILL USE THE DATA?

The data will be used by the USACE, the ADEC, the landowners, Kukulget Inc. in Savoonga, Alaska, and Sivuqaq, Inc., in Gambell, Alaska, and other stakeholders.

WHAT WILL THE DATA BE USED FOR?

The data will be used to do the following:

- Determine whether the remediation goals have been met at excavated areas at Site 13, Site 21, Site 31, and the MOC
- Determine whether the MOC excavation is impacting nearby surface water
- Evaluate MNA at Site 8 and MOC groundwater

- Characterize sediment at the site and aid in the excavation and disposal of contaminated sediment in the Site 28 drainage basin
- Characterize drum liquid and POL-contaminated soils for proper disposal
- Determine whether the bulk bag staging areas have been impacted from storing contaminated soil at those areas
- Determine whether contamination is present at the top of the mountain along the radar dome road

WHAT TYPES OF DATA ARE NEEDED? (target analytes, analytical groups, field screening, on-site analytical or off-site laboratory techniques, sampling techniques)

The planning team consists of USACE, ADEC, and Bristol. Professional disciplines include project managers (PMs), engineers, hydrogeologists, geologists, chemists, risk assessors, and scientists who determined the data needs for each of the HTRW project areas. Tables 11-1 (soil) and 11-2 (water) summarize the matrices, estimated number of confirmation samples, and analyses for the individual sites at NE Cape. Tables 15-1 and 15-2 summarize specific analytes, empirical reporting limits (detection limit [DL], limit of detection [LOD], limit of quantitation [LOQ]), and site-specific cleanup levels. The tables do not address the number of samples that will be submitted to the field-screening laboratory. Discrete samples for DRO from the MOC will be submitted to the field-screening laboratory, and results will be used to direct the removal action at the MOC. Field-screening laboratory results will not be used to confirm that site cleanup goals have been achieved. Discrete samples for PCBs from Site 13 and Site 31 will be submitted to the field-screening laboratory to support excavation activities. Field-screening results will be used to direct the removal actions at these sites. Confirmation samples submitted to the fixed laboratory for PCB analysis will be composited as described in this worksheet in the “How” subsection of “Where, When, and How Should the Data be Collected/Generated?” (page 58). The same sample collection criteria are used for the field laboratory samples and confirmation samples for consistency. The field-screening laboratory is not certified, but does employ similar extraction and analytical techniques as the certified confirmation laboratory (TestAmerica).

Field-screening and confirmation samples will be collected in accordance with ADEC Draft Field Sampling Guidance (ADEC, 2010) and Bristol SOPs (listed in Worksheet #21 and fully presented in Attachment 1). Site-specific sampling programs are described in the latter sections of this worksheet.

The goal of the HTRW RAs is to implement selected remedies for the NE Cape site, as detailed in the Final Decision Document for the NE Cape HTRW Project (USACE, 2009).

MATRICES

The matrices for samples collected at NE Cape are soil (surface and subsurface), sediment, and water (surface water and groundwater). Concrete may be sampled with PCB wipes at Site 13 and Site 31. Liquids from drums may be sampled for waste characterization purposes.

HOW "GOOD" DO THE DATA NEED TO BE IN ORDER TO SUPPORT THE ENVIRONMENTAL DECISION?

Laboratory analytical data must be determined to be of usable quality for regulatory purposes. The LOQs must be at or below evaluation criteria. Tables 15-1 (soil) and 15-2 (water) list the compounds of concern, site-specific cleanup levels and empirical DLs, LODs, and LOQs. No compounds have empirical LOQs above site-specific cleanup levels.

Analytical methods were selected during the planning process to ensure that the LOQs for the various analytes are adequate to make decisions in the HTRW RA or additional site characterization. Field instrumentation will be selected to cover the range of variation for the parameters being measured (refer to Worksheet #22). Additional detail on sampling methods, analyses, and equipment is provided in subsequent QAPP worksheets.

All soil and groundwater results will be compared to site-specific cleanup levels for the NE Cape project specified in the Decision Document, HTRW, Project #F10AK096903_05.09_0500_a 200_1e, NE Cape FUDS, St Lawrence Island, Alaska (USACE, 2009). COCs not listed in the 2009 Decision Document will be compared to ADEC cleanup criteria in 18 AAC 75.341, Table B1 and Table C. All confirmation sample results will be compared to the performance measurement criteria shown in Tables 15-1 and 15-2 to determine usability. The RA data must be suitable for making a determination if further removal action is necessary or to demonstrate that cleanup goals have been achieved to ensure site closure. Third-party data verification will be performed by AECOM on all data packages generated by the confirmation laboratory.

HOW MUCH DATA ARE NEEDED? (Number of samples for each analytical group, matrix, and concentration.)

Tables 11-1 and 11-2 list the estimated number of confirmation samples for each matrix and the analytical suites for which the samples will be analyzed. The tables list the various sites and appropriate analyses for each site. The actual number of confirmation samples collected and analyzed will be based on the size of the excavations at removal action sites. Excavation and stockpile sample quantities will be consistent with the ADEC *Draft Field Sampling Guidance* (ADEC, 2010). Sites 8 and 28 have specific sampling rationales based on the intended use of the results. Site 8 characterization addresses efficacy of natural attenuation of PCS, and the Site 28 characterization will be used to determine the extent and magnitude of possible contamination. Tables 15-1 and 15-2 contain specific analytes, their analytical sensitivity levels, and site-specific cleanup criteria.

WHERE, WHEN, AND HOW SHOULD THE DATA BE COLLECTED / GENERATED?

Where:

Sampling data will be collected from Sites 8, 13, 21, 28, 31, the MOC, the bulk bag staging areas, and the radar dome road. If the contract option is exercised, samples may be collected at the present-day refueling area. Sampling details in these areas are outlined below.

<u>Site 8 Surface Water and Soil Sampling Locations:</u> The Pipeline Break Site is located southwest of the intersection of Cargo Beach Road and the Airport Access Road. A fuel pipeline extended from the pump house at Cargo Beach to the bulk storage tanks at the MOC. A reported break in the pipeline was located on the west side of the main road embankment and north of the Suqitughneq River. The fuel pipeline was drained and removed in 2000.

The site is a wetland with thick surface vegetation, typical of locations along roads and the airstrip where the tundra mat was removed before construction. The wetland slopes southward toward the Suqitughneq River. The wetland narrows as it approaches the river and a spring of flowing water is present. The wetland consists of dense, grassy vegetation and roots with little soil or peat development. This vegetation does not appear stressed, though petroleum odor is evident when a person walks across the vegetative mat. Previous sampling events indicate DRO remains in the soil above cleanup levels.

In 2010, Bristol developed and implemented a Sampling and Analysis Plan (SAP) to monitor natural attenuation parameters and collect surface water samples where the wetland empties into the Suqitughneq River. In 2010 and 2011, Bristol divided the wetland area into three DUs (upper, middle and lower), with each unit measuring approximately 100 feet long by 40 feet wide, oriented roughly southwest to northeast. Each DU was divided into 40 grids, from which eight grids were randomly selected for MNA field parameters in the surface water and soil sample collection. Eight soil samples were field composited into one laboratory sample for each DU. In 2012, Bristol will continue to monitor natural attenuation of soil and surface water at Site 8. Bristol will use the same DUs that were established in 2011 (Figure 11 in Work Plan). The same sample rationale will be used in 2012 to evaluate the efficacy of MNA as a remedial approach. Two additional surface water samples will be collected at Site 8 from an area where a small spring creates a stream that flows into the Suqitughneq River. Surface water samples were collected at the same location, but contaminants were not detected in 2011.

<u>MOC Subsurface Soil, Groundwater, and Surface Water Sampling Locations</u>: The MOC once provided the majority of the site infrastructure, including central housing, administrative buildings, power generation sites, fuel storage tanks, and maintenance areas for the entire NE Cape facility (see Figures 4 through 6 and Figure 12 of the Work Plan). Multiple sites, including Sites 10, 11, 13, 15, 19, and 27 comprise the MOC. The primary COCs in shallow groundwater at the MOC are gasoline range organics, DRO, RRO, benzene, and naphthalene. According to the USACE, the affected area comprises approximately 175,000 square feet. Nine monitoring wells were sampled at the MOC in 2010 and 2011. In 2012, the same monitoring wells will be sampled for COCs and MNA parameters. Also in 2012, PCS will be removed at the MOC and confirmation samples will be sent to the fixed-based analytical laboratory to confirm that the various areas within the MOC have been cleaned up to the site-specific cleanup level of 9,200 mg/kg DRO. Surface water samples will also be collected from three locations pre-, during, and post-excavation at the MOC. The samples will be collected at locations near the MOC and all samples will be analyzed for DRO/RRO. The locations will be the Western Drainage, the pond where soil sample 11NC28SS003 was collected in 2011, and the first pond north of the Eastern Drainage. The surface water samples collected from the Western Drainage will be from a location upgradient of activities associated with the Site 28 Phase I Sediment Removal. Water samples may be collected from lined POL stockpiles if soils are wet or rainwater is present. Samples will be collected after treatment and analyzed for BTEX and PAHs to ensure they meet surface water discharge criteria.

During 2011, approximately 10 drums were exposed between MOC Excavation Area J1A and MOC Site 10. One of the drums was punctured when it was being unearthed and water mixed with POL liquid seeped out. The exposed drums and drum liquid were removed and disposed of. In 2012, a metal detector will be used to identify and mark drum locations at Site 10 adjacent to J1A and the drums will be selectively removed. Following drum, drum liquid, and POL-stained soil excavation, confirmatory soil samples will be collected and analyzed for GRO, BTEX, DRO, RRO, PAHs, PCBs, and the 8 RCRA metals, plus nickel, vanadium, and zinc. Clean backfill will be placed in the excavation to make it level with the surrounding topography and to avoid ponding. The recontoured area will be revegetated.

PCB-contaminated soils will also be removed at Site 13 in 2012. Further discussion of Site 13 is presented below.

<u>Site 21 Subsurface Soil Sampling Locations:</u> Site 21 included the wastewater treatment system for the main housing and operations complex. Located west of the perimeter road, the site consisted of a concrete septic settling tank, which discharged via an 8-inch insulated cast-iron pipe to the wetland area approximately 450 feet west. The septic tank compartments were cleaned and decommissioned, along with the utilidor corridor, which extended from the main complex to the septic tank, and the wooden utilidor outfall line, during the 2003 RA.

Following the 2003 RA, confirmation soil samples were collected and analyzed for PCBs. In 2003, PCBs were detected above cleanup levels in one location situated directly beneath the outfall piping, adjacent to the septic tank; 10.4 tons of PCB-contaminated soils were excavated from Site 21 in 2010. Another location at Site 21 that was excavated in 2010 contains an unusually high concentration of arsenic (170 mg/kg). In 2011, 16.7 tons of arsenic-contaminated soil was removed. Sample results from background samples collected in 2011 indicated that the arsenic at Site 21 is not naturally occurring. Arsenic-contaminated soil will be removed in 2012 at locations where confirmation samples collected in 2011 indicated that arsenic concentrations remained above cleanup levels (see Figure 9 of the Work Plan). Up to 100 tons of soil will be removed, and the excavation will be sampled to determine whether arsenic concentrations still exceed site cleanup levels. Floor confirmation samples will be collected in the Site 21 excavation area. Backfilling of Site 21 will be delayed until the 2012 confirmation samples have been summarized and evaluated.

One surface water sample (plus a duplicate and an MS/MSD) will be collected from the Site 21 excavation and analyzed for total and dissolved arsenic.

Site 28 Sediment Mapping and Sampling to Fill Data Gaps: Site 28 lies north of the MOC and flows north into the Suqitughneq River. This site has been impacted by fuel releases from the bulk fuel storage tanks and other possible releases from floor drains originating in maintenance and operations buildings at the MOC. Surface water run-off and subsurface water seeps from the MOC gravel pad drain into the tundra and wetland area. Three drainages originate from the MOC gravel pad and contribute flow to Site 28 (Figure 10 in Work Plan).

Sampling activities have occurred at the drainage basin between 1994 and 2001. The primary COCs in sediments are chromium, lead, zinc, PCBs, PAHs, DRO, and RRO. The highest concentrations of contaminants are located proximal to the edge of the MOC immediately below two culverts that were removed in 2010, which are located in the middle and western drainages. The highest concentrations of most COCs are located within this zone according the 2009 Decision Document (USACE, 2009).

Surface water samples were collected in the drainage basin in 1994, 1996, and 2001. Concentrations of DRO, TPH, PCBs, and lead were elevated in 1994 surface water samples. Sampling events performed in 2001 indicated elevated concentrations of DRO ranging from 0.39 to 2.3 mg/L, but PCB and RRO concentrations were not elevated.

In 2010, the manhole was cleaned and removed, and 91 feet of culvert was removed and capped at Site 28 by Bristol. The extent and magnitude of sediment/soil contamination was delineated in 2011 through the collection of sediment and soil samples along transects and at discrete locations throughout the basin. In 2012, further delineation of the extent and magnitude of contamination at Site 28 shall be accomplished through both review of existing data and collection of additional data. Areas of sediment shall be mapped in Site 28 from MOC to the Suqitughneq River. Mapping will begin at the Suqitughneq River and progress upstream to the MOC and will include interconnected channels and ponds as shown on Figure 17 of the Draft Revision 1 Site 28 Technical Memorandum dated February 2012. Mapping and surveying work at Site 28 shall include: 1) the extent of sediment, 2) the extent of vegetative mat in areas where sediment is present, and 3) the extent and depth of water to the nearest 0.1 foot where sediment is present.

All streams and ponds in the drainage basin will be visually surveyed 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 to determine the thickness of the sediment and the composition of the underlying material. Auger probing will be conducted every 30 linear feet along the stream channel and in 30-foot grids along ponds where sediment is visible. An underwater camera may be used to gather additional data in conjunction with the auger probing. Observations will be recorded in a field book or on field forms.

After the site has been mapped, sediment samples will be collected from the streams and ponds and analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals plus nickel, vanadium, and zinc. Sediment analysis will also include silica gel cleanup and

TOC as described in ADEC Technical Memorandum 06-001 (ADEC, 2006). Samples will be collected from sediment-laden stream channels at approximately 50-foot intervals. If a sediment-containing section of stream is less than 50 feet, then one sample will be collected from the section. The total number of samples collected from streams will not exceed 24 samples. Three sediment samples will be collected from each of 10 ponds for a total not to exceed 30 samples. Sample densities and locations may be adjusted following the sediment mapping effort, as dictated by the presence or absence of sediment at Site 28. Samples will be concentrated in sediment-dominated areas in the vicinity of historically contaminated locations. All sample locations will be surveyed by the on-site survey crew, along with sediment extents and relative vegetative cover.

<u>Site 28 Phase I Sediment Removal:</u> Following the sediment mapping and sampling effort at the Site 28 Drainage Basin, a Phase I contaminated sediment removal operation will be performed. Results from the sediment mapping and characterization efforts will be discussed and evaluated with the on-site QAR, USACE personnel, and ADEC personnel, in order to determine the best approach for a mechanical removal of sediment at the Site 28 drainage basin. ADEC will submit further comments after the requested Site 28 Mapping Results Technical Memorandum has been received. The Phase I sediment removal is initially planned to be performed in two areas identified from the 2011 Site 28 characterization results: the stream channel where Transect-7 was established and the pond where soil sample 11NC28SS036 was collected. The Phase I sediment removal location may change based on the results of the 2012 sediment mapping effort.

The sediment removal will consist of a vacuum hose attached to pumps, and tubing and piping that will direct the sediment to a dewatering site at the MOC. Sediment will be dewatered in Geotubes prior to off-site transport and disposal, and water produced during sediment removal and dewatering shall be captured, treated, and disposed of on site.

Pre- and post-treatment water samples will be collected. The Phase I Sediment Removal will assess at least two methods for accessing contaminated sediment in Site 28, removing and dewatering contaminated sediment from Site 28, and controlling and minimizing downstream suspended sediment migration during sediment removal.

Once dewatered, two representative sediment samples will be collected and submitted to a geotechnical laboratory (DOWL HKM) for moisture content and density; one of these will also be submitted for sieve–test (gradation) analysis. Four representative samples will be collected for waste characterization purposes and submitted to TestAmerica for analysis of BTEX, GRO, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) plus nickel, vanadium, and zinc. Analyses will also include silica gel cleanup and TOC.

Surface water samples will be collected at three locations before, during, and after the sediment removal process. Sample locations will be downstream of the sediment removal operations. Surface water sample will be analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals plus nickel, vanadium, and zinc. Surface water samples will also be analyzed for field turbidity.

If the option is awarded, up to 30 confirmation soil samples may be collected following the Phase I sediment removal action and submitted to TestAmerica for analysis of BTEX, GRO, DRO/RRO, and PAHs, PCBs, and the 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) plus nickel, vanadium, and zinc. Analyses will also include silica gel cleanup and TOC.

<u>Site 13 Subsurface Soil Sampling Locations</u>: Site 13, located in the MOC, consisted of the Heat and Electrical Power Building (Building 110). Several tanks, diesel generators, and power transformers were formerly located at this site. An estimated 2,420 tons of PCB-contaminated soil was excavated from Site 13 in 2011.

The PCB soil concentrations are elevated at various spots surrounding Building 110 and the transformer pads. In 2012, additional PCB-contaminated soils will be excavated and PCS may be removed from Site 13. The excavation at this site may encroach into the POL Plumes A2, B1, and B2. In the event that this occurs, PCBs will be the driving COC when excavations and off-site disposal of soil contaminated with POL and PCBs are conducted. Groundwater has not been encountered in the excavation at Site 13.

<u>Site 31 Subsurface Soil Sampling Locations:</u> Site 31 is located uphill from the MOC, south towards a valley at the base of Mt. Kangukhsam. The site formerly contained four large antennae, a central main electronics building, supporting structures, and seven ASTs, all of which were demolished and removed during the 2003 removal action.

A total of 118 tons of PCB-contaminated soil was excavated south and west of the former main electronics building, adjacent to a former transformer pad, and at the septic tank outfall during the 2005 field season. Seventy-nine tons of PCB-contaminated concrete were also removed from portions of the Building 1001 foundation.

Soil samples have been collected to analyze for petroleum hydrocarbons and PCBs associated with the site. Three previously identified PCB-contaminated areas were excavated in 2005. Confirmation samples collected in 2011 indicated that PCB concentrations remain above cleanup levels in one of the three areas located adjacent to the former transformer pad. Approximately 1,418 tons of PCB-contaminated soil was excavated from Site 31 in 2011. In 2012, additional PCB-contaminated soils will be removed to reach cleanup objectives (1.0 mg/kg PCBs) (see Figure 8 in the Work Plan). Groundwater has not been encountered in the excavation at Site 31.

<u>Site 13 and 31 PCB Wipe Sampling Locations</u>: If concrete in contact with PCB-contaminated soil is encountered in the Site 13 and Site 31 excavations, wipe samples will be collected from the concrete. Wipe samples will be analyzed by the field laboratory,

with 10 percent of the samples sent to the fixed laboratory for verification of the field laboratory results. Bristol will collect PCB wipe samples if PCB-contaminated soil is encountered directly adjacent to concrete that has not already been tested. Bristol will collect wipe samples in accordance with the procedures provided in Attachment 5 (EPA, 1987).

Bulk Bag Staging Areas Pre-and Post-Use MI Soil Sampling: Soil samples will be collected from each bulk bag staging area used for temporary storage of bagged contaminated soil. Cargo Beach, Site 6, and three areas at the MOC (one location south of the fuel containment area at the Site 26 former construction camp, one directly northeast of the present-day ISO fuel tank containment area, and the primary MOC bulk bag staging area located north of the ISO tanks directly across Cargo Beach Road) have been used for staging bulk bags in the past. Because of demobilization logistics, it is only feasible to collect pre-use soil samples at Cargo Beach. Other areas may not be accessible due to ongoing bulk soil storage; sampling will be conducted when possible. Samples will be analyzed for both DRO and PCBs. The bulk bag staging areas are shown on Figure 3 in the Work Plan.

Radar Dome Road Soil Sampling: Sampling will be conducted at the Radar Dome Road per the concerns expressed by community members during the December 2011 dialogue meeting. Six discrete soil samples will be collected at the top of Kangukhsam Mountain in areas of stressed or absent vegetation within 50 feet of the Radar Dome road centerline and at least 50 feet apart with paired samples from either side of the road. Digital photographs will be taken of each sample location. Samples will be submitted to TestAmerica and analyzed for BTEX, GRO, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) plus nickel, vanadium, and zinc.

When:

Confirmation samples at Sites 13, 31, and the MOC excavations will be collected after field-screening results indicate that excavations meet the project cleanup goals. Surface water samples will be collected before, during, and after excavation activities are performed at the MOC. MOC surface water sample collection frequency may be increased if increased turbidity or effluent is noted in the wetlands due to the MOC excavation activities. Samples of treated water from the MOC impoundment will be collected prior to discharge. Confirmation samples, including floor samples collected 2 feet below the water table, will be collected at Site 21 following excavation of contaminated soil to confirm that project cleanup goals have been met. Also, one surface water sample will be collected at Site 21 and analyzed for total and dissolved arsenic. The Site 8 samples and the MOC groundwater samples will be collected once during the 2012 summer field season. The MOC wells will be sampled prior to excavation activities at the MOC, which may impact MNA evaluations. Sediment samples will be collected at Site 28 near the beginning of the 2012 field season. A Phase I contaminated sediment removal action will occur after the Site 28 sediment analytical results have been reviewed. Samples that will be collected during the Site 28 Phase I removal action include: surface water samples from three locations before, during, and after the sediment removal effort; dewatered sediment samples from Geotubes; and water samples from the primary and secondary dewatering impoundments. Waste characterization samples will be collected at Site 10 from any POL liquids in drums.

MI samples will be collected at the bulk bag staging areas as follows: Cargo Beach will be sampled early during the project while the beach is free of equipment, containers, and bulk bags. Since the remaining sites are currently being used as staging areas, they will be sampled as soon as possible when the site becomes free of bulk bags. Post-use MI samples will be collected at Site 6 and the areas associated with the MOC at the end of the project when all bulk bags have been removed from those locations. Since no remedial activities are taking place along the radar dome road, soil samples will be collected as time permits during the 2012 field season.

How:

The sampling design detailed in the Scope of Work was selected as a result of the Decision Document (USACE, 2009) to meet cleanup objectives. Table 11-1 summarizes the soil sampling program at NE Cape, and Table 11-2 presents the sampling design for aqueous samples. The tables include the following information: sample media, sample IDs, estimated quantity of samples to be collected, empirical sample IDs, sampling techniques and tools, analytical suites, QC samples, and sampling rationale. Additional detail on sample collection is provided in Worksheet #17.

Further details on the sampling for each medium are outlined on page 81, under the heading POL and PCB Confirmation Samples.

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Table 11-1 – Soil and Sediment Field Sampling Program NE Cape

										Analytical Suite														
Sample Location	Total Depth (ft bgs)	Point ID (Location ID)	Sample ID (the last digits identify the chronological order of collection)	Matrix	Sample Type	Sampling Method/ Tool	Sampling Frequency	Sample Depth (ft bgs)	Expected Concentration Level	BTEX - 8260B	GRO - AK101	DRO - AK102	DRO/RRO - AK102/AK103	DRO/RRO SG - AK102/AK103	PAHs - 8270C	PCBs - 8082A	[1]Metals 11 - 6020A/7471B	Arsenic - 6020A	TOC - 9060	Moisture Content	Density	Gradation - Sieve	Sampling Rationale	Contractor Field SOP
Site 8																								
Three Decision Units, UDU, MDU and LDU (see Figure 15 of the work plan)	0.5	UDU-1, MDU-1 and LDU-1	12NC08SS01	Soil	Composite	T-handled sampler, stainless bowl for compositing	Once	0.5	Low	0	0	0	3	3	3	0	0	0	3	0	0	0	Decision unit boundaries were established in 2010. Each DU will select 8 grids within the DU. Samples will only be collected from grids with surface water present. The 8-grid sediment samples for each DU will be composited. See Table 15-2 for water analyses at the grid locations.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
Site 8 Field QC Samples																								
Field Duplicates	0.5	Same as parent sample	12NC08SS04 or other unique ID.	Soil	QC	T-handled sampler, stainless bowl for compositing	One duplicate per 10 primary samples	Same as parent sample	Low	0	0	0	1	1	1	0	0	0	1	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	0.5	Same as parent sample	Same as parent sample	Soil	QC	T-handled sampler, stainless bowl for compositing	One set per extraction batch	Same as parent sample	Low	0	0	0	1	1	1	0	0	0	1	0	0	0	QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Site 8 Total Sediment QC Samples										**0**	**0**	**0**	**3**	**3**	**3**	**0**	**0**	**0**	**3**	**0**	**0**	**0**		
Site 8 Total Sediment Samples										**0**	**0**	**0**	**6**	**6**	**6**	**0**	**0**	**0**	**6**	**0**	**0**	**0**		
MOC																								
Floor and sidewalls of excavation area(s) (See Figure 9 of the work plan)	Variable	MOC-[Excavation Area]-# (Loc IDs will chronologically increase in the order collected unless resampling is necessary)	12NCMOCSS001	Soil	Grab	Disposable stainless spoon	Floor: two samples for first 250 square feet, one for each additional 250 square feet. Sidewalls: one sample for every 20 linear feet	Confirmation samples can be collected from the floor and sidewalls of the excavation	Low to Medium	0	0	0	71	0	0	0	0	0	0	0	0	0	Field screening will indicate when cleanup goals have potentially been achieved. Confirmation samples will be collected from the floor and sidewalls if the excavation can be safely entered. If excavation depths are deemed unsafe for entry then samples will be collected from the center of an excavator bucket. The number of samples shown in this table assumes an approximate quantity of 2,000 tons of contaminated soil removed.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
MOC Field QC Samples																								
Field Duplicates	Same as parent sample	Same as parent sample	11NCMOCSS###	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One duplicate per 10 primary samples	Same as parent sample	Low	0	0	0	8	0	0	0	0	0	0	0	0	0	Field QC	Same as parent sample
MS/MSDs for Grab Samples	Same as parent sample	Same as parent sample	Same as parent sample	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One set per extraction batch	Same as parent sample	Low	0	0	0	6	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
MOC Total Soil QC Samples										**0**	**0**	**0**	**20**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
MOC Total Soil Samples										**0**	**0**	**0**	**91**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Site 13																								
Floor and sidewalls of excavation area (See Figure 4 of the work plan)	Variable	013-# (Loc IDs will chronologically increase in the order collected unless resampling is necessary)	12NC13SS001	Soil	Composite	Disposable stainless spoon	Once	Up to 9 contiguous grab samples may be collected from the floor or sidewalls of the excavation and composited at the laboratory	Low	0	0	0	0	0	0	606	0	0	0	0	0	0	Field screening will indicate when cleanup goals have potentially been achieved. Confirmation samples will be collected from the floor and sidewalls if the excavation can be safely entered. If excavation depths are deemed unsafe for entry, then samples will be collected from the center of an excavator bucket that will be used to collect soil samples. The number of samples shown in this table assumes an approximate quantity of 2,600 tons of contaminated soil removed, split between Site 13 and Site 31.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
Site 13 Field QC Samples																								
Field Duplicates	Same as parent sample	Same as parent sample	12NC13SS###	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One duplicate per 10 primary samples	Same as parent sample	Low	0	0	0	0	0	0	63	0	0	0	0	0	0	Field QC duplicate samples will be collected from the same grids as the parent sample and submitted in similar fashion after homogenizing in a stainless bowl. The laboratory will composite the duplicate sample if necessary.	Same as parent sample
MS/MSDs for Grab Samples	Same as parent sample	Same as parent sample	Same as parent sample	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One set per extraction batch	Same as parent sample	Low	0	0	0	0	0	0	46	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Site 13 Total Soil QC Samples										**0**	**0**	**0**	**0**	**0**	**0**	**155**	**0**	**0**	**0**	**0**	**0**	**0**		
Site 13 Total Soil Samples										**0**	**0**	**0**	**0**	**0**	**0**	**761**	**0**	**0**	**0**	**0**	**0**	**0**		

Table 11-1 – Soil and Sediment Field Sampling Program NE Cape (continued)

										Analytical Suite														
Sample Location	Total Depth (ft bgs)	Point ID (Location ID)	Sample ID (the last digits identify the chronological order of collection)	Matrix	Sample Type	Sampling Method/ Tool	Sampling Frequency	Sample Depth (ft bgs)	Expected Concentration Level	BTEX - 8260B	GRO - AK101	DRO - AK102	DRO/RRO - AK102/AK103	DRO/RRO SG - AK102/AK103	PAHs - 8270C	PCBs - 8082A	[1]Metals 11 - 6020A/7471B	Arsenic - 6020A	TOC - 9060	Moisture Content	Density	Gradation - Sieve	Sampling Rationale	Contractor Field SOP
Site 31																								
Floor and sidewalls of excavation area (See Figure 5 of the work plan)	Variable	031-# (Loc IDs will chronologically increase in the order collected unless resampling is necessary)	12NC31SS001	Soil	Grab	Disposable stainless spoon	Once	Up to 9 contiguous grab samples may be collected from the floor or sidewalls of the excavation and composited at the laboratory	Low	0	0	0	0	0	0	606	0	0	0	0	0	0	Field screening will indicate when cleanup goals have potentially been achieved. Confirmation samples will be collected from the floor and sidewalls if the excavation can be safely entered. If excavation depths are deemed unsafe for entry then samples will be collected from the center of an excavator bucket that will be used to collect soil samples. The number of samples shown in this table assumes an approximate quantity of 2,600 tons of contaminated soil removed, split between Site 13 and Site 31.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
Site 31 Field QC Samples																								
Field Duplicates	Same as parent sample	Same as parent sample	12NC31SS###	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One duplicate per 10 primary samples	Same as parent sample	Low	0	0	0	0	0	0	63	0	0	0	0	0	0	Field QC duplicate samples will be collected from the same grids as the parent sample and submitted in similar fashion. The laboratory will composite the duplicate sample.	Same as parent sample
MS/MSDs for Grab Samples	Same as parent sample	Same as parent sample	Same as parent sample	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One set per extraction batch	Same as parent sample	Low	0	0	0	0	0	0	45	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Site 31 Total Soil QC Samples										0	0	0	0	0	0	153	0	0	0	0	0	0		
Site 31 Total Soil Samples										0	0	0	0	0	0	759	0	0	0	0	0	0		
Site 21																								
Floor and sidewalls of excavation area (See Figure 10 of the work plan)	Variable	021-# (Loc IDs will chronologically increase in the order collected unless resampling is necessary)	12NC21SS001	Soil	Grab	Disposable stainless spoon	Floor: two samples for first 250 square feet, one for each additional 250 square feet. Sidewalls: one sample for every 20 linear feet	Confirmation samples can be collected from the floor and sidewalls of the excavation	Low	0	0	0	0	0	0	0	0	109	0	0	0	0	There is no field screening for arsenic in soil. Confirmation samples will be collected from the floor and sidewalls if the excavation can be entered safely. If excavation depths are deemed unsafe for entry, then samples will be collected from the center of an excavator bucket that will collect the samples. The number of samples shown in this table assumes an approximate quantity of 100 tons of contaminated soil removed.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
Site 21 Field QC Samples																								
Field Duplicates	Same as parent sample	Same as parent sample	12NC21SS###	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One duplicate per 10 primary samples	Same as parent sample	Low	0	0	0	0	0	0	0	0	14	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	Same as parent sample	Same as parent sample	Same as parent sample	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One set per extraction batch	Same as parent sample	Low	0	0	0	0	0	0	0	0	7	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Site 21 Total Soil QC Samples										0	0	0	0	0	0	0	0	28	0	0	0	0		
Site 21 Total Soil Samples										0	0	0	0	0	0	0	0	137	0	0	0	0		
Site 28																								
Streams and ponded areas throughout Site 28	0.5	028-# (Loc IDs will chronologically increase in the order collected unless resampling is necessary)	12NC28SD01	Sediment	Grab	T-handled sampler, shovel, disposable stainless spoon	Once	0.5	Low to Medium	54	54	0	54	54	54	54	54	0	54	0	0	0	Samples will be collected from active channels and ponded areas throughout Site 28 where sediment is present (as delineated during the sediment mapping effort). Samples will be collected at an approximate depth of 0.5 feet bgs. The purpose of the sampling is to further delineate the extent and concentration of possible contaminants of concern at the site.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
Site 28 Field QC Samples																								
Field Duplicates	Same as parent sample	Same as parent sample	12NC28SD##	Sediment	QC	T-handled sampler, shovel, disposable stainless spoon, bowl for mixing and splitting sample (except volatiles)	One duplicate per 10 primary samples	Same as parent sample	Low to Medium	6	6	0	6	6	6	6	6	0	6	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	Same as parent sample	Same as parent sample	Same as parent sample	Sediment	QC	T-handled sampler, shovel, disposable stainless spoon, bowl for mixing and splitting sample (except volatiles)	One set per extraction batch	Same as parent sample	Low to Medium	6	6	0	6	6	6	6	6	0	6	0	0	0	QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Trip Blanks	NA	NA	12NC[sample shipment date]TripBlank# (for example, 12NC072312TripBlank1)	Water	QC	NA	1 per cooler with VOCs	NA	Low	4	4	0	0	0	0	0	0	0	0	0	0	0	Trip blanks will accompany all sample shipments and will be placed in coolers containing GRO and BTEX samples.	NA
Site 28 Total Sediment QC Samples										22	22	0	18	18	18	18	18	0	18	0	0	0		
Site 28 Total Sediment Samples										76	76	0	72	72	72	72	72	0	72	0	0	0		

Table 11-1 – Soil and Sediment Field Sampling Program NE Cape (continued)

Sample Location	Total Depth (ft bgs)	Point ID (Location ID)	Sample ID (the last digits identify the chronological order of collection)	Matrix	Sample Type	Sampling Method/ Tool	Sampling Frequency	Sample Depth (ft bgs)	Expected Concentration Level	Analytical Suite: BTEX - 8260B	GRO - AK101	DRO - AK102	DRO/RRO - AK102/AK103	DRO/RRO SG - AK102/AK103	PAHs - 8270C	PCBs - 8082A	[1]Metals-11 - 6020A/7471B	Arsenic - 6020A	TOC - 9060	Moisture Content	Density	Gradation - Sieve	Sampling Rationale	Contractor Field SOP
Site 28 Phase I Sediment Removal - Waste Characterization Samples																								
Dewatered sediment in Geotubes	NA	NA	12NC28WCSD01	Sediment	Grab	Disposable stainless spoon, brass sleeves, Ziploc bags	Once	NA	Low to Medium	4	4	0	4	4	4	4	4	0	4	2	2	1	Samples will be collected from the dewatered sediment for determination of geotechnical properties and waste characterization purposes.	BERS-03, BERS-05, BERS-11
Site 28 Waste Characterization Field QC Samples																								
Field Duplicates	Same as parent sample	NA	12NC28WCSD##	Sediment	QC	Disposable stainless spoon, brass sleeves, Ziploc bags	One duplicate per 10 primary samples	NA	Low to Medium	1	1	0	1	1	1	1	1	0	1	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	Same as parent sample	NA	Same as parent sample	Sediment	QC	Disposable stainless spoon, brass sleeves, Ziploc bags	One set per extraction batch	NA	Low to Medium	1	1	0	1	1	1	1	1	0	1	0	0	0	QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Trip Blanks	NA	NA	12NC[sample shipment date]TripBlank# (for example, 12NC090512TripBlank1)	Water	QC	NA	1 per cooler with VOCs	NA	Low	1	1	0	0	0	0	0	0	0	0	0	0	0	Trip blanks will accompany all sample shipments and will be placed in coolers containing GRO and BTEX samples.	NA
Site 28 Waste Characterization Total Sediment QC Samples										**4**	**4**	**0**	**3**	**3**	**3**	**3**	**3**	**0**	**3**	**0**	**0**	**0**		
Site 28 Waste Characterization Total Sediment Samples										**8**	**8**	**0**	**7**	**7**	**7**	**7**	**7**	**0**	**7**	**2**	**2**	**1**		
Site 10 Drum Excavation																								
Floor of MOC excavation area (Site 10)	Variable	10-# (Loc IDs will chronologically increase in the order collected unless resampling is necessary)	12NC10SS01	Soil	Grab	Disposable stainless spoon	Floor: two samples for first 250 square feet, one for each additional 250 square feet.	Confirmation samples will be collected from the floor of the excavation	Low	5	5	0	5	0	5	5	5	0	0	0	0	0	Field screening will indicate when cleanup goals have potentially been achieved. Confirmation samples will be collected from the floor of the excavation. No sidewall samples are planned because it is assumed that n sidewalls greater than 1 foot will be present.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
Site 10 Drum Excavation Field QC Samples																								
Field Duplicates	Same as parent sample	Same as parent sample	12NC10SS##	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One duplicate per 10 primary samples	Same as parent sample	Low	1	1	0	1	0	1	1	1	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	Same as parent sample	Same as parent sample	Same as parent sample	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One set per extraction batch	Same as parent sample	Low	1	1	0	1	0	1	1	1	0	0	0	0	0	QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Trip Blanks	NA	NA	12NC[sample shipment date]TripBlank# (for example, 12NC080612TripBlank1)	Water	QC	NA	1 per cooler with VOCs	NA	Low	1	1	0	0	0	0	0	0	0	0	0	0	0	Trip blanks will accompany all sample shipments and will be placed in coolers containing GRO and BTEX samples.	NA
Site 10 Total Soil QC Samples										**4**	**4**	**0**	**3**	**0**	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**0**		
Site 10 Total Soil Samples										**9**	**9**	**0**	**8**	**0**	**8**	**8**	**8**	**0**	**0**	**0**	**0**	**0**		
Bulk Bag Areas *MI* Sampling																								
13 Decision Units: 6 DUs at Cargo Beach, 4 DUs at Site 6, and 3 DUs near ISO tanks (see Figure __ of the work plan)	0	CB-1 through CB-6, S6-1 through S6-4, MOC ISO-1, MOC-26-1, and MOC-BS-1	12NCBGSS01	Soil	MI	Disposable stainless spoon, bowl for mixing and splitting sample, sieve, cookie sheet	Cargo Beach: once at beginning of project. Site 6 and ISO tank areas: twice - once early in the project as soon as each site becomes free of bulk bags, and again at the end of the project	0.5	Low	0	0	20	0	0	0	20	0	0	0	0	0	0	These samples are designed to test the areas where bulk bags have been staged prior to transport and disposal offsite. Approximately 30-50 increments from each of the DUs will be collected and submitted for analysis.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11, BERS-14
Bulk Bag Areas MI Field QC Samples																								
Field Replicates (MI)	0	Same as parent sample	12NCBGSS##	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample, sieve, cookie sheet	One replicate sample (duplicate and triplicate) per 10 DUs	0.5	Low	0	0	3	0	0	0	3	0	0	0	0	0	0	QC Note: One set of replicate samples = 2 samples	Same as parent sample
MS/MSDs for Grab Samples	0	Same as parent sample	Same as parent sample	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample, sieve, cookie sheet	One set per extraction batch	0.5	Low	0	0	2	0	0	0	2	0	0	0	0	0	0	QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Total Bulk Bag Soil QC Samples										**0**	**0**	**10**	**0**	**0**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**		
Total Bulk Bag Area Soil Samples										**0**	**0**	**30**	**0**	**0**	**0**	**30**	**0**	**0**	**0**	**0**	**0**	**0**		

Table 11-1 – Soil and Sediment Field Sampling Program NE Cape (continued)

										Analytical Suite														
Sample Location	Total Depth (ft bgs)	Point ID (Location ID)	Sample ID (the last digits identify the chronological order of collection)	Matrix	Sample Type	Sampling Method/ Tool	Sampling Frequency	Sample Depth (ft bgs)	Expected Concentration Level	BTEX - 8260B	GRO - AK101	DRO - AK102	DRO/RRO - AK102/AK103	DRO/RRO SG - AK102/AK103	PAHs - 8270C	PCBs - 8082A	[1]Metals-11 - 6020A/7471B	Arsenic - 6020A	TOC - 9060	Moisture Content	Density	Gradation - Sieve	Sampling Rationale	Contractor Field SOP
Radar Dome Road																								
Areas of stressed or absent vegeation along road on top of mountain. **One sample from vigorous vegetation.**	0.5	RD-# (Loc IDs will chronologically increase in the order collected)	12NCRDSS01	Soil	Grab	Disposable stainless spoon	Once	0.5	Low	6	6	0	6	0	6	6	6	0	0	0	0	0	Samples will be used to determine if historical site activities has caused the anomolous lack of vegetation along the road. Locations to be determined based on field observations.	BERS-01, BERS-03, BERS-04, BERS-05, BERS-11
Radar Dome Road Field QC Samples																								
Field Duplicates	0.5	Same as parent sample	12NCRDSS##	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One duplicate per 10 primary samples	Same as parent sample	Low	1	1	0	1	0	1	1	1	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	0.5	Same as parent sample	Same as parent sample	Soil	QC	Disposable stainless spoon, bowl for mixing and splitting sample	One set per extraction batch	Same as parent sample	Low	1	1	0	1	0	1	1	1	0	0	0	0	0	QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Trip Blanks	NA	NA	12NC[sample shipment date]TripBlank# (for example, 12NC090512TripBlank1)	Water	QC	NA	1 per cooler with VOCs	NA	Low	1	1	0	0	0	0	0	0	0	0	0	0	0	Trip blanks will accompany all sample shipments and will be placed in coolers containing GRO and BTEX samples.	NA
Total Radar Dome Road Soil QC Samples										**4**	**3**	**0**	**3**	**0**	**3**	**3**	**3**	**0**	**0**	**0**	**0**	**0**		
Radar Dome Road Total Soil Samples										**10**	**10**	**0**	**9**	**0**	**9**	**9**	**9**	**0**	**0**	**0**	**0**	**0**		
Total Samples										**103**	**103**	**30**	**193**	**85**	**102**	**1646**	**96**	**137**	**85**	**2**	**2**	**1**		

Note:
[1]Metals-11 = 8 RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) plus nickel, vanadium, and zinc.

Table 11-2 – Aqueous Field Sampling Program NE Cape

Sample Location	Total Depth (ft bgs)	Point ID (Location ID)	Sample ID	Matrix	Sample Type	Sampling Method/ Tool	Sampling Frequency	Sample Depth (ft bgs)	Expected Conc Level	Analytical Suite: BTEX - 8260B	GRO - AK101	DRO/RRO - AK102/AK103	PAHs - 8270C	PCBs - 8082A	[1]Metals-11 - Total 6020A/7470B	[1]Dissolved Metals 11 6020A/7470A	Arsenic (Total and Dissolved)	[3]MNA	Methane - RSK175	pH	Conductivity	Temperature	[4]ORP	DO	Turbidity	TCLP VOCs	TCLP SVOCs	TCLP 8 RCRA Metals	Ignitability	Corrosivity	Sampling Rationale	Contractor Field SOP
Site 8 MNA Decision Units																																
Eight individual grid cells within each decision unit (See Figure 15 of the workplan)	NA	Decision unit and grid location (ex. UDU A-4)	12NC08WA001	Water	Grab	Peristaltic pump	Once	NA	Low	0	0	0	0	0	0	0	0	24	24	24	24	24	24	24	24	0	0	0	0	0	Water samples and field parameters will be collected before soil samples from grid locations within three decision units. Grid locations will be selected with a random number generator	BERS-02, BERS-03, BERS-04, BERS-05, BERS-09 BERS-11
Site 8 Decision Unit Field QC Samples																																
Field Duplicates	NA	Same as the sample is associated with	12NC08SWA002 or other unique ID.	Water	QC	Peristaltic pump	One per ten primary samples	Same as the parent sample	Low	0	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	Same as parent sample	NA	Water	QC	Peristaltic pump	NA	NA	Low	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	No methane MS/MSDs will be collected due to analytical method limitations	Same as parent sample
Trip Blanks	NA	NA	NA	Water	QC	NA	1 per cooler with methane samples	NA	Low	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Trip blanks will accompany all sample shipments in coolers containing methane samples.	NA
Site 8 MNA Decision Unit QC Samples										0	0	0	0	0	0	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0		
Site 8 MNA Decision Unit Total Samples										0	0	0	0	0	0	0	0	27	28	24	24	24	24	24	24	0	0	0	0	0		
Site 8 Outfall																																
Two locations previously surveyed at outfall to Suqi	NA	8-01 or 8-10	12NC08WA028 or other unique ID.	Water	Grab	Surface water collection - unpreserved container	Once	NA	Low	0	0	2	2	0	0	0	0	0	0	2	2	2	2	2	2	0	0	0	0	0	Water samples will be collected to measure if Site 8 is contributing contaminants to the Suqi River	BERS-02, BERS-03, BERS-04, BERS-05, BERS-09 BERS-11
Site 8 Outfall Field QC Samples																																
Field Duplicates	NA	Same as parent sample	12NC08WA029 or other unique ID.	Water	QC	Same as parent sample	One per ten primary samples	Same as parent sample	Low	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	Same as parent sample	Same as parent sample	Water	QC	Same as parent sample	One set per extraction batch	Same as parent sample	Low	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Site 8 Decision Unit QC Samples										0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Site 8 Decision Unit Total Samples										0	0	5	5	0	0	0	0	0	0	2	2	2	2	2	2	0	0	0	0	0		
MOC Wells																																
MOC wells;17MW-1, 88-1, 20MW-1, 88-4, MW10-1, 88-10, 22MW2, 26MW1, 88-5 (see Figure 16 of the workplan)	Various-dependent on water level	Loc IDs will be the same as well IDs.	12NCMOCWA001	Water	Grab	Submersible or peristaltic pump with low flow purging	Once	NA	Low	9	9	9	9	9	9	9	0	9	9	9	9	9	9	9	9	0	0	0	0	0	Water samples, water levels and field parameters, including MNA, will be collected at each well location	BERS-02, BERS-03, BERS-04, BERS-05, BERS-08, BERS-09 BERS-11
MOC Well QC Samples																																
Field Duplicates	Same as parent sample	Same as parent sample	12NCMOCWA010 or other unique ID.	Water	QC	Submersible or peristaltic pump with low flow purging	One per ten primary samples	Same as parent sample	Low	1	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	Same as parent sample	Same as the sample with which it is associated	Water	QC	Submersible or peristaltic pump with low flow purging	One set per extraction batch	Same as parent sample	Low	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples. No methane MS/MSD samples will be collected due to analytical method limitations.	Same as parent sample
Trip Blanks	NA	NA	NA	Water	QC	NA	1 per cooler with VOCs	NA	Low	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	Three sets of trip blanks will accompany all sample shipments in coolers, one set for GRO, one set for BTEX, and one set for methane.	NA
MOC Well QC Samples										7	7	5	5	5	5	5	0	1	2	0	0	0	0	0	0	0	0	0	0	0		
MOC Well Total Samples										16	16	14	14	14	14	14	0	10	11	9	9	9	9	9	9	0	0	0	0	0		

Table 11-2 – Aqueous Field Sampling Program NE Cape (continued)

										Analytical Suite																						
Sample Location	**Total Depth (ft bgs)**	**Point ID (Location ID)**	**Sample ID**	**Matrix**	**Sample Type**	**Sampling Method/ Tool**	**Sampling Frequency**	**Sample Depth (ft bgs)**	**Expected Conc Level**	**BTEX - 8260B**	**GRO - AK101**	**DRO/RRO - AK102/AK103**	**PAHs - 8270C**	**PCBs - 8082A**	**[1]Metals-11 - Total 6020A/7470B**	**[1]Dissolved Metals-11 6020A/7470A**	**Arsenic (Total and Dissolved)**	**[3]MNA**	**Methane - RSK175**	**pH**	**Conductivity**	**Temperature**	**[4]ORP**	**DO**	**Turbidity**	**TCLP VOCs**	**TCLP SVOCs**	**TCLP 8 RCRA Metals**	**Ignitability**	**Corrosivity**	**Sampling Rationale**	**Contractor Field SOP**
MOC Surface Water																																
Western Drainage-upgradient of Site 28 sediment, near NC28SS003 soil location, first pond north of Eastern Drainage	Various-dependent on water level	Loc IDs will be MOCSW01 as example.	12NCMOCSWA001	Water	Grab	Surface water collection - unpreserved container	Once	NA	Low	0	0	9	0	0	0	0	0	0	0	9	9	9	9	9	9	0	0	0	0	0	Water samples and field parameters will be collected at each surface water sample location	BERS-02, BERS-03, BERS-04, BERS-05, BERS-08, BERS-09 BERS-11
MOC Surface Water QC Samples																																
Field Duplicates	Same as parent sample	Same as parent sample	12NCMOCSWA004 or other unique ID.	Water	QC	Surface water collection - unpreserved container	One per ten primary samples	Same as parent sample	Low	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	Same as parent sample	Same as the sample with which it is associated	Water	QC	Surface water collection - unpreserved container	One set per extraction batch	Same as parent sample	Low	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples.	Same as parent sample
MOC Surface Water QC Samples										**0**	**0**	**7**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
MOC Surface Water Total Samples										**0**	**0**	**16**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**9**	**9**	**9**	**9**	**9**	**0**	**0**	**0**	**0**	**0**		
MOC Water Impoundment																																
Post treatment samples	NA	NA	12NCMOCSWA001 or other unique ID.	Water	Grab	Surface water collection - unpreserved container	Once per discharge event	NA	Low	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Samples will be collected to verify that water meets discharge criteria	BERS-02, BERS-03, BERS-04, BERS-05, BERS-09 BERS-11
MOC Water Impoundment QC Samples																																
Field Duplicates	NA	NA	12NCMOCSWA004 or other unique ID.	Water	QC	Surface water collection - unpreserved container	One per ten primary samples	Same as parent sample	Low	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	NA	Same as the sample with which it is associated	Water	QC	Surface water collection - unpreserved container	One set per extraction batch	Same as parent sample	Low	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples.	Same as parent sample
Trip Blanks	NA	NA	12NC[sample shipment date]TripBlank# (example: 12NC072312TripBlank1)	Water	QC	NA	1 per cooler with VOCs	NA	Low	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	One set of trip blanks will accompany all sample shipments in coolers for BTEX.	NA
MOC Water Impoundment QC Samples										**4**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
MOC Water Impoundment Total Samples										**5**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Site 28 Phase I Sediment Removal - Surface Water Samples																																
Three locations downstream of sediment removal activities	NA	28-W-01, 28-W-02, 28-W-03	12NC28WA01 or other unique ID.	Water	Grab	Surface water collection - unpreserved container	Three times - before, during, and after sediment removal	NA	Low	9	9	9	9	9	9	9	0	0	0	0	0	0	0	0	9	0	0	0	0	0	Water samples will be collected to assess if downstream areas of the drainage basin are affected by the Phase I sediment removal activities	BERS-02, BERS-03, BERS-04, BERS-05, BERS-09 BERS-11
Site 28 Phase I Sediment Removal - Surface Water QC Samples																																
Field Duplicates	NA	Same as parent sample	12NC28WA02 or other unique ID.	Water	QC	Same as parent sample	One per ten primary samples	Same as parent sample	Low	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	Same as parent sample	Same as parent sample	Water	QC	Same as parent sample	One set per extraction batch	Same as parent sample	Low	3	3	3	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Equipment Blank	NA	NA	12NCWA04 or other unique ID.	Water	QC	Pour deionized water over auger and bowl.	Once following collection of sediment samples and decontamination.	NA	Low	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	One equipment blank rinsate will be collected following 10 soil-sediment samples collected at Site 28. The equipment blank will demonstrate if sampling equipment contributes to analytical results for sediment.	BERS-01, BERS-05, BERS-09 BERS-11
Trip Blanks	NA	NA	12NC[sample shipment date]TripBlank# (example: 12NC072312TripBlank1)	Water	QC	NA	1 per cooler with VOCs	NA	Low	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Two sets of trip blanks will accompany all sample shipments in coolers, one set for GRO and one set for BTEX.	NA
Site 28 Surface Water QC Samples										**11**	**11**	**8**	**8**	**8**	**8**	**8**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Site 28 Surface Water Total Samples										**20**	**20**	**17**	**17**	**17**	**17**	**17**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**9**	**0**	**0**	**0**	**0**	**0**		

Table 11-2 – Aqueous Field Sampling Program NE Cape (continued)

										Analytical Suite																						
Sample Location	Total Depth (ft bgs)	Point ID (Location ID)	Sample ID	Matrix	Sample Type	Sampling Method/ Tool	Sampling Frequency	Sample Depth (ft bgs)	Expected Conc Level	BTEX - 8260B	GRO - AK101	DRO/RRO - AK102/AK103	PAHs - 8270C	PCBs - 8082A	[1]Metals-11 - Total 6020A/7470B	[1]Dissolved Metals-11 6020A/7470A	Arsenic (Total and Dissolved)	[3]MNA	Methane - RSK175	pH	Conductivity	Temperature	[4]ORP	DO	Turbidity	TCLP VOCs	TCLP SVOCs	TCLP 8 RCRA Metals	Ignitability	Corrosivity	Sampling Rationale	Contractor Field SOP
Site 28 Phase I Sediment Removal - Water Impoundment Samples																																
Pre-treatment and post-treatment samples	NA	NA	12NC28PRE01 or other unique ID.	Water	Grab	Surface water collection - unpreserved container	Once per collection/ discharge event (8 events)	NA	Low	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	8	0	0	0	0	0	Samples will be collected to verify that water meets discharge criteria	BERS-02, BERS-03, BERS-04, BERS-05, BERS-09 BERS-11
Site 28 Phase I Sediment Removal - Water Impoundment QC Samples																																
Field Duplicates	NA	NA	12NC08WA029 or other unique ID.	Water	QC	Same as parent sample	One per ten primary samples	Same as parent sample	Low	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	NA	Same as parent sample	Water	QC	Same as parent sample	One set per extraction batch	Same as parent sample	Low	8	8	8	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Trip Blanks	NA	NA	12NC[sample shipment date]TripBlank# (example: 12NC072312TripBlank1)	Water	QC	NA	1 per cooler with VOCs	NA	Low	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Two sets of trip blanks will accompany all sample shipments in coolers, one set for GRO and one set for BTEX.	NA
Site 28 Water Impoundment QC Samples										**26**	**26**	**18**	**18**	**18**	**18**	**18**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Site 28 Water Impoundment Total Samples										**34**	**34**	**26**	**26**	**26**	**26**	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**8**	**0**	**0**	**0**	**0**	**0**		
Site 10 Drum Area - Waste Characterization Samples																																
POL liquid in drums	NA	NA	12NCDRUM01 or other unique ID.	Liquid	Grab	Unpreserved container	Up to two times	NA	Medium	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	Samples will be collected to characterize liquid in drums for waste disposal. Since these are waste characterization samples, no QC samples will be submitted.	BERS-02, BERS-03, BERS-04, BERS-05, BERS-09 BERS-11
Site 10 Drum Area - Waste Characterization Total Samples										**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**2**	**2**	**2**	**2**		
Site 21 Surface Water Samples																																
Post removal samples	NA	NA	12NC21SW001 or other unique ID.	Water	Grab	Surface water collection - unpreserved container	Once-following soil removal	NA	Low	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Samples will be collected to determine if surface water is arsenic impacted	BERS-02, BERS-03, BERS-04, BERS-05, BERS-09 BERS-11
Site 21 Surface Water QC Samples																																
Field Duplicates	NA	NA	12NC21SW002 or other unique ID.	Water	QC	Same as parent sample	One per sampling event	Same as parent sample	Low	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	QC	Same as parent sample
MS/MSDs for Grab Samples	NA	NA	Same as parent sample	Water	QC	Same as parent sample	One set per extraction batch	Same as parent sample	Low	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	Field QC Note: One set of MS/MSD samples = 2 samples	Same as parent sample
Site 21 Surface Water QC Samples										**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Site 21 Surface Water Total Samples										**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**		
Total Aqueous Samples										75	70	80	66	57	57	57	4	37	39	44	44	44	44	44	61	2	2	2	2	2		

Notes

[1]Metals-11 = 8 RCRA metals (arsenic, barium, cadium, chromium, lead, mercury, selenium, and silver) plus nickel, vanadium, and zinc.

[2]MNA parameters are: nitrate, sulfate, dissolved manganese, ferrous iron, and alkalinity.

[3]ORP=oxidation-reduction potential (redox)

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POL and PCB Confirmation Samples: The DRO confirmation sample grids within excavations at the MOC will be approximately 250 square feet per ADEC requirements (ADEC, 2010). Samples will be collected from the excavation sidewalls at a frequency of 1 sample per 20 linear feet. The POL-impacted soils will not be composited at excavated areas. Floor and sidewall areas will be treated separately.

The PCB confirmation sample grids at Site 13 and Site 31 will be 25 square feet to meet Toxic Substances Control Act (TSCA) sample requirements. The PCB samples may be composited with up to 9 samples per composite. Floor and sidewall areas will be treated separately. Floor samples from the excavation will be composited from contiguous grids and from similar depth levels. Sidewall samples will be a composite of soil samples collected near the mid-point of the sidewall at that location. The PCB composite sample will be made up of discrete samples collected one every 5 feet of horizontal distance along the sidewall for PCB excavations. Analytical results for composite samples will indicate if cleanup goals have been achieved by multiplying the result by the number of discrete samples that went into the composite. If the result is less than one, no further action will be taken over the sampled area. If the result is greater than one, the samples that made up the composite will be analyzed as discrete samples to identify which sample locations remain above the 1.0 mg/kg cleanup level. If any area is above 1.0 mg/kg, the area will be re-excavated and resampled.

For both the POL and PCB field screening and confirmation samples, the sample will be collected approximately midway up the wall from each grid at the perimeter of the excavated area. The sidewall depth from the excavated areas will vary from 1.0 foot to possibly up to 15 feet deep, and potentially even deeper if PCB contamination is still above cleanup levels at a depth of 15 feet. The field team will attempt to field screen the most POL-contaminated areas based on visual observations, such as staining and odors, lithology, and past field-screening results.

PCB Wipe Sampling Design: If concrete that has been in contact with PCB-contaminated soil is encountered at Sites 13 and 31, wipe samples will be collected at a frequency of one sample per 250 square feet of exposed concrete. Wipe samples will be analyzed by the field laboratory, with 10 percent of the samples sent to the fixed laboratory for verification of the field laboratory results. Because of matrix characteristics and the inability to reproduce a homogeneous sample of the concrete surface, no MS/MSD will be submitted to the fixed-base laboratory.

Site 21 Arsenic Confirmation Samples: Confirmation samples will be collected after excavation of arsenic-contaminated soil at Site 21. Samples will be collected from the excavation per ADEC's *Draft Field Sampling Guidance* (ADEC, 2010). Since the excavation is currently beneath water, it is anticipated that only sidewall confirmation samples will be collected in 2012. Samples will be collected from the excavation sidewalls at a frequency of 1 sample per 20 linear feet. Samples will be collected at the surface of mineral soil or just below the vegetative layer if a vegetative layer is present. Floor confirmation samples will be collected if the excavation floor is above the groundwater level. Two floor confirmation samples will be collected for the first 250 square feet of excavated area, and one sample will be collected for each additional 250 square feet of the excavation.

One surface water sample (plus a duplicate and an MS/MSD) will be collected from the Site 21 excavation and analyzed for total and dissolved arsenic. Since the ADEC is in the process of developing guidance for the collection of surface water samples (ADEC, 2010), the surface water samples will be collected by filling clean, unpreserved jars with surface water and transferring water to appropriate containers.

<u>Site 8 MNA Samples</u>: In 2010, Bristol divided the wetland area into three DUs with approximate dimensions of 100 feet long by 40 feet wide, oriented roughly southwest to northeast. Each DU was divided into 40 grids, from which eight grids will be randomly selected for surface water and soil sample collection. Surface water samples for MNA parameters will be collected with a peristaltic pump. ADEC's *Draft Field Sampling Guidance* (ADEC, 2010) states that guidance for the collection of surface water samples are in the process of being developed. From each DU, the eight soil samples will be composited into one laboratory sample in the field. Only grids that contain surface water will be included in the sampling event. Two additional surface water samples will be collected at Site 8 from an area where a small spring begets a small rivulet that flows into the Suqitughneq River.

<u>MOC Surface Water Sampling Design:</u> Surface water samples will be collected from three different locations before, during, and after excavation activities at the MOC. The locations will be near the former manhole of the Western Drainage, the pond where soil sample NC28SS003 was collected in 2011, and the first pond north of the Eastern Drainage. Since the ADEC is in the process of developing guidance for the collection of surface water samples (ADEC, 2010), the surface water samples will be collected by filling clean, unpreserved jars with surface water and transferring water to appropriate containers.

<u>MOC Groundwater Sampling Design:</u> Groundwater samples will be collected from nine existing wells that were sampled in 2010 (see Figure 16 in Work Plan). Sampling techniques include low-flow purging as described in Bristol's SOP BERS-02 (Attachment 1), and will be conducted in accordance with ADEC's *Draft Field Sampling Guidance* (ADEC, 2010). Field parameters (pH, DO, conductivity, temperature, ORP and turbidity) will be collected just prior to analytical sample collection. Analytical samples

will also be collected along with MNA parameters (nitrate, sulfate, ferrous iron, dissolved manganese, and alkalinity). Methane samples will also be collected and analyzed by TestAmerica as an MNA parameter.

Site 28 Drainage Basin Sediment Sampling Design: Sediment samples will be collected from streams and ponds following the sediment mapping effort. ADEC's *Draft Field Sampling Guidance* (ADEC, 2010) states that guidance for the collection of sediment samples are in the process of being developed. Sediment will be defined as all loose mineral and organic material that is not actively growing vegetation or that is not part of the vegetative mat. Mineral material atop a vegetative mat, or in a predominately peat interval, will not be considered sediment. Samples will be collected from sediment-laden stream channels at approximately 50-foot intervals. If a sediment-containing section of stream is less than 50 feet, then one sample will be collected from the section. The total number of samples collected from streams will not exceed 24 samples. Three sediment samples will be collected from each of the ponds for a total not to exceed 30 samples. Sample densities and locations may be adjusted following the sediment mapping effort, as dictated by the presence or absence of sediment at Site 28. Samples will be concentrated in sediment dominated areas in the vicinity of historically contaminated locations.

Site 28 Phase I Sediment Removal Samples: Surface water samples will be collected at three locations before, during, and after the sediment removal process. Sample locations will be downstream of the sediment removal operations and determined in the field in consultation with the USACE Quality Assurance Representative (QAR). Since the ADEC is in the process of developing guidance for the collection of surface water samples (ADEC, 2010), the surface water samples will be collected by filling clean, unpreserved jars with surface water and transferring water to appropriate containers.

The Phase I sediment removal will include dewatering contaminated sediment, so that it can be loaded into bulk bags for disposal. The dewatering area will consist of primary and secondary impoundments to capture the water. Water samples will be collected from the primary water impoundment and analyzed at TestAmerica for all COCs. Water from the primary impoundment will be treated through a filtering system and discharged into a secondary impoundment. Samples will be collected from the secondary impoundment for all COCs and analyzed at TestAmerica. Water will remain in the secondary impoundment until sample results confirm that all COCs are below cleanup criteria and discharge criteria. If results indicate concentrations below cleanup and discharge criteria, then the treated water will be discharged to the ground.

After the sediment has been dewatered, two samples will be collected and sent to DOWL HKM, a geophysical laboratory, to determine moisture content and density, and a sieve-test analysis will be performed on one of the two samples. Geotechnical samples will be collected and analyzed in accordance with ASTM D2216 (moisture content), ASTM D2974 (density), and ASTM D422 (sieve test). In addition, four sediment samples will be collected from the Geotubes for waste characterization purposes and analyzed for the Site 28 COCs.

<u>Bulk Bag Staging Areas Sampling Design:</u> MI sampling will be performed at the following bulk bag storage areas: Cargo Beach, Site 6, and three areas near the MOC (one location south of the fuel containment area at the Site 26 former construction camp, one directly northeast of the present-day ISO fuel tank containment area, and another north of the ISO tanks on the north side of Cargo Beach Road). Cargo Beach will be sampled early during the project while the beach is free of equipment, containers, and bulk bags. Since the remaining sites are currently being used as staging areas, they will be sampled as soon as possible when the site becomes free of bulk bags. Post-use MI samples will be collected

at Site 6 and the areas associated with the MOC at the end of the project when all bulk bags have been removed from those locations. Samples will be collected as described in Bristol SOP *BERS-14 MULTI INCREMENT® Sampling SOP_Rev0* (Attachment 1). Various sampling tools will be tested on site to determine the best tool for the material.

Cargo Beach: Cargo Beach will be divided into six DUs consisting of approximately 15,000 square feet. The DUs will be created in areas where equipment traveled and bags were placed. Each DU will be divided into 40 to 50 incremental units. The increments will be sampled in an unbiased manner from each DU. One MI sample will be collected from each DU, for a total of 6 MI samples collected from Cargo Beach.

Site 6: The Site 6 staging area is approximately 30,000 square feet and will be divided into four DUs of approximately 7,500 square feet each. Each DU will be determined on site, and divided into 30 to 50 incremental units. The increments will be sampled in an unbiased manner from each DU. One MI sample will be collected from each DU, for a total of four MI samples, which will be collected from Site 6 early in the project as soon as the site becomes free of bulk bags. Four post-use MI samples will also be collected at the end of the project, using the same DUs established during the first round of MI sampling.

MOC: The MOC staging areas consist of three areas: one area south of the present-day refueling area (ISO tanks) at the Site 26 Former Construction Camp; one area directly northeast of the ISO tanks; and the primary MOC bulk bag staging area located north of the ISO tanks directly across Cargo Beach Road. The MOC bag staging areas cover an area of approximately 10,000 square feet. Each DU will be approximately 3,333 square feet, and will be divided into 30 to 50 incremental units. The increments will be sampled in an unbiased manner from each DU. One MI sample will be collected from each DU, for a total of three MI samples collected early in the project, as soon as the site becomes free of bulk bags. Three post-use samples will also be collected at the end of the project, using the same DUs established during the first round of MI sampling.

Radar Dome Road Sampling Design: Six discrete soil samples will be collected at the top of Kangukhsam Mountain in areas of stressed or absent vegetation within 50 feet of the radar dome road centerline and at least 50 feet apart with paired samples from either side of the road.

WHO WILL COLLECT AND GENERATE THE DATA

The Bristol field scientists, Eric Barnhill and Emily Conway, will collect the field data and environmental samples. The on-site field laboratory run by analysts subcontracted from TestAmerica will analyze PCB and POL soil samples for field-screening purposes. The fixed-based analytical laboratory, TestAmerica, will analyze the environmental confirmation samples and generate laboratory results.

HOW WILL THE DATA BE REPORTED

All 2012 data will be reported in an HTRW Final Report, with the exception of the Site 28 sediment mapping and sampling effort and the Site 28 Phase I sediment removal action. The information inputs for the report are made of both existing and new data. The information collected prior to the 2012 HTRW RA will only be summarized to the extent necessary to establish the baseline for the 2012 Final HTRW RA report. Regarding new data, concentrations of compounds will be summarized in report tables, and maps will depict the locations of sampling points. Laboratory analytical reports, field forms (including sampling data forms, etc.), and copies of field log books will be included as attachments to the report. Ultimately, the 2012 HTRW RA Report will be comprehensive in nature and no additional sources of information will be necessary to capture the full extent of the field operations and data collected.

Results from the 2012 Site 28 sediment mapping and sampling effort will be reported as an addendum to the 2011 Site 28 Technical Memorandum (Bristol Engineering Services Corporation, 2012). The addendum will discuss the methods used to conduct the sediment mapping and where sediment was present throughout the site. The addendum will also describe the 2012 sediment sampling procedures, analytical results, and a comparison of analytical results to cleanup levels stated in the Decision Document (USACE, 2009). Analytical data will be summarized on report tables. Maps will be included in the addendum that show the Site 28 Drainage Basin topography (1.0-foot primary and 0.5-foot secondary contours), as surveyed during the 2011 field season; areas where sediment is present and boundaries of the sediment areas; sediment thickness; presence and absence of vegetative mat within areas of sediment; and historical and recent sample locations highlighting laboratory data above site cleanup levels. In addition, if contaminated sediment is present, maps will be included in the addendum showing suggested sediment removal areas, suggested sediment removal depths and volumes, and any necessary construction such as roads, sediment ponds, or dewatering structures. Field notes, field forms, electronic boring logs, photographs, laboratory analytical data, ADEC checklists, and a Chemical Data Quality Review will be included as attachments.

A report will be prepared describing the 2012 Phase I Site 28 sediment removal effort, including a summary of methods used for accessing, removing, and dewatering contaminated sediment from Site 28, methods for minimizing and treating water produced by sediment removal and dewatering activities, and the methods and results for controlling and minimizing downstream suspended-sediment migration during sediment removal and dewatering. The most effective methods of sediment removal and dewatering will be discussed, and alternatives will be proposed for full-scale sediment removal of the remainder of the Site 28 drainage area to the Suqitughneq River. Maps will be developed that show the Site 28 topography, locations of and methods used during the 2012 Phase I sediment removal, the extent of sediment contamination and suggested sediment removal areas, and the proposed location(s) of the components necessary for full-scale sediment removal at Site 28. Photographs of methods and processes used during the sediment removal effort will be included as an attachment to the report.

A series of software applications will be utilized to handle chemical data from the time of sample collection to processing for the HTRW RA Report and the Site 28 Technical Memorandum Addendum. At the end of the project, chemical data (hard copy and electronic) and associated location information, field sample information, and chain-of-custody information will be submitted as part of the Final RA report. The Geographic Information System (GIS) data will maintain formatting consistent with Environmental Systems Research Institute, Inc., ArcGIS® software and will conform to the Spatial Data Standards for Facilities, Infrastructure, and Environment. Final GIS deliverables to the USACE may consist of geodatabases and shapefiles. All data deliverables will be compliant with the 2011 USACE Alaska District Manual for Electronic Deliverables (USACE, 2011).

HOW WILL THE DATA BE ARCHIVED

The laboratory data will be saved in existing electronic formats (PDFs of the entire Level IV reports, Corps of Engineers Loading Tool (COELT), and staged electronic data deliverables [SEDD] files will be included as part of the laboratory deliverable package. Planning documents and the final report will be saved in Microsoft® Word, Excel®, and PDF formats in project archives at Bristol. Field notes will be provided as PDFs in an attachment to the final report. All information will be retained on servers and in hard copy formats. The GIS data will maintain formatting consistent with Environmental Systems Research Institute, Inc. (ESRI®) ArcGIS software. Final deliverables to the USACE may consist of geodatabases and shapefiles. The GIS data will conform to the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE).

All reports and data will be presented in accordance with the Manual for Electronic Deliverables (USACE, 2011).

QAPP WORKSHEET #12-1
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Soil
Analytical Group	**Gasoline Range Organics**
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11	Alaska Test Method 101 (AK101) TA-MV-0376 Rev 9 (Tacoma) DV-GC-0010 Rev 7.1 (Denver)	Precision	Relative Percent Difference (RPD) <50%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank and Trip Blank)	A
		Accuracy/bias	$\leq$20% Difference	Initial Calibration Verification (ICV)	A
		Accuracy	75 to125%	Continuing Calibration Verification (CCV)	A
		Accuracy	60 to 120% Recovery	LCS & LCSD	A
		Accuracy	50 to 150% Recovery	MS & MSD	S&A
		Precision	$\leq$20% RPD	LCS, LCSD	A
		Precision	$\leq$50% RPD	MS & MSD	S&A
		Accuracy	Surrogate: a,a,a-Trifluorotoluene 60 to 120% Recovery	Surrogate-Method Blank, LCS & LCSD	A
		Accuracy	Surrogate: a,a,a-Trifluorotoluene 50 to 150% Recovery	Field Samples	S&A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP Worksheet #12-2
Measurement Performance Criteria Table

Matrix	Soil
Analytical Group	**Diesel Range Organics**
Concentration Level	Low to high

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	AK102 TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)	Precision	RPD<50%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	≤20% Difference	ICV	A
		Accuracy	75 to 125%	CCV	A
		Accuracy	75 to 125% Recovery	LCS & LCSD	A
		Accuracy	72 to 128% Recovery	MS & MSD	A
		Precision	≤20% RPD	LCS/LCSD	A
		Precision	≤20% RPD	MS/MSD	S&A
		Accuracy	Surrogate: o-Terphenyl 60 to 120% Recovery	Surrogate-Method Blank and LCS/LCSD	A
		Accuracy	Surrogate: o-Terphenyl 50 to 150% Recovery	Field Samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-3
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Soil
Analytical Group	**Residual Range Organics**
Concentration Level	Low to High

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11	AK103 TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)	Precision	RPD<50%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	≤20% Difference	ICV	A
		Accuracy	75 to 125%	CCV	A
		Accuracy	60 to 120% Recovery	LCS & LCSD	A
		Accuracy	53 to 116% Recovery	MS & MSD	A
		Precision	≤20% RPD	LCS/LCSD, & MS/MSD	A
		Accuracy	Surrogate: n-Triacontane-d62 60 to 120% Recovery	Surrogate-Method Blank and LCS/LCSD	A
		Accuracy	Surrogate: n-Triacontane-d62 50 to 150% Recovery	Field Samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-4
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Soil
Analytical Group	**PCBs**
Concentration Level	Low to High

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	SW3550B TA-OP-0302 (extraction) TA-GS-0351 Rev 18 (Tacoma) DV-GC-0021 Rev 5.1 (Denver)	Precision	RPD<50%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	$\leq$20% Difference	ICV & CCV	A
		Accuracy	40 to 140% Recovery-Aroclor® 1016 60 to 130% Recovery-Aroclor 1260	LCS/LCSD & MS/MSD	A
		Precision	$\leq$20% RPD	LCS/LCSD & MS/MSD	A
		Accuracy	Surrogates: Tetrachloro-M-xylene (TCMX) 45 to 155% Recovery; Decachlorobiphenyl 60 to 125%	Surrogate-All samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-5
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Soil
Analytical Group	**BTEX**
Concentration Level	Low/Medium/High

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11	SW8260B, TA-MV-0312 Rev 18 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)	Precision	RPD<50%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Method Blank, Trip Blank	S&A
		Accuracy/bias	≤20% difference	ICV & CCV	A
		Instrument Performance	Tune criteria consistent with SW8260B	Mass spectrometer tuning check, bromoflourobenzene	A
		Sensitivity	Retention time ±30 seconds from the internal standard (IS) of the calibration mid-point standard and extracted ion current profile area within -50% to +100% of area from IS calibration mid-point standard	Internal Standards	A
		Accuracy	% Recovery, DoD QSM 4.2 Limits	LCS & LCSD	A
		Accuracy	% Recovery, DoD QSM 4.2 Limits	MS & MSD	A
		Precision	RPD< 30%	LCS, LCSD, MS & MSD	A

Matrix	Soil
Analytical Group	**BTEX**
Concentration Level	Low/Medium/High

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
		Accuracy	4-Bromofluorobenzene-85-120% Toluene d_8 85-115%	Surrogate recoveries	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-6
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Soil
Analytical Group	PAHs
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11, BERS-14	SW8270C selected ion monitoring (SIM) mode, TA-MS-0313 Rev 17 (Tacoma) DV-MS-0002 Rev 6.2 (Denver)	Precision	RPD<50%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	≤20% difference	ICV & CCV	A
		Instrument Performance	Tune criteria consistent with SW8270C	Mass Spectrometer Tuning Check, DFTPP	A
		Sensitivity	Retention time ±30 seconds from retention time of the IS of the calibration mid-point standard, and extracted ion current profile area within -50% to +100% of area from IS calibration mid-point standard	Internal Standards	A
		Accuracy	% Recovery, in-house limits	LCS, LCSD, MS & MSD	A
		Precision	RPD, In house laboratory limits	LCS/LCSD & MS/MSD	A
		Accuracy	% Recovery, in-house limits	Surrogate recoveries-all samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-7
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Soil
Analytical Group	ICP/MS Metals
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	SW6020A, TA-MT-0217 Rev 22 (Tacoma) DV-MT-0018 Rev 2 (Denver)	Precision	RPD<50%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank/Calibration Blanks)	A
		Accuracy/bias	≤10% Recovery	ICV & CCV	A
		Instrument Performance	Tune criteria consistent with SW6020A and DoD QSM 4.2	Tuning	A
		Accuracy/bias	ICS-A: All non-spiked analytes < LOD ICS-AB: Within ± 20% of expected value	Interfering Element Check Standards	A
		Sensitivity	IS intensity within 30 to 120 of the intensity of the IS calibration	Internal Standards	A
		Accuracy	80 to 120% Recovery	LCS, LCSD, MS & MSD	A
		Precision	<20% RPD	LCS, LCSD, MS & MSD	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

*ICP/MS metals are: arsenic, barium, cadmium, chromium, lead, selenium, silver, nickel, vanadium, and zinc.

QAPP Worksheet #12-8
Measurement Performance Criteria Table

Matrix	Soil
Analytical Group	**Mercury**
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11, BERS-14	SW7471A, TA-MT-0202 Rev 20 (Tacoma) DV-MT-0016 Rev 3.1 (Denver)	Precision	RPD<50%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank/Calibration Blanks)	A
		Accuracy/bias	80 to 120% Recovery	ICV & CCV	A
		Accuracy	80 to 120% Recovery	LCS, LCSD, MS & MSD	A
		Precision	≤20% RPD	LCS, LCSD, MS & MSD	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-9
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Soil
Analytical Group	**Total Organic Carbon (TOC)**
Concentration Level	Low/medium/high

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11	SW9060 TA-WC-0157 Rev 13 (Tacoma) DV-WC-0006 Rev 6.3 (Denver)	Precision	RPD<50%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	≤20% difference from true value	ICV & CCV	A
		Accuracy	12.8-187%	LCS & LCSD	A
		Accuracy	76-128%	MS & MSD	A
		Precision	RPD <28%	LCS, LCSD, MS & MSD	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-10
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Water
Analytical Group	**Gasoline Range Organics**
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11	AK101 TA-MV-0376 Rev 9 (Tacoma) DV-GC-0010 Rev 7.1 (Denver)	Precision	RPD <30%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank, Trip Blank)	A
		Accuracy/bias	≤20% Difference	CV CCV	A
		Accuracy	75-125%	CCV	A
		Accuracy	60 to 120% Recovery	LCS & LCSD	A
		Accuracy	50 to 150% Recovery	MS & MSD	A
		Precision	≤20% RPD	LCS, LCSD	A
		Precision	≤50% RPD	MS & MSD	A
		Accuracy	Surrogate: a,a,a-Trifluorotoluene 60 to 120% Recovery	Method Blank, LCS & LCSD	A
		Accuracy	Surrogate: a,a,a-Trifluorotoluene 50 to 150% Recovery	Field Samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-11
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Water
Analytical Group	**Diesel Range Organics**
Concentration Level	Low to high

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	AK102 TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)	Precision	RPD<30%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	$\leq$20% Difference	ICV & CCV	A
		Accuracy	75 to 125%	CCV	A
		Accuracy	75 to 125% Recovery	LCS & LCSD	A
		Accuracy	61 to 127% Recovery	MS & MSD	A
		Precision	$\leq$20% RPD	LCS/LCSD	A
		Precision	$\leq$27% RPD	MS/MSD	A
		Accuracy	Surrogate: o-Terphenyl 60 to 120% Recovery	Surrogate-Method Blank and LCS/LCSD	A
		Accuracy	Surrogate: o-Terphenyl 50 to 150% Recovery	Field Samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP Worksheet #12-12
Measurement Performance Criteria Table

Matrix	Water
Analytical Group	**Residual Range Organics**
Concentration Level	Low to High

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11	AK103 TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)	Precision	RPD<30%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	≤20% Difference	ICV & CCV	A
		Accuracy	75 to 125%	CCV	A
		Accuracy	60 to 120% Recovery	LCS & LCSD	A
		Accuracy	53 to 118% Recovery	MS & MSD	A
		Precision	≤20% RPD	LCS/LCSD	A
		Precision	≤28% RPD	MS/MSD	A
		Accuracy	Surrogate: n-Triacontane-d62 60 to 120% Recovery	Surrogate-Method Blank and LCS/LCSD	A
		Accuracy	Surrogate: n-Triacontane-d62 50 to 150% Recovery	Surrogate-Field Samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-13
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Water
Analytical Group	**PCBs**
Concentration Level	Low to High

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	SW8082A TA-OP-0323 (extraction) TA-GS-0351 Rev 18 (Tacoma) DV-GC-0021 Rev 5.1 (Denver)	Precision	RPD<30%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	<u><</u>20% Difference	ICV & CCV	A
		Accuracy	25 to 145% Recovery-Aroclor 1016 30 to 145% Recovery-Aroclor 1260	LCS/LCSD & MS/MSD	A
		Precision	<u><</u>30% RPD	LCS/LCSD & MS/MSD	A
		Accuracy	Surrogates: TCMX 60 to 150% Recovery; Decachlorobiphenyl 40 to 135%	Surrogate-All samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-14
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Water
Analytical Group	BTEX
Concentration Level	Low/Medium/High

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	SW8260B TA-MV-0312 Rev 20 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)	Precision	RPD<30%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Trip Blank/Method Blank)	S&A
		Accuracy/bias	≤20% difference	ICV & CCV	A
		Instrument Performance	Tune criteria consistent with SW8260B	Mass spectrometer tuning check, bromofluorobenzene(BFB)	A
		Sensitivity	Retention time ±30 seconds from retention time of the IS and extracted ion current profile area within -50% to +100% of area from IS calibration mid-point standard	Internal Standards	A
		Accuracy	% Recovery, DoD QSM 4.2 Limits	LCS & LCSD	A
		Accuracy	% Recovery, DoD QSM 4.2 Limits	MS & MSD	A
		Precision	RPD 30% RPD	LCS/LCSD, MS/MSD	A

Matrix	Water				
Analytical Group	**BTEX**				
Concentration Level	Low/Medium/High				
Sampling Procedure	**Analytical Method/SOP**	**DQIs**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	SW8260B, TA-MV-0312 Rev 20 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)	Accuracy	1,2-Dichloroethane-d_4 70-120% 4-Bromofluorobenzene 75-120% Dibromofluoromethane 85-115% Toluene d_8 85 to120%	Surrogates-All Samples	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-15
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Water
Analytical Group	PAHs
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11, BER-14	SW8270C selected ion monitoring mode, TA-MS-0313 Rev 17 (Tacoma) DV-MS-0002 Rev 6.2 (Denver)	Precision	RPD<30%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank)	A
		Accuracy/bias	≤20% difference	ICV & CCV	A
		Instrument Performance	Tune criteria consistent with SW8270C	Mass Spectrometer Tuning Check DFTPP	A
		Sensitivity	Retention time ±30 seconds from retention time of the IS of the calibration mid-point standard, and extracted ion current profile area within -50% to +100% of area from IS calibration mid-point standard	Internal Standards	A
		Accuracy	% Recovery, In-house Limits	LCS, LCSD, MS & MSD	A
		Precision	RPD, In house laboratory limits	LCS, LCSD, MS & MSD	A

Matrix	Water				
Analytical Group	**PAHs**				
Concentration Level	Low				
Sampling Procedure	**Analytical Method/SOP**	**DQIs**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
		Sample Handling	Temperature and holding times	Temperature and Time	S&A
		Accuracy	2-Fluorobiphenyl (50 to 110% Recovery) Nitrobenzene-d5 (40 to 110% Recovery) Terphenyl-d14 (50 to 135% Recovery)	Surrogates – All samples	A

QAPP Worksheet #12-16
Measurement Performance Criteria Table

Matrix	Water
Analytical Group	**ICP/MS Metals***
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	SW6020A, TA-MT-0217 Rev 22 (Tacoma) DV-MT-0018 Rev 2 (Denver)	Precision	RPD<30%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank/Calibration Blanks)	A
		Accuracy/bias	<u><</u>10% True Value	ICV & CCV	A
		Instrument Performance	Tune criteria consistent with SW6020A and DoD QSM 4.2	Tuning	A
		Accuracy/bias	ICS-A: All non-spiked analytes < LOD ICS-AB: Within ± 20% of expected value	Interfering Element Check Standards	A
		Sensitivity	IS intensity within 30 to 120% of the intensity of the IS in the initial calibration (ICAL)	Internal Standards	A
		Accuracy	80 to 120% Recovery	LCS, LCSD& MS/MSD	A
		Precision	<u><</u>20% RPD	LCS, LCSD, MS & MSD	A

Matrix	Water				
Analytical Group	**ICP/MS Metals***				
Concentration Level	Low				
Sampling Procedure	**Analytical Method/SOP**	**DQIs**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)**
		Accuracy/bias	X5 dilution within ±10% of original value	Serial Dilution	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A
		Accuracy/bias	Within ±25% of expected value	Post Digestion Spike	A

Note:
*ICP/MS METALS include: arsenic, barium, cadmium, chromium, lead, selenium, silver, nickel, vanadium, and zinc.

QAPP WORKSHEET #12-17
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Water
Analytical Group	**Mercury**
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	DQIs	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-02, BERS-03, BERS-05, BERS-10, BERS-11	SW7470A, TA-MT-0202 Rev 20 (Tacoma) DV-MT-0017 Rev 1.1 (Denver)	Precision	RPD<30%	Field Duplicate	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank/Calibration Blanks)	A
		Accuracy/bias	80 to 120% Recovery	ICV & CCV	A
		Accuracy	80 to 120% Recovery	LCS, LCSD, MS & MSD	A
		Precision	≤20% RPD	LCS, LCSD, MS & MSD	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #12-18
MEASUREMENT PERFORMANCE CRITERIA TABLE

Matrix	Water
Analytical Group	**Methane**
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP BERS-01, BERS-03, BERS-05, BERS-10, BERS-11, BERS-14	RSK 175, DV-GC-0025 Rev 3 (Denver)	Precision	RPD<30%	Field Duplicate (Discrete)	S&A
		Accuracy/Bias/ Contamination	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Blanks (Method Blank/Calibration Blanks)	A
		Accuracy/bias	$\leq$75 to 125% Recovery	ICV & CCV	A
		Accuracy	80 to 120% Recovery	LCS, LCSD, MS & MSD	A
		Precision	$\leq$20% RPD	LCS, LCSD, MS & MSD	A
		Sample Handling	Temperature and holding times	Temperature and Time	S&A

QAPP WORKSHEET #13
SECONDARY DATA CRITERIA AND LIMITATIONS TABLE

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Organization, Data Types, Data Generation/Collection Dates)	Data Quality Issues	How Data Will Be Used/ Limitations on Data Use
Historical Site Information and Military Operations Groundwater and Soil Quality Data	USACE, 2009. Decision Document: Hazardous, Toxic, and Radioactive Waste (HTRW) Project #F10AK096903, Northeast Cape Formerly Used Defense Site (FUDS) St. Lawrence Island, Alaska. Prepared by U.S. Army Corps of Engineers-Alaska District, January 2009.	USACE, Alaska District, identified areas that either required or did not require remedial action. The report contained historical site summaries from previous investigations.	Data quality issues were not addressed in the document.	Data is used for determining the site-specific cleanup levels.
Groundwater and Soil Quality Data, and In-Situ Remediation Study.	Bristol, 2010. U.S. Army Corps of Engineers, Alaska District In-Situ Chemical Oxidation (Phase I) and Intrusive Drum Removal/Landfill Cap Northeast Cape, St. Lawrence Island, Alaska, January 2010	Bristol, soil, groundwater analytical data, collected July – September, 2009.	No major data quality issues were noted.	Data is used for historical sample data and coordinates.
Soil, Sediment, Surface water, and Groundwater Quality Data. UVOST delineation of fuel contamination.	Bristol, 2011. Northeast Cape HTRW Remedial Actions; Prepared by Bristol Environmental Engineering Services, LLC, February 2011	Bristol, soil, sediment, surface water, and groundwater analytical data, collected July – September, 2010.	No major data quality issues were noted.	Data is used for historical sample data and coordinates.

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Organization, Data Types, Data Generation/Collection Dates)	Data Quality Issues	How Data Will Be Used/ Limitations on Data Use
Soil, Sediment, Surface water, and Groundwater Data	Shannon & Wilson, Inc. 2005. *Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska. Final, June 2005*	Shannon & Wilson, Inc., soil, sediment, groundwater surface water – collected August – September 2004	No major data quality issues were noted.	Data is used for historical sample data and coordinates.
Surface water, groundwater, sediment, surface and subsurface soils data.	Montgomery Watson. 2003. Phase III, Phase III Remedial Investigation Northeast Cape, St. Lawrence Island, Alaska, Final, Prepared by MWH. 2003	MWH, surface water, groundwater, sediment, surface and subsurface soils – Summer 2001 and 2002	No major data quality issues were noted.	Data is used for historical sample data and coordinates.
Soil sample data.	Bristol 2006, U.S. Army Corps of Engineers, Alaska District White Alice Tram and Debris Removal Northeast Cape, St. Lawrence Island, Alaska, Removal Action Report. September 2006.	Bristol, Soil samples collected June – September 2005	No major data quality issues were noted.	Data is used for historical sample data and coordinates.

QAPP WORKSHEET #14
SUMMARY OF PROJECT TASKS

Sampling Tasks

Worksheet #11 and Tables 11-1 and 11-2 provide details and summaries of sample collection and analyses. Professional land surveyors will reestablish sample locations at Site 8 and excavation areas at Site 13 and Site 31, along with 2010 UVOST probe locations that will be used to guide the excavations at the MOC.

The following sections briefly reiterate the sampling tasks:

Subsurface Soil

- Excavating, processing, and disposing of PCS to a depth of up to 15 feet bgs where accessible, or 2 feet below the groundwater, whichever comes first at the MOC, specifically at Sites 10, 11, 13, 15, 19 and 27. Subsurface confirmation soil samples will be collected from excavation limits from the floor if above groundwater and sidewalls
- Excavating, and disposing of PCB-contaminated soils from Site 13 (Heat and Power Plant) and Site 31 (White Alice Communications Station). Subsurface confirmation soil samples will be collected from excavation limits from the floor if above groundwater and sidewalls
- Excavating, and disposing of arsenic-contaminated soils from Site 21 (Wastewater Treatment Tank). Subsurface confirmation soil samples will be collected from the sidewalls of the excavation limit, and from the floor if above groundwater
- Conducting MNA sampling of PCS at Site 8 (POL Spill Site)

Surface Sediment/Soil

- Collecting up to 54 sediment samples from channels and ponded areas throughout the Site 28 Drainage Basin. Samples will be collected from a depth of approximately 0.5 foot bgs
- Collecting surface MI soil samples from five areas where bulk bags have been stored, specifically Cargo Beach, Site 6, and three areas near the MOC
- Collecting six discrete surface soil samples along radar dome road at the top of Kangukhsam Mountain

Groundwater

- Sampling nine monitoring wells at the MOC

Surface Water

- Conducting MNA sampling of petroleum-contaminated surface water at Site 8 (POL Spill Site)
- Collecting surface water samples from three locations before, during, and after the MOC excavation
- Collecting one surface water sample at Site 21 to be analyzed for total and dissolved arsenic
- Collecting surface water samples from three locations before, during, and after the Site 28 Phase I sediment removal

Bulk Bags

A sub-sample will be collected from each DOT-approved bulk bag and will be composited with as many as seven other grab samples to make one composite sample. The sub-sample will consist of soil collected from each end of the containers (two total per bulk bag). Bulk PCB and POL waste sample composites will be submitted to the field-screening laboratory for waste characterization.

Other Characterization Samples

- Site 28 Phase I sediment removal: collecting water samples from the primary and secondary water impoundments in order to determine if water is below criteria and able to be discharged to the ground
- Site 28 Phase I sediment removal: collecting samples from dewatered sediment for geotechnical and waste characterization purposes
- POL drums at Site 10: collecting samples of POL liquid in drums for waste characterization purposes

Analysis Tasks

Field analyses will consist of measuring temperature, pH, DO, conductivity, ORP, turbidity, nitrate, sulfate, ferrous iron, alkalinity, and dissolved manganese in surface and groundwater. The on-site field-screening laboratory will measure PCBs and DRO for field-screening purposes. TestAmerica will process, prepare, and analyze COCs in surface and subsurface soil, and groundwater. See Tables 11-1 and 11-2 for analytical requirements for each sample. Laboratory analysis will follow the SOPs listed on Worksheet #23.

An on-site field-screening laboratory will utilize gas chromatographs to provide results for DRO/RRO analyzed by Method AK 102/103 and for PCBs analyzed by EPA Method 8082. The field-screening laboratory will not be certified. The SOPs for the field-screening laboratory are in Attachment 5.

Quality Control Tasks

Field and laboratory QC samples are listed on Worksheets # 12, 20, and 28, and on Tables 11-1 and 11-2.

Tables 11-1 and 11-2 depict only the laboratory QC samples that have an impact on either field collection, or are relevant to the cost of the confirmation sampling. Laboratory QC samples will be prepared and analyzed according to the analytical method requirements and the laboratory's Quality Assurance Plan. Laboratory technical systems audits (TSAs) will be conducted by the Contract Laboratory QA manager prior to the start of the field sampling program, as identified in Worksheet #7. The Bristol Senior Technical Review Chemist will review data as it is submitted to Bristol to ensure that the laboratory is reporting in conformance with the QAPP and QC non-conformance issues are tracked and resolved as soon as possible. All laboratory analyses other than field screening will be performed in accordance with DoD QSM 4.2.

Secondary Data

See Worksheets #10 and #13 for a synopsis of secondary data.

Data Management Tasks

For each sample delivery group (SDG), a final analytical report and two electronic data deliverables (EDDs) will be provided. The final analytical report will be in a searchable PDF. One of the EDDs will be in SEDD format, Stage 2A, and compliant with the POA Instructional_Set. The second EDD will be in the COELT Electronic Deliverable Format (EDF) 1.2a format. All reports, photographs, data packages, and other deliverables will be compliant with the USACE, Alaska District, Manual for Electronic Deliverables (USACE, 2011). All laboratory reports and EDDs will be error free and full reports and EDDs will be provided in the Supplemental Data section of the final report. Hard copies of the analytical and QC samples will be provided as hard copy with the final report.

Documentation and Records

All sample locations will be surveyed by a Professional Land Surveyor and recorded. A field notebook will be used to record information about each sample, along with all field measurements. Information contained in the field books will be in compliance with Section 4.4.6 of the Statement of Work. Each sample will be tracked using secure chain-of-custody protocol until receipt at the laboratory and using laboratory sample logs afterward. Air bills for sample shipping will be retained. Site conditions, field measurements and soil descriptions will be recorded in the logbooks. Additional field forms may be completed as required by Bristol SOPs (see Attachments 1 and 2).

Well purging and sampling information will be recorded on a field form, including notes on groundwater sample collection.

Field Logbooks

Fieldwork will be documented in bound field log books with pre-numbered pages. Each book will contain the following information on the cover:

- Owner of the book
- Book number
- Job name and work order
- Start date
- End date

Daily entries will be recorded in field logbooks. The entries will include:

- Date and time
- Work start/stop times
- Weather
- Full names and titles/roles of personnel on site, including visitors
- Safety meetings/tailgates
- Level of PPE
- Name(s) of person(s) collecting samples or performing work
- Location of work areas (excavations and landfill areas) and sampling points (sketches when appropriate)
- Sample identification numbers and descriptions
- Sample shipping information (date, time, destination, location)
- Type of field instrumentation (model number and serial number)
- All calibrations performed and their results
- Other work performed
- Relevant field observations and comments
- Any deviations from the Work Plan

Assessment / Audit Tasks

Field sample collection and documentation audits will be conducted on site by the Bristol Project Contractor Quality Control System Manager (CQCSM) and on-site Chemist-QA/QC Manager as identified in Worksheet #7.

Laboratory Technical Systems Audits will be conducted prior to the initiation of the sampling program by the Contract Laboratory QA manager, as identified in Worksheet #7.

Data Review Tasks

When final laboratory analytical data has been received, a Bristol subcontractor, AECOM, will perform data verification in accordance with Worksheets #34 through #37. Bristol will complete the ADEC laboratory data checklists. AECOM will perform data verification after receiving all final reports for the 2012 field effort.

QAPP WORKSHEET #15
REFERENCE LIMITS AND EVALUATION TABLES

Tables 15-1 and 15-2 present the reporting limits (DL, LOD, LOQ) and evaluation criteria tables for soil and groundwater, respectively. These tables identify the analytical groups, site-specific cleanup levels, empirical sample IDs, and reporting limits for which samples collected at the NE Cape sites will be analyzed. For each target analyte/COC, the evaluation criteria have been identified based on either site-specific cleanup levels established in the NE Cape Decision Document (USACE, 2009; referenced in the Work Plan) or ADEC cleanup levels stated in 18 AAC 75, Section 341, Tables B1 and B2, Migration to Groundwater for Soils, and Table C from Section 345 for groundwater cleanup levels.

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Table 15-1 – Reference Limits and Evaluation Criteria for Soil and Sediment

Analyte	Analytical Group	Analytical Method	Preparation Method	CASRN	Units	NOAA SQuiRT Sediment Screening Criteria		Site-Specific Cleanup Criteria		Achievable Laboratory Limits		
						SEDIMENT-TEL[3]	SEDIMENT-PEL[3]	SEDIMENT	SOIL	DL	LOD	LOQ
POL												
Gasoline Range Organics - C_6 to C_{10}	FUELS	AK101	SW5035A	NS	mg/kg	NS	NS	NS	300[2]	0.46	1	4
Diesel Range Organics - C_{10} to C_{25}	FUELS	AK102	SW3550B	NS	mg/kg	NS	NS	3500[1]	9200[1]	2.3	6.50	20
Residual Range Organics - C_{25} to C_{36}	FUELS	AK103	SW3550B	NS	mg/kg	NS	NS	3500[1]	9200[1]	11	25.0	50
Volatile Organic Compounds												
Benzene	VOC	SW8260B	SW5035A	71-43-2	µg/kg	NS	NS	NS	2000[1]	4	10.0	16.0
Ethylbenzene	VOC	SW8260B	SW5035A	100-41-4	µg/kg	NS	NS	NS	6900[2]	10.00	30.0	40.0
Toluene	VOC	SW8260B	SW5035A	108-88-3	µg/kg	NS	NS	NS	6500[2]	10.00	30.0	40.0
m-Xylene & p-Xylene	VOC	SW8260B	SW5035A	1330-20-7	µg/kg	NS	NS	NS	NS	10.0	30.0	40
o-Xylene	VOC	SW8260B	SW5035A	95-47-6	µg/kg	NS	NS	NS	NS	10.00	30.0	40.0
Xylenes, total	VOC	SW8260B	SW5035A	1330-20-7	µg/kg	NS	NS	NS	63000[2]	10.00	30.0	40.0
Polynuclear Aromatic Hydrocarbons												
Acenaphthene	PAH	SW8270C-SIM	SW3550B	83-32-9	µg/kg	6.71	88.9	500[1]	180000[2]	1.5	2.5	5.0
Acenaphthylene	PAH	SW8270C-SIM	SW3550B	208-96-8	µg/kg	5.87	128	NS	180000[2]	1.5	2.5	5.0
Anthracene	PAH	SW8270C-SIM	SW3550B	120-12-7	µg/kg	46.9	245	NS	3000000[2]	1.5	2.5	5.0
Benzo(a)anthracene	PAH	SW8270C-SIM	SW3550B	56-55-3	µg/kg	31.7	385	NS	3600[2]	1.5	2.5	5.0
Benzo(b)fluoranthene	PAH	SW8270C-SIM	SW3550B	205-99-2	µg/kg	NS	NS	NS	12000[2]	1.5	2.5	5.0
Benzo(k)fluoranthene	PAH	SW8270C-SIM	SW3550B	207-08-9	µg/kg	NS	NS	NS	120000[2]	1.5	2.5	5.0
Benzo(a)pyrene	PAH	SW8270C-SIM	SW3550B	50-32-8	µg/kg	370	782	NS	2100[2]	1.5	2.5	5.0
Benzo(g,h,i)perylene	PAH	SW8270C-SIM	SW3550B	191-24-2	µg/kg	170	NS	1700[1]	38700000[2]	1.5	2.5	5.0
Chrysene	PAH	SW8270C-SIM	SW3550B	218-01-9	µg/kg	57.1	862	NS	360000[2]	1.5	5.0	5.0
Dibenz(a,h)anthracene	PAH	SW8270C-SIM	SW3550B	53-70-3	µg/kg	6.22	135	NS	4000[2]	1.5	2.5	5.0
Fluoranthene	PAH	SW8270C-SIM	SW3550B	206-44-0	µg/kg	111	2355	2000[1]	1400000[2]	1.5	2.5	5.0
Fluorene	PAH	SW8270C-SIM	SW3550B	86-73-7	µg/kg	21.2	144	800[1]	220000[2]	1.5	2.5	5.0
Indeno(1,2,3-cd)pyrene	PAH	SW8270C-SIM	SW3550B	193-39-5	µg/kg	NS	NS	3200[1]	41000[2]	1.5	2.5	5.0
2-Methylnaphthalene	PAH	SW8270C-SIM	SW3550B	91-57-6	µg/kg	NS	NS	600[1]	6100[2]	2.0	5.0	5.0
Naphthalene	PAH	SW8270C-SIM	SW3550B	91-20-3	µg/kg	34.6	391	1700[1]	120000[1]	2.0	2.5	5.0
Phenanthrene	PAH	SW8270C-SIM	SW3550B	94-09-7	µg/kg	41.9	515	4800[1]	3000000[2]	1.5	2.5	5.0
Pyrene	PAH	SW8270C-SIM	SW3550B	129-00-0	µg/kg	53	875	NS	1000000[2]	1.5	2.5	5.0
Polychlorinated Biphenyls												
PCB-1221	PCB	SW8082A	SW3550B	11104-28-2	mg/kg	NS	NS	0.7[1]	1[1]	0.0032	0.005	0.010
PCB-1016	PCB	SW8082A	SW3550B	12674-11-2	mg/kg	NS	NS	0.7[1]	1[1]	0.0080	0.005	0.011
PCB-1232	PCB	SW8082A	SW3550B	11141-16-5	mg/kg	NS	NS	0.7[1]	1[1]	0.0070	0.010	0.011
PCB-1242	PCB	SW8082A	SW3550B	53469-21-9	mg/kg	NS	NS	0.7[1]	1[1]	0.0021	0.005	0.010
PCB-1248	PCB	SW8082A	SW3550B	12672-29-6	mg/kg	NS	NS	0.7[1]	1[1]	0.0030	0.005	0.010
PCB-1254	PCB	SW8082A	SW3550B	11097-69-1	mg/kg	.06	.34	0.7[1]	1[1]	0.0021	0.005	0.010
PCB-1260	PCB	SW8082A	SW3550B	11096-82-5	mg/kg	NS	NS	0.7[1]	1[1]	0.0030	0.005	0.010
PCBs (sum)	PCB	SW8082A	SW3550B	1336363	mg/kg	0.034	0.277	0.7[1]	1[1]	NS	NS	NS

Table 15-1 – Reference Limits and Evaluation Criteria for Soil and Sediment (continued)

Analyte	Analytical Group	Analytical Method	Preparation Method	CASRN	Units	NOAA SQuiRT Sediment Screening Criteria		Site-Specific Cleanup Criteria		Achievable Laboratory Limits		
						SEDIMENT-TEL[3]	SEDIMENT-PEL[3]	SEDIMENT	SOIL	DL	LOD	LOQ
Total Metals												
Arsenic	Metals	SW6020A	SW3050B	7440-38-2	mg/kg	5900	17000	93 [1]	11[1]	0.18	0.4	0.50
Barium	Metals	SW6020A	SW3050B	7440-39-3	mg/kg	NS	NS	NS	3.9[2]	0.03	0.04	0.20
Cadmium	Metals	SW6020A	SW3050B	7440-43-9	mg/kg	596	3530	NS	5.0[2]	0.008	0.02	0.20
Chromium	Metals	SW6020A	SW3050B	7440-47-3	mg/kg	37300	90000	270[1]	25[2]	0.113	0.15	0.20
Lead	Metals	SW6020A	SW3050B	7439-92-1	mg/kg	35000	91300	530[1]	400[2]	0.013	0.020	0.20
Mercury	Metals	SW7471B	SW7471B	7439-97-6	mg/kg	174	486	NS	1.4[2]	0.0063	0.01	0.02
Nickel	Metals	SW6020A	SW3050B	7440-02-0	mg/kg	18000	36000	NS	86[2]	0.071	0.25	0.50
Selenium	Metals	SW6020A	SW3050B	7782-49-2	mg/kg	NS	NS	NS	3.4[2]	0.202	0.4	0.70
Silver	Metals	SW6020A	SW3050B	7440-22-4	mg/kg	NS	NS	NS	11.2[2]	0.012	0.02	0.20
Vanadium	Metals	SW6020A	SW3050B	7440-62-2	mg/kg	NS	NS	NS	3400[2]	0.473	0.5	0.70
Zinc	Metals	SW6020A	SW3050B	7440-66-6	mg/kg	123000	315000	960[1]	4100[2]	1.12	1.50	2.00

Notes:

[1] Site-specific cleanup values established in 2009 Decision Document

[2] Cleanup levels from 18AAC75 Section 341, Tables B1 and B2, migration to groundwater

[3] Screening values from NOAA SQuiRT tables, Freshwater Sediment 2009

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
AAC = Alaska Administrative Code
AK = Alaska Test Method
CASRN = Chemical Abstracts Service Registry Number
DL= detection limit
LOD = limit of detection
LOQ = limit of quantitation
NOAA = National Oceanic & Atmospheric Administration
NS = not specified
PAH = polynuclear aromatic hydrocarbon
PCB = polychlorinated biphenyls
PEL = Permissible Exposure Limit
POL = petroleum, oil, and lubricants
SIM = selective ion monitoring
SQuiRT = Screening Quick Reference Table
SW = EPA Solid Waste Test Method
TEL = Threshold Effects Level
VOC = volatile organic compounds

Table 15-2 – Reference Limits and Evaluation Criteria for Water

Analyte	Analytical Group	Analytical Method	CASRN	Preparation Method	Units	Site-Specific Cleanup Levels	Achievable Laboratory Limits		
						ADEC Cleanup Levels[1]	DL	LOD	LOQ
POL									
Gasoline Range Organics - C_6 to C_{10}	TPH	AK101	NS	SW5030B	mg/L	1.3 [2]	0.015	0.044	0.05
Diesel Range Organics - C_{10} to C25	TPH	AK102	NS	SW3510C	mg/L	1.5	0.022	0.06	0.1
Residual Range Organics - C_{25} to C36	TPH	AK103	NS	SW3510C	mg/L	1.1	0.027	0.06	0.1
Volatile Organic Compounds									
Benzene	VOC	SW8260B	71-43-2	SW5030B	µg/L	5.0	0.15	0.45	1.0
Ethylbenzene	VOC	SW8260B	100-41-4	SW5030B	µg/L	700	0.15	0.45	1.0
Toluene	VOC	SW8260B	108-88-3	SW5030B	µg/L	1,000	0.15	0.45	1.0
m-Xylene & p-Xylene	VOC	SW8260B	1330-20-7	SW5030B	µg/L	NS	0.30	0.9	2.0
o-Xylene	VOC	SW8260B	95-47-6	SW5030B	µg/L	NS	0.15	0.45	1.0
Xylenes, total	VOC	SW8260B	1330-20-7	SW5030B	µg/L	10,000	0.45	1.35	3.0
Polynuclear Aromatic Hydrocarbons (PAHs)									
Acenaphthene	PAH	SW8270C-SIM	83-32-9	SW3510C	µg/L	2,200	0.03	0.075	0.13
Acenaphthylene	PAH	SW8270C-SIM	208-96-8	SW3510C	µg/L	2,200	0.03	0.075	0.10
Anthracene	PAH	SW8270C-SIM	120-12-7	SW3510C	µg/L	11,000	0.03	0.075	0.10
Benzo(a)anthracene	PAH	SW8270C-SIM	56-55-3	SW3510C	µg/L	1.2	0.03	0.075	0.10
Benzo(b)fluoranthene	PAH	SW8270C-SIM	205-99-2	SW3510C	µg/L	1.2	0.03	0.075	0.10
Benzo(k)fluoranthene	PAH	SW8270C-SIM	207-08-9	SW3510C	µg/L	12	0.03	0.075	0.10
Benzo(a)pyrene	PAH	SW8270C-SIM	50-32-8	SW3510C	µg/L	0.2	0.03	0.075	0.20
Benzo(g,h,i)perylene	PAH	SW8270C-SIM	191-24-2	SW3510C	µg/L	1,100	0.03	0.075	0.10
Chrysene	PAH	SW8270C-SIM	218-01-9	SW3510C	µg/L	120	0.03	0.075	0.10
Dibenz(a,h)anthracene	PAH	SW8270C-SIM	53-70-3	SW3510C	µg/L	0.12	0.03	0.075	0.10
Fluoranthene	PAH	SW8270C-SIM	206-44-0	SW3510C	µg/L	1,500	0.03	0.075	0.10
Fluorene	PAH	SW8270C-SIM	86-73-7	SW3510C	µg/L	1,500	0.03	0.075	0.10
Indeno(1,2,3-cd)pyrene	PAH	SW8270C-SIM	193-39-5	SW3510C	µg/L	1.2	0.03	0.08	0.10
1-Methylnaphthalene	PAH	SW8270C-SIM	90-12-0	SW3510C	µg/L	150	0.03	0.075	0.10
2-Methylnaphthalene	PAH	SW8270C-SIM	91-57-6	SW3510C	µg/L	150	0.03	0.075	0.10
Naphthalene	PAH	SW8270C-SIM	91-20-3	SW3510C	µg/L	730	0.04	0.075	0.10
Phenanthrene	PAH	SW8270C-SIM	94-09-7	SW3510C	µg/L	11,000	0.03	0.075	0.10
Pyrene	PAH	SW8270C-SIM	129-00-0	SW3510C	µg/L	1,100	0.03	0.075	0.10
Polychlorinated Biphenyls									
PCB-1221	PCB	SW8082A	11104-28-2	SW3520C	µg/L	0.5	0.062	0.13	0.5
PCB-1016	PCB	SW8082A	12674-11-2	SW3520C	µg/L	0.5	0.045	0.10	0.5
PCB-1232	PCB	SW8082A	11141-16-5	SW3520C	µg/L	0.5	0.041	0.10	0.5
PCB-1242	PCB	SW8082A	53469-21-9	SW3520C	µg/L	0.5	0.041	0.10	0.5
PCB-1248	PCB	SW8082A	12672-29-6	SW3520C	µg/L	0.5	0.071	0.08	0.5
PCB-1254	PCB	SW8082A	11097-69-1	SW3520C	µg/L	0.5	0.044	0.13	0.5
PCB-1260	PCB	SW8082A	11096-82-5	SW3520C	µg/L	0.5	0.039	0.08	0.5

Table 15-2 – Reference Limits and Evaluation Criteria for Water (continued)

Analyte	Analytical Group	Analytical Method	CASRN	Preparation Method	Units	Site-Specific Cleanup Levels	Achievable Laboratory Limits		
						ADEC Cleanup Levels[1]	DL	LOD	LOQ
Metals									
Arsenic (total)	Metals	SW6020A	7440-38-2	SW3005A	µg/L	NS	3.75	4	5.0
Arsenic (dissolved)	Metals	SW6020A	7440-38-2	SW3005A	µg/L	10	3.75	4	5.0
Barium (total)	Metals	SW6010C	7440-39-3	SW3005A	µg/L	NS	0.27	1.0	6
Barium (dissolved)	Metals	SW6010C	7440-39-3	SW3005A	µg/L	2,000	0.27	1.0	6
Cadmium (total)	Metals	SW6020A	7440-43-9	SW3005A	µg/L	NS	0.140	0.25	2.0
Cadmium (dissolved)	Metals	SW6020A	7440-43-9	SW3005A	µg/L	5	0.140	0.25	2.0
Chromium (total)	Metals	SW6010C	7440-70-2	SW3005A	µg/L	NS	1.35	1.5	2
Chromium (dissolved) (includes Cr+3 and Cr+6)	Metals	SW6010C	7440-47-3	SW3005A	µg/L	100	1.35	1.5	2
Lead (total)	Metals	SW6010C	7439-89-6	SW3005A	µg/L	NS	0.17	0.25	2
Lead (dissolved)	Metals	SW6020A	7439-92-1	SW3005A	µg/L	15	0.17	0.25	2
Mercury (total)	Metals	SW6020A	7439-96-5	SW3005A	µg/L	NS	0.041	0.1	0.2
Mercury (dissolved)	Metals	SW7470A	7439-97-6	SW7470A	µg/L	2	0.041	0.1	0.2
Nickel (total)	Metals	SW6010C	7439-98-7	SW3005A	µg/L	NS	2.0	2.50	15
Nickel (dissolved)	Metals	SW6010C	7440-02-0	SW3005A	µg/L	100	2.0	2.50	15
Selenium (total)	Metals	SW6010C	7440-09-7	SW3005A	µg/L	NS	3.55	4	5
Selenium (dissolved)	Metals	SW6020A	7782-49-2	SW3005A	µg/L	50	3.55	4	5
Silver (total)	Metals	SW6020A	7782-49-2	SW3005A	µg/L	NS	0.15	0.25	2.0
Silver (dissolved)	Metals	SW6020A	7440-22-4	SW3005A	µg/L	100	0.15	0.25	2.0
Vanadium (total)	Metals	SW6020A	7440-31-5	SW3005A	µg/L	NS	4.875	5	10
Vanadium (dissolved)	Metals	SW6020A	7440-31-5	SW3005A	µg/L	260	4.875	5	10
Zinc (total)	Metals	SW6010C	7440-62-2	SW3005A	µg/L	NS	4.4	5.0	7
Zinc (dissolved)	Metals	SW6020A	7440-66-6	SW3005A	µg/L	5,000	4.4	5.0	7

Notes:

[1]Cleanup levels from 18AAC75 Section 345, Table C, Groundwater Cleanup Levels

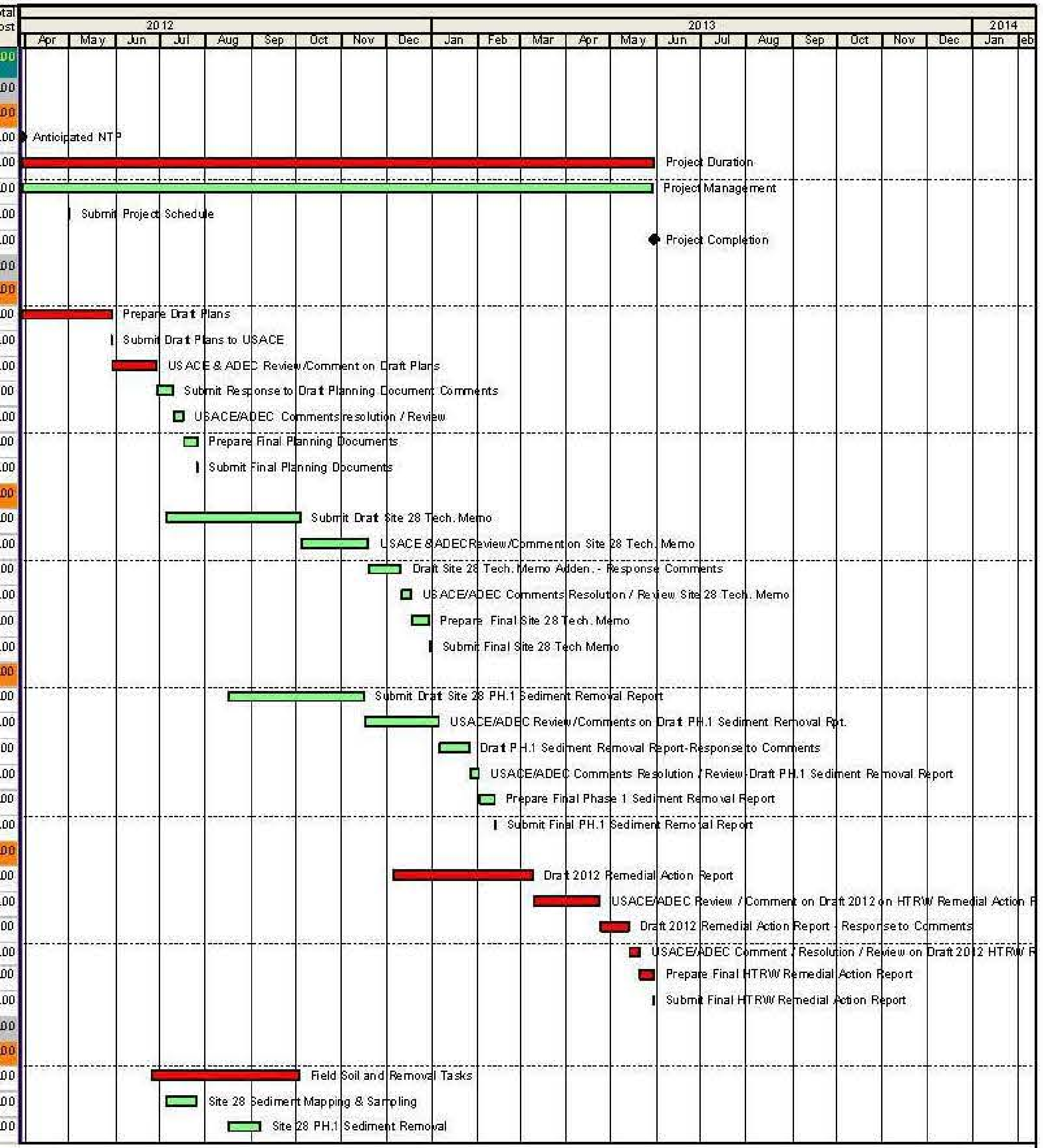
[2]Site-specific cleanup values established in 2009 Decision Document

ADEC = Alaska Department of Environmental Conservation

AK = Alaska Test Method
CASRN = Chemical Abstracts Service Registry Number
DL= detection limit
LOD = limit of detection
LOQ = limit of quantitation
mg/L= milligrams per liter
µg/L = micrograms per liter
NS = not specified
PAH = polynuclear aromatic hydrocarbon
PCB = polychlorinated biphenyls
SIM = selective ion monitoring
SW = EPA Solid Waste Test Method
TPH = total petroleum hydrocarbons
VOC = volatile organic compounds

QAPP WORKSHEET #16
PROJECT SCHEDULE / TIMELINE TABLE

Activity ID	Activity Name	OD	Early Start	Early Finish	TF	Budgeted Total Cost
	Total	534	Mar-30-12	May-30-13	0	$5,999,300.00
	General Conditions	534	Mar-30-12	May-30-13	0	$143,705.00
	General Conditions	534	Mar-30-12	May-30-13	0	$143,705.00
GC01	Anticipated NTP	0	Mar-30-12		0	$0.00
GC03	Project Duration	417	Mar-30-12	May-30-13	0	$0.00
GC05	Project Management	416	Mar-30-12	May-29-13	1	$143,705.00
GC06	Submit Project Schedule	1	Apr-30-12	Apr-30-12	27	$0.00
GC04	Project Completion	0		May-30-13	0	$0.00
	Submittals	534	Mar-30-12	May-30-13	0	$370,717.00
	Planning Doc's	149	Mar-30-12	Jul-26-12	58	$109,613.00
P01	Prepare Draft Plans	60	Mar-30-12	May-29-12	0	$72,345.00
P01-1	Submit Draft Plans to USACE	1	May-29-12	May-29-12	0	$0.00
P01-2	USACE & ADEC Review/Comment on Draft Plans	30	May-30-12	Jun-28-12	0	$0.00
P02	Submit Response to Draft Planning Document Comments	10	Jun-29-12	Jul-09-12	45	$5,000.00
P03	USACE/ADEC Comments resolution / Review	7	Jul-10-12	Jul-16-12	45	$0.00
P04	Prepare Final Planning Documents	10	Jul-17-12	Jul-26-12	45	$32,268.00
P05	Submit Final Planning Documents	1	Jul-26-12	Jul-26-12	45	$0.00
	Site 28 Tech Memo Addendum	224	Jul-05-12	Dec-30-12	86	$77,393.00
P500	Submit Draft Site 28 Tech. Memo	90	Jul-05-12	Oct-03-12	67	$62,393.00
P501	USACE &ADEC Review/Comment on Site 28 Tech. Memo	45	Oct-04-12	Nov-18-12	67	$0.00
P502	Draft Site 28 Tech. Memo Adden. - Response Comments	20	Nov-19-12	Dec-10-12	67	$5,000.00
P503	USACE/ADEC Comments Resolution / Review Site 28 Tech. Memo	7	Dec-11-12	Dec-17-12	67	$0.00
P505	Prepare Final Site 28 Tech. Memo	10	Dec-18-12	Dec-29-12	67	$10,000.00
P507	Submit Final Site 28 Tech Memo	1	Dec-30-12	Dec-30-12	67	$0.00
	Site 28 Ph.1 Sediment Removal Report	226	Aug-16-12	Feb-12-13	31	$49,865.00
P200	Submit Draft Site 28 PH.1 Sediment Removal Report	90	Aug-16-12	Nov-15-12	25	$34,865.00
P201	USACE/ADEC Review/Comments on Draft PH.1 Sediment Removal Rpt.	45	Nov-16-12	Jan-05-13	25	$0.00
P202	Draft PH.1 Sediment Removal Report-Response to Comments	20	Jan-06-13	Jan-25-13	25	$5,000.00
P203	USACE/ADEC Comments Resolution / Review-Draft PH.1 Sediment Removal Report	7	Jan-26-13	Feb-01-13	25	$0.00
P205	Prepare Final Phase 1 Sediment Removal Report	10	Feb-02-13	Feb-11-13	25	$10,000.00
P206	Submit Final PH.1 Sediment Removal Report	1	Feb-12-13	Feb-12-13	25	$0.00
	2012 HTRW Remedial Action Report	220	Dec-06-12	May-30-13	0	$133,846.00
P250	Draft 2012 Remedial Action Report	90	Dec-06-12	Mar-09-13	0	$99,925.00
P251	USACE/ADEC Review / Comment on Draft 2012 on HTRW Remedial Action Report	45	Mar-10-13	Apr-23-13	0	$0.00
P252	Draft 2012 Remedial Action Report - Response to Comments	20	Apr-24-13	May-13-13	0	$5,000.00
P253	USACE/ADEC Comment / Resolution / Review on Draft 2012 HTRW Remedial Action R...	7	May-14-13	May-20-13	0	$0.00
P255	Prepare Final HTRW Remedial Action Report	10	May-21-13	May-30-13	0	$28,921.00
P256	Submit Final HTRW Remedial Action Report	1	May-30-13	May-30-13	0	$0.00
	Remedial Activities	125	Jun-25-12	Oct-02-12	0	$5,484,878.00
	Remedial Activities	125	Jun-25-12	Oct-02-12	0	$5,484,878.00
1003	Field Soil and Removal Tasks	98	Jun-25-12	Oct-02-12	0	$4,876,740.00
1004	Site 28 Sediment Mapping & Sampling	21	Jul-05-12	Jul-25-12	46	$258,684.00
1005	Site 28 PH.1 Sediment Removal	21	Aug-16-12	Sep-06-12	25	$349,454.00



Actual Work
Remaining Work
Critical Remaining Work
Milestone

2012CP00

NE Cape 2012 Remedial Action MW

Page 1 of 1

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

Date	Revision	Checked	Approved
Apr-18-12	cost edits		

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QAPP WORKSHEET #17
SAMPLE DESIGN AND RATIONALE

Describe and provide a rationale for choosing the sampling approach (e.g., grid system, biased statistical approach):

The sampling details, such as matrix, analyses type of sampling, sample depth, sampling tools, and rationale for sample collection to be performed at each of the sites are summarized in Worksheet #11 and Tables 11-1 and 11-2. Sample locations are depicted in figures contained in the Work Plan. Specific compounds of potential concern (COPCs) for the various analyses are listed on Tables 15-1 and 15-2. The field procedures that will be applicable in the implementation of the sampling strategies are listed in Worksheet #21 and included in Attachment 1. The rationale for choosing the sampling approach for each site is discussed below.

Subsurface Soil Sampling at Excavation Sites

Confirmation samples from excavations will be collected using a grid system. Field-screening results from the on-site laboratory for POL and PCBs will indicate when cleanup goals have potentially been achieved in a portion or all of an excavation. Confirmation samples will be collected from the floor and sidewalls of the contaminated areas. Confirmation samples will not be collected from the excavation floor if water has submerged that portion of the floor. The total number of samples collected will be based on the final area excavated, which will be determined in the field.

The PCB soil confirmation samples will be collected for each 25 square feet of excavated area and up to 9 samples may be composited by the laboratory into one analytical sample. Floor samples and sidewall samples will be composited separately. Less than 9 samples may be composited if screening results indicate that the PCB concentrations are less than cleanup levels but above concentrations that would fail the 1/n threshold if up to 9 samples were composited together.

The POL confirmation samples will be collected and analyzed as discrete samples. Two samples will be collected for the first 250 square feet of contaminated area that was excavated, and one sample will be collected from each additional 250 feet of excavated area. Samples will be collected from the excavation sidewalls at a frequency of 1 sample per 20 linear feet.

There is no field screening for arsenic in soil, so only confirmation samples will be collected from the Site 21 excavation. Two floor confirmation samples will be collected for the first 250 square feet and one sample will be collected for each additional 250 square feet of impacted area. No samples will be collected at those locations where the surface water depth is greater than 2 feet above the excavation floor. Samples will be collected from the excavation sidewalls at a frequency of 1 sample per 20 linear feet.

Bulk Waste Sampling Protocol

The PCB and POL bulk waste samples will be collected from two locations within each bulk bag immediately after they are filled. Bulk waste samples will be stored in sealed glass containers for compositing. Up to seven bulk bags will be composited for waste characterization. If PCB excavation field screening indicates that soil concentrations are greater than 45 mg/kg, then those soils will be bagged, segregated, and manifested as TSCA-level waste without characterizing or compositing. Bulk waste samples will be analyzed by the field-screening laboratory, except for arsenic. Arsenic bulk soil will be analyzed by TestAmerica. Bulk waste results will be used to properly dispose of the wastes at the waste handling facilities.

PCB Wipe Sample Collection

Excavation activities may expose buried concrete in contact with PCB-contaminated soils. Concrete that has been exposed to soils containing PCB concentrations above cleanup levels will be wipe-sampled; appropriate disposal methods for the concrete will be determined.

Samples from the concrete will be collected at a rate of one sample per 250 square feet of exposed concrete. Field and sampling procedures will consist of the following as determined by Toxic Substances Control Act (TSCA) requirements and Title 40, Code of Federal Regulations, Part 761.125 (40 CFR 761.125):

- Determine the sample location and prepare for sampling by cleaning the area. Cleaning will consist of dry brushing followed by pressure washing. Once the area has air dried, it will be brushed again prior to sample collection.
- The sample area will be measured and marked with indelible marker to comprise an area that is 10 centimeters wide by 10 centimeters long.
- A piece of cotton gauze will be folded and coated with 5 milliliters of hexane solvent. The sampler will wear two layers of nitrile gloves and will change gloves between sample locations.
- The sample will be collected by wiping the gauze twice across the entire sample area, first from left to right and then from top to bottom.
- The gauze will then be placed into a sampling vial, upon which the sample ID will be marked. The vial will be capped for submission to the field laboratory.
- Sampling details will be recorded in the sampler's fieldbook, and digital photographs will be taken.

The wipe sample will be collected using the EPA double wash-rinse cleanup wipe technique (EPA, 1987). The EPA wipe technique is contained in Attachment 5 of the QAPP (Field Lab SOPs). The field laboratory will analyze the PCB wipe samples, and 10 percent of the samples will be sent to the fixed laboratory for verification of the field laboratory results.

Site 8 Soil and Surface Water Collection

Surface water samples and field parameters for natural attenuation evaluation at Site 8 will be collected from the DUs established in 2010 for comparing natural attenuation parameters as summarized in Table 11-2. Individual grid locations will again be selected using a random number generator. Only grid locations containing surface water will be sampled. The two surface water sample locations near the outfall of Site 8 and the Suqitughneq River will be at the same locations. The Site 8 DU boundaries and surface water sample locations near the outfall will be reestablished using 2010 survey data prior to any sample collection.

Soil samples will be collected from the same grid locations as MNA locations after field parameter and MNA sample collection. A T-handled sampler will be used to collect the soil samples. Soil from the eight locations within each DU will be composited and analyzed for DRO/RRO (with and without silica gel cleanup), PAHs and TOC.

Groundwater

Locations for groundwater sampling were selected based on the previous results and the condition of the wells (whether they were usable wells). Nine MOC groundwater monitoring wells will be sampled in 2012. The 2012 monitoring wells are the same wells that were sampled in 2011. Samples from these existing wells are meant to provide additional information for MNA and monitor COCs. The results will be used to establish contaminant trends and determine if MNA is a viable remedial option.

Site 28 Sediment Mapping and Sampling

A sediment mapping effort will be performed at Site 28 in 2012 to determine where sediment exists in Site 28. For this mapping effort, sediment will be all loose mineral and organic material that is not actively growing vegetation or part of the vegetative mat. . Mineral material atop a living vegetative mat, or mineral material in a predominantly peat interval, will not be considered sediment.

Sediment samples will be collected after the mapping effort to fill data gaps and further delineate the extent and magnitude of contaminated sediment at Site 28. Up to 24 samples will be collected from active channels at approximately 50-foot intervals. If a sediment-containing section of stream is less than 50 feet long, then one sample will be collected from the section. The total number of samples collected from streams will not exceed 24 samples. Three sediment samples will be collected from each of the ponds for a total not to exceed 30 samples. Sample densities and locations may be adjusted following the sediment mapping effort, as dictated by the presence or absence of sediment at Site 28. Samples will be concentrated in sediment dominated areas in the vicinity of historically contaminated locations. Samples will be collected at a depth of approximately 0.5 foot bgs using a T-handled sampler, hand auger, shovel, sediment dredge, or disposable stainless spoon, and analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals plus nickel, vanadium and zinc. Sediment analysis will also include silica gel cleanup and TOC as described in ADEC Technical Memorandum 06-001 (ADEC, 2006). Samples for multiple analyses may be collected and submitted in a single jar, except for BTEX analyses.

Site 28 Phase I Sediment Removal Samples

Results from the sediment mapping and characterization efforts will be discussed and evaluated with the on-site QAR, other USACE personnel, and ADEC personnel to determine the best approach for a mechanical removal of sediment at the Site 28 drainage basin. Part of the consideration will be an assessment to determine the potential for further environmental impact due to sediment removal activities. Once the project team has reached a consensus on the appropriate course of action at Site 28, Bristol will proceed as recommended by the project team.

Various samples will be collected during the Site 28 Phase I sediment removal action, including surface water samples, water impoundment samples, and sediment samples.

Soil/sediment removal activities may produce large volumes of water requiring impoundment, treatment, and sampling. This water will be treated with a water scrubber, impounded, and then sampled to confirm that it is below the ADEC Table C groundwater cleanup level. The water collected from the Site 28 dewatering impoundment will be analyzed for GRO/BTEX, DRO/RRO, PAHs, total and dissolved metals (includes 8 RCRA metals plus nickel, vanadium, and zinc) and PCBs, which has previously been approved by ADEC, prior to the water being discharged to the ground.

Surface water samples will be collected before, during, and after the sediment removal to ensure that disturbance to the tundra wetland environment is minimized. The samples will be collected from three locations downstream of the area where work is occurring. The locations will be selected by the on-site Bristol CQCSM and USACE QAR. Surface water sample will be analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals plus nickel, vanadium, and zinc. Surface water samples will also be analyzed for field turbidity.

Sediment removed during the Phase I effort will be dewatered prior to off-site transport and disposal; a dewatering site with water impoundment areas will be constructed. Water will first enter a primary impoundment, after which it will be treated through a filtering system and discharged into a secondary impoundment. Wastewater samples will be collected from both the primary and secondary impoundments and analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals plus nickel, vanadium, and zinc. Samples will also be analyzed for field turbidity. If sample results confirm that all contaminant concentrations are below discharge criteria presented in the State of Alaska Wastewater General Permit 2009DB0004, then the treated water will be discharged to the ground.

Samples of the dewatered sediment will be collected for characterization purposes. Two representative dewatered sediment samples will be submitted to DOWL HKM to determine moisture content and density, with a sieve-test analysis performed on one of the two samples. In addition, four representative sediment samples will be collected for waste characterization purposes and submitted to the analytical laboratory for analysis of GRO, BTEX, DRO/RRO, PAHs, PCBs and 8 RCRA metals plus nickel, vanadium and zinc. The analyses will also include silica gel cleanup and TOC analysis. Final disposal of the sediment will be determined based on the results from these samples.

Bulk Bag Staging Area MI Soil Sampling

An MI sampling approach is designed to obtain a mean concentration for a specified area by reducing sampling errors. MI sampling will be performed at the five areas where bulk bags have been staged throughout the project. These areas are Cargo Beach, Site 6, and three areas near the MOC (one location south of the fuel containment area at the Site 26 former construction camp, one directly northeast of the present-day ISO fuel tank containment area, and the primary MOC bulk bag staging area located north of the ISO tanks directly across Cargo Beach Road). Various sampling tools will be tested in each area to determine the best tool for the material. MI soil samples will be analyzed for DRO and PCBs.

Cargo Beach will be sampled early during the project while the beach is free of equipment, containers, and bulk bags. Since the remaining sites are currently being used as staging areas, they will be sampled as soon as possible when the site becomes free of bulk bags. Post-use MI samples will be collected at Site 6 and the areas associated with the MOC at the end of the project when all bulk bags have been removed from those locations.

Cargo Beach will be divided into six DUs consisting of approximately 15,000 square feet. The DUs will be located along approximately 1,400 feet of shoreline and vary in width depending on the landscape, but the average width will be approximately 65 feet. Each DU will be divided into approximately 40 to 50 incremental units, which will be sampled in an unbiased manner using a random number generator.

The Site 6 staging area is approximately 30,000 square feet and will be divided into four DUs of approximately 7,500 square feet each. Each DU will be determined on site and divided into 30 to 50 incremental units. The increments will be sampled in an unbiased manner from each DU.

The MOC staging areas consist of three areas: one area south of the present-day refueling area (ISO tanks) at the Site 26 Former Construction Camp, one area directly northeast of the ISO tanks, and the primary MOC bulk bag staging area located north of the ISO tanks directly across Cargo Beach Road. The MOC bag staging areas cover an area of approximately 10,000 square feet. Each DU will be approximately 3,333 square feet, and will be divided into 30 to 50 incremental units. The increments will be sampled in an unbiased manner from each DU.

Radar Dome Road Sampling

A citizen of Savoonga reported an anomalous lack of vegetation along both sides of the radar dome road at the top of Kangukhsam Mountain. Bristol will collect six discrete soil samples from areas exhibiting stressed or absent vegetation at the top of the mountain to determine whether contamination from historical site activities may be hindering vegetative growth. The samples will be analyzed for GRO, BTEX, DRO/RRO, PAHs, PCBs, and 8 RCRA metals plus nickel, vanadium and zinc.

POL Drum Sampling

Drums and small amounts of associated POL liquid were encountered during POL-contaminated soil removal activities in 2011. It is believed that additional drums may be present in the vicinity of Site 10. Bristol will attempt to locate any remaining drums using a metal detector, and an excavator will be utilized to recover the drums and any associated liquids. Drum contents will be sampled for DRO/RRO, TCLP VOCs, TCLP

8 RCRA metals, TCLP SVOCs, ignitability, and corrosivity in order to characterize the liquid for proper disposal.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations):

The sampling details, such as media, type of sampling, sample depth, sample analyses, sampling tools, and rationale for sample collection to be performed at each of the project areas is presented in Worksheet #11 and Tables 11-1 and 11-2. The SOPs that will be applicable in the implementation of the sampling strategies are included in Attachment 1.

Soil, sediment, subsurface soil, surface water, groundwater, and POL liquids will be sampled. Discussion of investigation-derived waste (IDW) sampling, characterization, and disposal are provided in the Work Plan (Bristol, 2011b) and BERS SOP BERS-09 (provided in Attachment 1).

To reduce redundancy, only general information on how decisions were made regarding these elements is presented in the paragraphs below. Worksheet #11 and Tables 11-1 and 11-2 outline the sampling design and rationale, matrices and associated suites of analytes, expected concentration levels, as well as types and number of field and laboratory QC samples applicable to each sub-site.

Based on historical soil data, POL concentrations are expected to be from approximately 250 mg/kg to greater than 70,000 mg/kg. Arsenic concentrations are expected to be non-detect to approximately 180 mg/kg, and PCBs are expected to be non-detect to greater than 50 mg/kg. Based on historical groundwater data, DRO concentrations are expected to range from non-detect to approximately 12 mg/L, RRO from non-detect to approximately 1.6 mg/L, and benzene from non-detect to approximately 10 micrograms per liter. Based on historical sediment data, Site 28 samples are expected to range from non-detect to approximately 8,000 mg/kg for DRO, non-detect to approximately 5,000 mg/kg for RRO, and non-detect to approximately 1.5 mg/kg total PCBs.

Details regarding QC samples are presented in Worksheets #12, #24, and #28.

Investigation-Derived Waste Management

Investigation-derived waste will be generated during sampling and equipment decontamination, and will consist of soil cuttings; purge, development, and decontamination water; and personal protective equipment. Management of soil and water IDW is covered in Bristol's SOP BERS-09 (Attachment 1). Purge water from the MOC wells will be treated on site through a media filtration system. Excess soil will be placed in the proper bulk bags for disposal. Excess sediment in Site 28 will be returned to the spot from which it was collected. Personal protective equipment generated during this field effort is considered nonhazardous and will be disposed of as solid waste.

Sample Preservation

Appropriate preservatives will be added to the sample containers at the laboratory prior to sample container shipment except for methanol, which will be added to the sample containers in the field. Worksheet #19 details the specific containers and preservatives required for each media/analyte. The sample containers and preservatives will be supplied by the analytical laboratory. All soil samples, except VOCs, are not preserved except for maintaining temperatures at 4 degrees Celsius ± 2 degrees.

Sample Container Labeling, Storage and Shipment

Refer to Worksheets #26 and #27.

Sample Identification

Sample IDs will contain unique identifying schemes that address the year, NE Cape site, location, type of sample, and chronological sample number, as example: 12NC28SD01

In the example, 12 represents the year 2012, NC represents NE Cape, 28 represents Site 28, SD represents sediment sample, and 01 represents the first sample collected at Site 28.

Field duplicates will have a unique ID similar to other samples collected, so as not to be distinguishable from other field samples. The matrix spike/matrix spike duplicate (MS/MSD) samples will have the same ID as the parent sample. Samples selected for MS/MSD QC analysis will be identified on the chain-of-custody.

Decontamination Procedures

Decontamination procedures will be done in accordance with the Bristol's SOP BERS-05 (included in Attachment 1). Sampling options will be selected such that they will minimize the need for decontamination by using disposable sampling equipment. Moreover, to minimize the impact of media contamination on the reusable equipment, an attempt will be made to always sample the least impacted location first and move progressively to the more contaminated areas.

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QAPP WORKSHEET #18
SAMPLING LOCATIONS AND METHODS/SOP REQUIREMENTS TABLE

Sample sites, matrices, sample depth, analytical suite, concentration levels, number of samples (including QC such as field duplicates and MS/MSD samples), field sampling SOP references, and the rationale for sampling are included in Worksheet #11 and Tables 11-1 and 11-2. Exact sample locations will be determined based on the size of the excavations using a grid-system for the confirmation samples at Sites 13, Site 31, Site 21, and the MOC.

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QAPP WORKSHEET #19
ANALYTICAL SOP AND SAMPLE CONTAINER REQUIREMENTS TABLE

TestAmerica-Tacoma and TestAmerica-Denver will perform the work in accordance with the requirement set forth in the Quality Assurance Manual (TestAmerica, 2009) (see Attachment 3 for this plan and the ELAP certification), as well as DoD QSM 4.2 (DoD, 2010). Once received at the laboratory, samples will be handled in accordance with the TestAmerica SOP TA-QA-0001, Sample Receipt and Login, and the quality assurance program as specified in SOP TA-QAM, Revision 3. These SOPs and those listed below are included as Attachment 4 of this UFP QAPP. Dissolved gas samples will be analyzed for methane by TestAmerica Denver. Samples will be forwarded from TestAmerica-Tacoma to TestAmerica-Denver as specified in Work Sharing Process (SOP CA-CS-001 Rev 2, effective 23 Nov 2009).

Soil samples may be combined in a single jar for multiple analyses where appropriate. Extra jars will be collected for MS/MSD analyses. Water samples for DRO/RRO analyses can be extracted from a single container.

Analytical Group	Analytical Method	Preparation Method	Conc. Level	Sample Extraction Volume	Container Quantity / Size / Type	Preservation	Maximum Holding Time for Preparation / Analysis	Analytical SOP
Water								
TPH-GRO (C_6-C_{10})	AK101	SW5030B	Low	5mL	3 x 40-mL glass VOA vials with Teflon® septum top	4±2°C, HCL to pH<2	14 days from sample collection until analysis	TA-MV-0376 Rev 9 (Tacoma) DV-GC-0010 Rev 7.1 (Denver)
TPH-DRO (C_{10}-<C_{25})	AK102	SW3510C	Low	1 Liter	2 x 1-L amber glass with Teflon-lined cap.	4±2°C, HCL to pH<2	14 days from sample collection until extraction; 40 days from extraction until analysis	TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 3 (Denver)
TPH-RRO (<C25-C36)	AK103	SW3510C	Low	1 Liter	2 x 1-L amber glass with Teflon-lined cap.	4±2°C, HCL to pH<2	7 days from sample collection until extraction; 40 days from extraction until analysis	TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 3 (Denver)

Analytical Group	Analytical Method	Preparation Method	Conc. Level	Sample Extraction Volume	Container Quantity / Size / Type	Preservation	Maximum Holding Time for Preparation / Analysis	Analytical SOP
Water								
BTEX	SW8260B	SW5030B	Low	5 mL	3 x 40-mL glass VOA vials with Teflon septum top	4±2°C, HCL to pH<2	14 days from sample collection until analysis (if preserved with HCl as described)	TA-MV-0312 Rev 20 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)
PAH	SW8270C-SIM	SW3510C	Low	1 Liter	2 x 1-L amber glass with Teflon-lined cap.	4±2°C	7 days from sample collection until extraction; 40 days from extraction until analysis	TA-MS-0313 Rev 17 (Tacoma) DV-MS-0002 Rev 6.2 (Denver)
Metals (except mercury)	SW6020A	SW3005A	Low	50 mL	1 x 100-mL HDPE	4±2°C, HNO_3 to pH<2	180 days from sample collection until analysis	TA-MT-0217 Rev 22 (Tacoma) DV-MT-0019 Rev 2 (Denver)
Mercury	SW7470A	SW7470A	Low	50 mL	1 x 100-mL HDPE	4±2°C, HNO_3 to pH<2	28 days from sample collection until analysis	TA-MT-0202 Rev 20 (Tacoma) DV-MT-0017 Rev 1.1 (Denver)

Analytical Group	Analytical Method	Preparation Method	Conc. Level	Sample Extraction Volume	Container Quantity/Size/Type	Preservation	Maximum Holding Time for Preparation/ Analysis	Analytical SOP
Soil								
PCBs	SW8082A	SW3510C	Low	1 Liter	2 x 1-L amber glass with Teflon-lined cap.	4±2°C	40 days from extraction until analysis	TA-GS-0351 Rev 18 (Tacoma) DV-GC-0021 Rev 5.1 (Denver)
Methane	RSK-175	5030B	Low	18 mL	3 x 40-mL glass VOA vial with Teflon septum top	4±2°C, HCL to pH<2	14 days from sample collection until analysis (if preserved with HCl as described)	DV-GC-0025 Rev 3 (Denver)
TPH-GRO (C_6-C_{10})	AK101	SW5035A	Mid/High	25 g	Pre-tared 4 oz jar with Teflon septa, 25-mL methanol & surrogate in VOA vial (added immediately after sample collection)	4±2°C methanol	28 days from sample collection until analysis	TA-MV-0376 Rev 9 (Tacoma) DV-GC-0010 Rev 7.1 (Denver)

Analytical Group	Analytical Method	Preparation Method	Conc. Level	Sample Extraction Volume	Container Quantity/Size/Type	Preservation	Maximum Holding Time for Preparation/Analysis	Analytical SOP
Soil								
TPH-DRO (C_{10}-<C_{25})	AK102	SW3550B	Low	30 g	(1) 4-oz or 8-oz jar with Teflon-lined cap.	4±2°C	14 days from sample collection until extraction; 40 days from extraction until analysis	TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)
TPH-RRO (<C_{25}-<C_{36})	AK103	SW3550B	Low	30 g	(1) 4-oz or 8-oz jar with Teflon-lined cap.	4±2°C	14 days from sample collection until extraction; 40 days from extraction until analysis	TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)
BTEX	SW8260B	SW5035A	Medium	25 g	Pre-tared 4 oz jar with Teflon septa, 25-mL methanol in VOA vial (added immediately after sample collection)	4±2°C methanol	14 days from sample collection until analysis (if preserved with MeOH as described)	TA-MV-0312 Rev 20 (Tacoma) DV-MS-0011 Rev 6.4 (Denver)

Analytical Group	Analytical Method	Preparation Method	Conc. Level	Sample Extraction Volume	Container Quantity/Size/Type	Preservation	Maximum Holding Time for Preparation/ Analysis	Analytical SOP
Soil								
PAH	SW8270C-SIM	SW3550B	Low	30 g	(1) 4-oz or 8-oz jar with Teflon-lined cap.	4±2°C	14 days from sample collection until extraction; 40 days from extraction until analysis	TA-MS-0313 Rev 20 (Tacoma) DV-MS-0002 Rev 6.2 (Denver)
Metals (except mercury)	SW6020A	SW3050B	Low	1 to 5 g	(1) 4-oz or 8-oz jar with Teflon-lined cap.	4±2°C	180 days from sample collection until analysis	TA-MT-0217 Rev 22 (Tacoma) DV-MT-0018 Rev 2 (Denver)
Mercury	SW7471A	SW7471A	Low	0.2 to 1 g	(1) 4-oz or 8-oz jar with Teflon-lined cap.	4±2°C	28 days from sample collection until analysis	TA-MT-0202 Rev 20 (Tacoma) DV-MT-0016 Rev 3.1 (Denver)

Analytical Group	Analytical Method	Preparation Method	Conc. Level	Sample Extraction Volume	Container Quantity / Size / Type	Preservation	Maximum Holding Time for Preparation / Analysis	Analytical SOP
Soil								
PCBs	SW8082A	SW3550B	Low	30 g	(1) 4-oz or 8-oz jar with Teflon-lined cap.	4±2°C	No holding time from sample collection until extraction; 40 days from extraction until analysis	TA-GS-0351 Rev 18 (Tacoma) DV-GC-0021 Rev 5.1 (Denver)
Total Organic Carbon (TOC)	SW9060	SW9060	Low-Med-High	3 grams (analyzed in triplicate)	(1) 4-oz or 8-oz jar	4±2°C	28 Days, Sediments may be frozen for up to 6 months	TA-WC-0157 Rev 13 (Tacoma) DV-WC-0006 Rev 7.3 (Denver)

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QAPP WORKSHEET #20
FIELD QUALITY CONTROL SAMPLE SUMMARY TABLE

Field QC samples are included in Worksheet #11, Tables 11-1 and 11-2, and Worksheet #28. These tables identify the matrices of the samples, the analytical suite, number of samples and sample locations, duplicates for grab samples, as well as the estimated total number of samples per analytical suite to be analyzed for the SIs. One equipment blank will be collected during the Site 28 sediment collection following equipment decontamination. Trip blanks for BTEX, GRO, and methane will be included with all volatile samples and shipped in the same coolers. Moreover, the analytical and preparation SOPs for the QC samples are the same as the SOPs employed during collection of the associated environmental samples that are depicted in Worksheet #19.

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QAPP WORKSHEET #21
PROJECT SAMPLING SOP REFERENCES TABLE

Reference Number	Title, Revision Date, and/or Number	Organizing Organization	Equipment Type	Modified for Project Work (Check if yes)	Comments
BERS-01	Soil Sampling - Revision 2	Bristol Team	Various, including but not limited to: spoons, shovels, hand-augers, split spoon samplers, backhoes, acetate sleeves, coring devices, and sample containers	No	Note how to avoid cross-contamination of samples and how to ensure representative soil samples. Modified SOP to address frozen low-level VOC soil samples.
BERS-02	Groundwater Sampling - Revision 2	Bristol Team	Submersible or peristaltic pumps and disposable tubing, YSI multi-meter, and water level indicator.	No	Purging requirements and low-flow sampling.
BERS-03	Sample Management – Revision 1	Bristol Team	Sample containers, labels, chain of custody, custody seals, sample coolers, shipping labels, clear tape, plastic baggies, inert packing material, and gel ice or water ice	No	Follow 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).
BERS-04	Field Measurement & Test Equipment – Revision 1	Bristol Team	Various, including but not limited to: multi-parameter water quality meters and turbidity meters.	No	Follow manufacturer's instructions regarding calibration and maintenance of field equipment.
BERS-05*	Equipment Decontamination – Revision 2	Bristol Team	Alconox rinse and tap water. Deionized/distilled water when sampling for trace organic compounds.	No	Use disposable equipment when possible; use of some cleaning agents will create IDW.

Reference Number	Title, Revision Date, and/or Number	Organizing Organization	Equipment Type	Modified for Project Work (Check if yes)	Comments
BERS-08	Water Level Measurement – Revision 1	Bristol Team	Pumps, water quality monitoring instruments, and water level indicator	No	Decontaminate equipment between water level measurements. Air monitoring of well casing may be required.
BERS-09	IDW Management – Revision 1	Bristol Team	Nonhazardous waste disposal – on-site Dumpsters, waste treatment systems, impervious surfaces; hazardous waste disposal - varies	No	Suspected hazardous waste to be tested for proper classification prior to disposal.
BERS-11	Field Documentation – Revision 0	Bristol Team	Field book and field forms	No	Proper use of field books, and information required for various field tasks.
BERS-12	Excavation and Trenching – Revision 0	Bristol Team	Heavy equipment	No	Addresses trenching and regulations set in 29 CFR, USACE Manual 385 1-1.
BERS-13	General Backfill and Compaction – Revision 0	Bristol Team	Heavy equipment	No	Describes safe operation around backfill and compaction activities.
BERS-14	*MULTI-INCREMENT*® Sampling – Revision 0	Bristol Team	Various, including but not limited to: spoons, stainless steel bowls, Ziploc bags, 5-gallon buckets, #10 (2 mm) sieve, steel cookie sheet, scale coring devices, and sample containers	No	Describes MI sampling procedures, including identifying DU (s), selecting random sample locations within the DU (s), and sample collection
BERS-15	Document Control System – Revision 0	Bristol Team	None	No	None
BERS-17	Trimble GPS Procedures-Revision 1	Bristol Team	Handheld GPS	No	Describes coordinate systems, compliance with Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) and Post-Processing.
BERS-22	UTV Operations	Bristol Team	UTV (side by side)	No	Drive Safely

*Note: Heavy equipment decontamination will deviate from the SOP slightly. No water will be used to decontaminate the heavy equipment. Rakes, shovels, and brushes will be used to remove all soil from the excavator bucket and tracks. It is expected that only the excavator buckets will contact contaminated soil.

QAPP WORKSHEET #22
FIELD EQUIPMENT CALIBRATION, MAINTENANCE, TESTING AND INSPECTION TABLE

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
YSI 556 Multi-Probe System	Calibrate probe with pH, conductivity, ORP, and DO standards	Decontaminate and place in hard case between sampling activities	Field test in accordance with the manual	Inspect for external damage (i.e., connections, liquid crystal display(LCD) screen, etc.)	Daily, before use and when unstable readings occur	Within calibration standard(s) range	Recalibration	Field personnel	BERS-04
Hach 2100P Turbidimeter	Calibrate with Gelex Secondary Turbidity Standards	Keep clean and place in hard case between sampling activities	Field test in accordance with the manual	Inspect for external damage (i.e., LCD screen, etc.)	Daily, before use and when unstable readings occur	Within calibration standard(s) range	Recalibration	Field personnel	BERS-04
Electronic Water Level Meter	Not applicable. Operate in accordance with the manufacturer's instructions	Decontaminate between wells	Field test in accordance with the manual	Inspect tape for kinks and cuts, inspect probe for dirt, check batteries	Daily	Response	Replace battery if no response during test button check. If battery replacement does not correct problem, replace meter.	Field personnel	BERS-08
Trimble® GeoXT™ Global Positioning System Unit	Validate accuracy using nearby benchmark	Charge battery and place in case at the end of each day	Field test in accordance with the manual	Inspect for external damage (i.e., LCD screen, dents, etc.).	Daily	Refer to manufacturer's instructions	Refer to manufacturer's instructions	Field personnel	See Equipment Manual

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Gas Chromatograph	Initial and continuing calibration checks	Change septa, add rinse solvent	Analyze soil samples for PCBs or DRO	Check for leaks, inspect moving parts	Daily	Acceptable calibration	Fix problems, recalibrate	Chemist	Field-Screening SOP
Lab Balance	Daily Calibration Check	Keep balance clean	Weigh samples	Calibration check	Daily	Within 1% of actual weight	Recalibrate	Chemist	NA

QAPP WORKSHEET #23
ANALYTICAL SOP REFERENCES TABLE

Laboratory Analytical SOP References						
Reference Number	**Title, Revision Date, and/or Number**	**Definitive or Screening Data**	**Analytical Group**	**Instrument**	**Organization Performing Analysis**	**Modified for Project Work?**
NA	DoD Quality Systems Manual for Environmental Laboratories, Version 4.2, 25 Oct 2010	NA	General	NA	DoD Environmental Quality Workgroup (EDQW)	No
TA-QAM	TestAmerica Laboratories Tacoma Quality Assurance Manual, Revision 3, Effective 30 Jun 2010	NA	General	NA	TestAmerica, Tacoma, WA	No
TA-QA-0001	Sample Receiving and Login, Revision 20, Effective 7 Jun 2010	NA	General	NA	TestAmerica, Tacoma, WA	No
TA-QA-0003	Sample Data Processing, Revision 14, Effective 26 Mar 2010	NA	General	NA	TestAmerica, Tacoma, WA	No
TA-QA-0032	Sample Documentation, Revision 11, Effective 31 Mar 2010	NA	General	NA	TestAmerica, Tacoma, WA	No
TA-QA-0601	Quality Assurance Audit Procedures	NA	General	NA	TestAmerica, Tacoma, WA	No
TA-QA-0606	QA Review of Audit Reports, Effective 4 Nov, 2010	Definitive	General	NA	TestAmerica, Tacoma, WA	No
CA-C-S-004	Work Sharing Process, Revision 2, Effective 23 Nov 2009	NA	General	NA	TestAmerica, Tacoma, WA	No
TA-MV-0376 DV-GC-0010	Gasoline Range Organics Analysis (Tacoma Rev 9 Effective 6/20/2011) (Denver Rev 7.1 Effective 7/29/2011)	Definitive	TPH-GRO	GC/FID	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No

Laboratory Analytical SOP References						
Reference Number	**Title, Revision Date, and/or Number**	**Definitive or Screening Data**	**Analytical Group**	**Instrument**	**Organization Performing Analysis**	**Modified for Project Work?**
TA-GS-0363 DV-GC-0027	Diesel and/or Residual Range Organics (Methods AK102 & AK103) (Tacome Rev 15 Effective 3/5/2012) (Denver Rev 2 Effective 3/25/2011)	Definitive	TPH-DRO/RRO	GC/FID	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No
TA-MV-0312 DV-MS-0010	Determination of Volatile Organics by GC/MS (Tacoma Rev 20 Effective 8/1/2011) (Denver Rev 6.4 Effective 12/28/2011)	Definitive	BTEX	GC/MS	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No
TA-MS-0313 DV-MS-0011	Semi-Volatile Organic Compounds Analysis by GC/MS Selected Ion Monitoring (Tacoma Rev 17 Effective 5/31/2011) (Denver Rev 6 Effective 1/6/2012)	Definitive	PAHs	GC/MS	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No
TA-MT-0202 DV-MT-0016	Mercury Analysis by Cold Vapor Atomic Absorption, SW-846, Methods 7470A and 7471A (Tacoma Rev 20 Effective 4/25/2011) (Denver Rev 3.1 Effective 2/3/2011)	Definitive	Metals-Mercury	cold vapor atomic adsorption spectroscopy (CVAAS)	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No
TA-MT-0217 DV-MT-0018	Inductively Coupled Plasma-Mass Spectrometry (ICP-MS) SW-846 Method 6020 (Tacoma Rev 22 Effective 4/25/2011) (Denver Rev 2 Effective 12/2/2011)	Definitive	Metals	ICP-MS	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No
TA-GS-0351 DV-GC-0021	PCBs by Method 8082 (Tacoma Rev 18 Effective 5/31/2011) (Denver Rev 5.1 Effective 1/16/2012)	Definitive	PCBs	GC/ECD	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No

Laboratory Analytical SOP References						
Reference Number	**Title, Revision Date, and/or Number**	**Definitive or Screening Data**	**Analytical Group**	**Instrument**	**Organization Performing Analysis**	**Modified for Project Work?**
DV-GS-0025	Dissolved Gases in Water, Method No. RSK-175, (Denver Rev 3 Effective 7/25/2011)	Definitive	NA	GC/FID	TestAmerica, Denver, CO	No
TA-WC-0157 DV-WC-0006	Total Organic Carbon in Solids (Tacoma Rev 13 Effective 4/8/2011) (Denver Rev 7.3 Effective 1/31/2012)	Definitive	Organics	TOC Analyzer	TestAmerica, Tacoma, WA TestAmerica, Denver, CO	No

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QAPP WORKSHEET #24
ANALYTICAL INSTRUMENT CALIBRATION TABLE

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
GC/FID (purgeable)	Initial multipoint calibration for target analytes (minimum five standards)	Initial calibration is performed prior to sample analysis initially upon instrument set up, after major changes to system, or when initial or continuing calibration criteria cannot be met. A second source ICV standard is run after an acceptable calibration and CCV standard is analyzed after every 10 samples and at the end of the analytical sequence: percent difference (%D)≤20%	One of the options below: *Option 1*: linear – relative standard deviation (RSD) for each analyte ≤ 20% *Option 2*: linear – least squares regression $r^2 \geq$ 0.995 for each analyte or *Option 3*: non-linear – coefficient of determination (COD) ≥ 0.99 (six points shall be used for second order, seven points shall be used for third order)	Correct problem, document in maintenance log, then repeat initial calibration.	Analyst	TA-MV-0376 Rev 9 (Tacoma) DV-GC-0010 Rev 7.1 (Denver)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
GC/FID (extractable)	Initial multipoint calibration for target analytes (minimum five standards)	Initial calibration is performed prior to sample analysis initially upon instrument set up, after major changes to system, or when initial or continuing calibration criteria cannot be met. A second source ICV standard is run after an acceptable calibration and a CCV standard is analyzed after every 10 samples and at the end of the analytical sequence: %D≤20%	One of the options below: *Option 1*: linear – RSD for each analyte ≤ 20% *Option 2*: linear – least squares regression $r^2 \geq$ 0.995 for each analyte or *Option 3*: non-linear – COD ≥ 0.99 (six points shall be used for second order, seven points shall be used for third order)	Correct problem, document in maintenance log, then repeat initial calibration.	Analyst	TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
GC/MS (purgeable)	Check of mass spectral ion intensities (tuning procedure) using BFB (8260B)	Prior to ICAL and at the beginning of each 12-hour period.	Refer to method/SOP for specific ion criteria.	Retune instrument and verify.	Laboratory Manager / Analyst [b]	TA-MV-0312 Rev 20 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)
GC/MS (purgeable)	Initial multipoint calibration for target analytes (minimum five standards)	Initial calibration is performed prior to sample analysis initially upon instrument set up, after major changes to system, or when initial or continuing calibration criteria cannot be met. A second source ICV standard is run after an acceptable calibration and a CCV standard is analyzed daily and every 12 hours: %D≤20%	1. Average Response Factor for SPCCs: ≥ 0.30 for chlorobenzene, and 1,1,2,2-tetrachloroethane; ≥ 0.10 for chloromethane, bromoform, and 1,1-dichloroethane 2. RSD for RFs for calibration check compounds (CCCs): ≤ 30% and one option below: Option 1: RSD for each analyte ≤ 15% Option 2: Linear regression r ≥ 0.995 Option 3: Non linear regression r^2 ≥ 0.990 and 6 points must be used.	Terminate analysis; correct the problem; recalibrate. Problem must be corrected. No samples may be run until ICAL-ICV has passed.	Analyst	TA-MV-0312 Rev 20 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
GC/MS (extractable)	Check of mass tuning using DFTPP	Prior to ICAL and at the beginning of each 12-hour period.	Method specific criteria. Section 10.5 of SOP	Retune instrument and verify.	Laboratory Manager / Analyst [b]	TA-MS-0313 Rev 17 (Tacoma) DV-MS-0002 Rev 6.2 (Denver)
GC/MS (extractable)	Breakdown Check	At the beginning of each 12-hour period and prior to analyzing samples	Degradation ≤ 20% for DDT. Benzidine and PCP should be present at their normal responses, and should not exceed a tailing factor of 2.	Correct problem then repeat breakdown check. No samples can be run until degradation is acceptable.	Laboratory Manager / Analyst [b]	TA-MS-0313 Rev 17 (Tacoma) DV-MS-0002 Rev 6.2 (Denver)
GC/MS (extractable)	Minimum five-point initial calibration for target analytes, lowest concentration standard at or near the reporting limit (ICAL).	Initial calibration is performed prior to sample analysis initially upon instrument set up, after major changes to system, or when initial or continuing calibration criteria cannot be met. A second source ICV standard is run after a acceptable calibration and a CCV standard is analyzed daily and every 12 hours: %D$\leq$20%	1. Average Response Factor for SPCCs: ≥ 0.050 2. RSD for RFs for CCCs: ≤ 30% and one option below: Option 1: RSD for each analyte ≤ 15% Option 2: Linear regression r ≥ 0.995. Option 3: Non-linear regression r^2 ≥ 0.990 and 6 points must be used.	Terminate analysis; correct the problem; recalibrate. Problem must be corrected. No samples may be run until ICAL has passed.	Laboratory Manager / Analyst [b]	TA-MS-0313 Rev 17 (Tacoma) DV-MS-0002 Rev 6.2 (Denver)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
ICP/MS	Tuning	Prior to initial calibration	Mass calibration ≤ 0.1 atomic mass unit (amu) from true value; Resolution < 0.9 amu full width at 10% peak height; For stability, RSD ≤ 5% for at least four replicate analyses.	Correct problem, then repeat tuning.	Laboratory Manager / Analyst [b]	TA-MT-0217 Rev 22 (Tacoma) DV-MT-0018 Rev 2 (Denver)
ICP/MS	If more than one standard is used, correlation coefficient must be ≥ 0.995	Initial calibration is performed daily prior to sample analysis and initially upon instrument set-up, after major changes to system, or when initial or continuing calibration criteria cannot be met.	Calibration curve correlation coefficient ≥ 0.995 if more than one standard and a blank; calibration verification acceptance ranges must be met: ICV/CCV ±10% recovery of true value.	Correct problem, then repeat initial calibration. Reported samples must be bracketed by compliant QC.	Analyst	TA-MT-0217 Rev 22 (Tacoma) DV-MT-0018 Rev 2 (Denver)
CVAAS	Initial multipoint calibration for target analytes (minimum three standards and blank)	Initial calibration is performed daily prior to sample analysis and initially upon instrument set-up, after major changes to system, or when initial or continuing calibration criteria cannot be met.	Calibration curve correlation coefficient ≥0.995; calibration verification acceptance ranges must be met: ICV/CCV ±10% recovery of true value.	The validity of the calibration is determined by the subsequent calibration verifications. If invalid, identify and correct problem, then repeat ICAL.	Analyst	TA-MT-0202 Rev 20 (Tacoma) DV-MT-0016 Rev 3.1 (Denver)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
GC/ECD (PCBs)	Initial multipoint calibration for target analytes (minimum five standards)	Initial calibration is performed prior to sample analysis initially upon instrument set-up, after major changes to system, or when initial or continuing calibration criteria cannot be met. A second source ICV standard is run after an acceptable calibration and a CCV standard is analyzed after every 10 samples, and at the end of the analytical sequence: %D≤20%.	One of the options below: *Option 1*: linear – RSD for each analyte ≤ 20% *Option 2*: linear – least squares regression $r^2 \geq$ 0.995 for each analyte or *Option 3*: non-linear – COD ≥ 0.99 (six points shall be used for second order, seven points shall be used for third order)	Evaluate standards, chromatography, and detector response. If problem found with above, correct as appropriate, then repeat initial calibration.	Laboratory Manager / Analyst [b]	TA-GS-0351 Rev 18 (Tacoma) DV-GC-0021 Rev 5.1 (Denver)
GC-FPD/TCD (headspace)	ICAL – Minimum 5 points. Lowest point at or below RL. Upper point defines calibration range.	Initially, and when CCV is unacceptable	<25% RSD r2>0.990	Correct problem. Recalibrate.	Analyst	DV-GC-0025 Rev 3 (Denver)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
GC-FPD/TCD (headspace)	Second Source Calibration Verification (ICV)	After each ICAL	<25% D	Correct problem. Recalibrate or reanalyze ICV.	Analyst	DV-GC-0025 Rev 3 (Denver)
GC-FPD/TCD (headspace)	Continuing Calibration Verification (CCV)	Every 24 hours or 20 samples	<25% D	Correct problem. Reanalyze CCV and all affected samples.	Analyst	DV-GC-0025 Rev 3 (Denver)
TOC Analyzer	ICAL - Minimum 5 points. Lowest point at or below RL. Upper point defines calibration range	Initially, and when CCV is unacceptable	<25% RSD r2>0.990	Correct problem. Recalibrate.	Analyst	TA-WC-0157 Rev 13 (Tacoma) DV-MS-0010-Rev 6.4 (Denver)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible for Corrective Action	SOP Reference
TOC Analyzer	Second Source Calibration Verification (ICV)	After each ICAL	<30% D from True Value	Correct problem. Recalibrate or reanalyze ICV.	Analyst	TA-WC-0157 Rev 13 (Tacoma) DV-MS-0010- Rev 6.4 (Denver)
TOC Analyzer	CCV	Prior to sample analysis and after every 10 samples.	<20% difference from True Value	Correct problems, recalibrate, and re-analyze all samples analyzed since the last successful CCV.	Analyst	TA-WC-0157 Rev 13 (Tacoma) DV-MS-0010- Rev 6.4 (Denver)

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC-FPD/TCD (headspace)	Daily: Check carrier gas supply; check temperatures of inlet and detectors; verify temperature program. range.	Dissolved methane in water (RSK-175)	The analyst checks and records the condition of connections, carrier gas supply, and temperatures of inlet, detectors, and verifies temperature programs; replaces disposables; bakes out instrument; and performs leak test.	Daily	Successful analysis of blanks and calibration standards	Corrective action may include inspecting system; correcting problem; rerunning calibration and affected samples, as well as calling the service engineer.	Analyst	DV-GC-0025 Rev 3 (Denver)
GC-FID (purgeable)	Change septum, clean injection port, change or clip column, install new liner	Detector signals and chromatogram review for GRO	Instrument performance and sensitivity	As needed	CCV passes criteria	Reinspect injector port, cut additional column, reanalyze CCV, recalibrate instrument	Analyst	TA-MV-0376 Rev 9 (Tacoma) DV-GC-0010 Rev 7.1 (Denver)

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC/FID (extractable)	Change septum, clean injection port, change or clip column, install new liner	Detector signals and chromatogram review for DRO/RRO	Instrument performance and sensitivity	As needed	CCV passes criteria	Reinspect injector port, cut additional column, reanalyze CCV, recalibrate instrument	Analyst	TA-GS-0363 Rev 15 (Tacoma) DV-GC-0027 Rev 2 (Denver)

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC/MS (purgeable)	Daily: Check inlet pressure and sufficient supply of carrier gas; check temperatures of inlet and detectors; verify temperature program; check septa, clean injection port or replace injection port liner and cut column if needed; check carrier gas supply; check tune parameters. As needed: Check oil levels in mechanical pumps and the diffusion pump if vacuum is insufficient; replace electron multiplier; clean source; replace filaments; change rough pump oil and exhaust filters; relubricate the turbomolecular pump bearing wick.	BTEX (SW8260B)	The analyst checks and records the condition of connections, carrier gas supply, and temperatures of inlet, detectors, and verifies temperature programs; replaces disposables; bakes out instrument, reconditions column, and performs leak test. Inspect chromatograph to verify symmetrical peak shape and adequate resolution between closely eluting peaks.	Daily or as needed	Tune and CCV pass criteria	Corrective action may include inspecting system; correcting problem; rerunning calibration and affected samples, as well as calling the service engineer.	Analyst	TA-MV-0312 Rev 20 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC/MS (extractable)	Daily: Check inlet pressure and sufficient supply of carrier gas; check temperatures of inlet and detectors; verify temperature program; check septa, clean injection port or replace injection port liner and cut column if needed; check carrier gas supply; check tune parameters. As needed: Check oil levels in mechanical pumps and the diffusion pump if vacuum is insufficient; replace electron multiplier; clean source; replace filaments; change rough pump oil and exhaust filters; relubricate the turbomolecular pumpbearing wick.	Tuning, Calibration-8270C-SIM	The analyst checks and records the condition of connections, carrier gas supply, and temperatures of inlet, detectors, and verifies temperature programs; replaces disposables; bakes out instrument, reconditions column, and performs leak test. Inspect chromatograph to verify symmetrical peak shape and adequate resolution between closely eluting peaks.	Daily or as needed	Tune and CCV pass acceptance criteria	Corrective action may include inspecting system; correcting problem; rerunning calibration and affected samples, as well as calling the service engineer.	Analyst	TA-MV-0312 Rev 20 (Tacoma) DV-MS-0010 Rev 6.4 (Denver)

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
TOC Analyzer	Daily: Check carrier gas supply; check temperatures of inlet and detectors; verify temperature program. range.	Total Organic Carbon, (SW9060)	Check gas supply lines, reagent reservoirs, tubing and transfer lines for leaks. Check temperatures of heated zones.	Daily or as needed	Successful analysis of blanks and calibration standards	Corrective action may include inspecting system; changing tubing; rerunning calibration and affected samples, as well as calling the service engineer.	Analyst	TA-WC-0157 Rev 13 (Tacoma) DV-WC-0006 Rev 7.3 (Denver)
ICP/MS	Daily: Monitor gas supplies; examine and replace pump tubing, filters, and O-rings. As needed: monitor and clean or replace torches, spray chambers, air filters, injectors, purge windows and lenses, and igniters and load coils; fill argon humidifier with water; change oil in vacuum pumps.	Metals (SW6020A)	The analyst checks and records the argon supply pressure, the operating vacuum, the temperature of the cooling chiller, and the nebulizer flow-rate, torch for residue, and level of the internal fluid reservoir and cooling fluid, as well as waste container.	Daily or as needed	Intensity of Daily performance check for Rh at least 200,000 counts	Corrective action may include inspecting system, changing the auto sampler pump tubing, cleaning or changing torch, adjusting the nebulizer flow, cleaning or changing cones, rerunning calibration and affected samples, as well as calling the service engineer.	Analyst	TA-MT-0217 Rev 22 (Tacoma) DV-MT-0018 Rev 2 (Denver)

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
CVAAS	Daily: Change rinse solution; optimize light path; check nitrogen flow; monitor gas supplies, examine and replace pump tubing, filters, and O-rings and replace as needed. Monthly: Check lamp intensity and clean or replace lamps; check drain and condition of dryer; clean cell and aspirator in aqua regia; check silica gel in drying tube. Annually: Change lamp and check liquid/gas separator.	Mercury (SW7470A and SW7471B)	The analyst checks and records the pump tubing and pump flow and level in waste container.	See SOP Nos. DV-MT-0017, Rev 0.2 Effective 07 Aug 2009 and DV-MT-0023, Rev 0.5 Effective 07 Aug 2009	See SOP Nos. DV-MT-0017, Rev 0.2 Effective 07 Aug 2009 and DV-MT-0023, Rev 0.5 Effective 07 Aug 2009	Corrective action may include inspecting system, changing the auto sampler pump tubing, cleaning cell, rerunning calibration and affected samples, as well as calling the service engineer.	Analyst	TA-MT-0202 Rev 20 (Tacoma) DV-MT-0017 Rev 3.1 (Denver)

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC/ECD (PCBs)	Daily: Check carrier gas supply; check temperatures of inlet and detectors; verify temperature program. As needed: Check septa clean injection port or replace injection port liner and cut column if needed; reactivate carrier gas drying agents; replace or repair flow controllers if constant flow cannot be maintained; replace disposables; bake out instrument; recondition column; and detector cleaning.	PCBs as Aroclors	The analyst checks and records the condition of connections, carrier gas supply, and temperatures of inlet, detectors, and verifies temperature programs; replaces disposables; bakes out instrument, reconditions column, and performs leak test.	Daily or as needed	CCV passes criteria	Corrective action may include inspecting system; correcting problem; rerunning calibration and affected samples, as well as calling the service engineer.	Analyst	TA-GS-0351 Rev 18 (Tacoma) DV-GC-0021 Rev 5.1 (Denver)

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QAPP WORKSHEET #26
SAMPLE HANDLING SYSTEM

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT

Sample Collection (Personnel/Organization): Bristol Field Personnel

Sample Packaging (Personnel/Organization): Eric Barnhill, Emily Conway, Bristol

Coordination of Shipment (Personnel/Organization): Eric Barnhill, Bristol

Type of Shipment/Carrier: Coolers containing samples, Bering Air to Nome, Alaska Airlines Goldstreak® Nome to SEATAC or Denver International Airport, TestAmerica courier to Tacoma Laboratory or Denver Laboratory.

SAMPLE RECEIPT AND ANALYSIS

Sample Receipt (Personnel/Organization): Samples will be sent to TestAmerica-Tacoma (point of contact [POC]-Terri Torres) or TestAmerica-Denver (POC Michelle Johnston).

Sample Custody and Storage (Personnel/Organization): Samples will be handled and stored at the laboratory in accordance with TestAmerica SOPs (as noted in Worksheet #23, and included in Attachment 4). Analysis will be coordinated by POC-Terri Torres (Tacoma) or POC-Michelle Johnston (Denver). Samples will be stored at the site in dedicated refrigerators in the “environmental Conex” until shipped to TestAmerica for analysis.

Sample Preparation (Personnel/Organization): Sample preservation will be done in the field (POC Eric Barnhill, Bristol) and preparation will occur upon arrival at the performing laboratory, TestAmerica. The samples will be prepared by laboratory depending on each matrix and analyte. The laboratory POC (Terri Torres or Michelle Johnston) will assign tasks to the appropriate personnel at that time in accordance with TestAmerica SOPs (as noted in Worksheet #23, and included in Attachment 4).

Sample Determinative Analysis (Personnel/Organization): Sample analysis will occur after formal receipt by the performing laboratory. The laboratory POCs (noted above) will assign tasks to the appropriate personnel at that time in accordance with TestAmerica SOPs (as noted in Worksheet #23, and included in Attachment 4).

SAMPLE ARCHIVING

Field Sample Storage (No. of days from sample collection): Samples will be stored within the proper storage conditions as soon as possible after sampling. The samples will then be maintained at the proper storage conditions until shipment. The storage and shipment of samples will be done as quickly as possible and in compliance with appropriate SOPs. The storage and shipping of samples will be done as to allow the laboratories enough time not to exceed their holding times (see Worksheet #19). In general, samples will be sent to the laboratories on a daily basis to minimize field storage time.

Sample Extract/Digestate Storage (No. of days from extraction/digestion): Sample extract/digestate storage will be done by the performing laboratory in accordance with TestAmerica SOPS (as noted in Worksheet #23, and included in Attachment 4).

SAMPLE DISPOSAL

Personnel/Organization: Sample disposal will be done by the performing laboratory in accordance with TestAmerica SOPs (as noted in Worksheet #23, and included in Attachment 4).

Number of Days from Analysis: Sample disposal will comply with the laboratory protocols. Subcontracted laboratory will store samples for approximately 60 days after sample analysis.

QAPP WORKSHEET #27
SAMPLE CUSTODY REQUIREMENTS

Field sample custody procedures (sample collection, packaging, shipment, and delivery to laboratory):

Soil samples will be collected with disposable stainless steel spoons. Sediments may be collected with disposable spoons or a hand auger depending on the matrix and depth to sample collection. Groundwater samples will be collected with disposable sample tubing using either submersible or peristaltic pumps. Soil and groundwater samples will be containerized, labeled, and immediately placed in a cooler containing gel ice. Samples may be stored in an on-site refrigerator until prepared for shipment. Sample collection information (i.e., sample identification, time and date of collection, sampler's initials, type of container, and analytes to be tested, etc.) will be included on the chain-of-custody form. Prior to shipment to the analytical laboratory, sample containers will be bubble-wrapped and the chain-of-custody forms will be inserted into a plastic bag and taped on the inside lid of the cooler. 500 mL temperature blanks will be included in every cooler. QC samples (such as trip blanks) will be included in each cooler containing GRO, BTEX, or methane samples. Each cooler will then be taped closed with strapping tape and two custody seals (one front, one back) will be initialed and dated by the field personnel, and affixed on the lid of the cooler in a manner such that if the cooler is opened, the custody seal will break. The coolers will then be shipped via Bering Air and Alaska Airlines Goldstreak to the analytical laboratory.

Detailed Sample Packaging, Shipping, and Delivery:

1. Soil samples will be containerized, labeled, and immediately placed in a cooler containing gel ice.
2. Each sample will be labeled with indelible ink and will contain the following information:
   a. Project Name (NE Cape)

b. Sample ID

c. Sampling date and time

d. Initials of the sampling staff

e. Analysis requested

f. Preservatives added

3. Waterproof plastic ice chests or coolers will be used for sample storage and shipping.
4. All cooler drain holes will be taped closed on the inside and outside of the cooler.
5. Bubble packing, sorbent material, and a layer of gel ice will be placed in bottom of cooler.
6. Bubble bags containing sample bottles will be sealed. Bottles will be placed upright in cooler in such a way that they do not touch and will not touch during shipment.
7. 500 mL temperature blanks and appropriate QC samples (such as a duplicate samples and trip blanks when appropriate) will be included in each shipment or cooler.
8. Additional bubble packing, or similar packing material, will be inserted to partially cover sample bottles (more than halfway). Bags of gel ice will be placed around, among, and on top of sample bottles. Samples will be packed so as to maintain the temperature specified in Worksheet #19.
9. The remaining area of the cooler will be filled with bubble packing, cardboard or similar packing material.
10. The chain-of-custody record will be placed in a waterproof plastic bag and taped with strapping tape to the inside of the cooler lid. North Pacific Division Laboratory No. 12-043 (NPDL #12-043) will be written on all chain of custodies for this project.
11. The lid will be secured with strapping tape. The cooler will be wrapped completely with strapping tape at a minimum of two locations. Labels will not be covered.
12. The custody seals will be signed and dated, and attached on both the front and back of the cooler in a manner such that if the cooler is opened, the custody seal will break. Custody seals will be covered with wide, clear tape.

13. The cooler will be shipped via charter carrier to Nome and transshipped via Alaska Airlines Goldstreak to TestAmerica in Tacoma, Washington.

Laboratory sample custody procedures (receipt of samples, archiving, disposal):

The laboratory sample custody protocol will be followed for the analysis.

Sample Bottle Preparation

The chain-of-custody procedure begins with the preparation of the sample containers and preservatives to be used for sample collection. TestAmerica will provide the necessary sample containers pre-cleaned. Vendors are required to provide documentation of analysis for each lot of containers, and the documentation is kept on file in the laboratory's sample management office. Additionally, potential contaminant levels in each vendor lot are evaluated by the laboratory through analysis of randomly selected containers. Worksheet #19 defines the types of containers required, preservation techniques, and holding times for specific analyses. Preservatives will be added to the sample containers in the laboratory, or as soon as possible after collection of soil BTEX or GRO, prior to shipment. Sample kits, which are coolers containing chain-of-custody forms, custody seals, sample containers (with preservatives), and packing material, are prepared by the sample management office at the laboratory in response to receipt of an analytical task order from the PM or company representative.

The laboratory will receive and document samples per QSM 4.2 requirements. A cooler receipt form shall be prepared for each cooler of samples received by the project laboratory and will contain the following at a minimum: chain of custody; signed custody seals; and laboratory documentation of sample receipt, which will include any discrepancies. The analytical laboratory shall e-mail a copy of the cooler receipt form to receipt.cooler@usace.army.mil within 24 hours of delivery of each sample data group.

Sample Identification Procedures

Sample Identification

Each sample will receive a unique identification string based on the project name, the locations within the project area, the type of sample being collected, and the depth of the bottom of the sample. Background samples will be designated in a similar manner.

Sample Documentation

Sample tracking will start at the point of collection with log book entries. The log entries will be recorded in waterproof ink in a bound, paginated field logbook, updated daily and maintained at the site. Information to be recorded in the logbook will include the project name (*NE Cape 2012, 34120057*) and site for which sampling is being conducted; a unique, sequential sample number for each sample taken; sampling date and time; specific sampling location in sufficient detail to allow resampling at the same location, if required; method of sampling; preservation techniques; analyte classes of interest (i.e., BTEX, metals); significant observations made during the sampling process; results of any field measurements, such as depth of soil sample; and printed name and signature of the person performing the sampling.

Field QC samples, such as duplicates, will receive individual sample numbers and will not be identified as QC samples on the chain-of-custody. The MS/MSD samples will have the same ID as the parent sample and will be noted in sample comments on the chain-of-custody. A summary of QC sample frequency and field IDs is provided in Worksheet #11, Tables 11-1 and 11-2.

Chain-of-Custody Procedures

Upon completion of sample collection, logging, and preservation, the chain-of-custody forms will be completed, identifying sample-specific information with a listing of the analytical parameters required on each sample. The chain-of-custody form will accompany the sample throughout the shipping and analytical process. Each cooler will have a chain-of-custody form properly sealed into the cooler prior to shipment. Samples will be accompanied by a properly completed chain-of-custody form with sample ID, date/time collected, sampler, matrix, analysis, preservative, and turnaround time for analysis. NPDL #12-043 will be written on each chain of custody. When transferring possession of samples, the individuals relinquishing and receiving the samples, will sign, date, and note the time on the chain-of-custody form. This record will document transfer of custody of samples from the sampler to another person or to the laboratory. The original chain-of-custody form will accompany the sample shipment, and copies will be retained by the Bristol PM for the project file. The performing laboratories will follow their documented, internal chain-of-custody procedures. Custody seals will be placed on the front and back lids of the sample coolers to ensure that the samples are not tampered with during shipment.

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QAPP WORKSHEET #28
QC SAMPLES TABLE

In an effort to avoid duplication of information throughout this QAPP, the following will not be presented in this worksheet because it has already been provided in the following locations:

- The number of samples, sample IDs, frequency of collection for field QC samples, concentration level, and sampling SOP are presented in Worksheet #11, Tables 11-1 and 11-2.
- The analytical SOPs are identified in Worksheets #12, #19 and #23 and are presented in Attachment 4.
- Field sampling and analytical organization are presented in Worksheet #26.

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Field Duplicate for Grab Samples	One per 10 field samples of similar matrix per analytical group	$\leq$50% RPD for soil matrix and $\leq$30% RPD for water matrix	Qualify parent and duplicate result as needed.	Data reviewer	Precision	RPD
Trip Blank	One for each cooler containing GRO, methane or BTEX samples.	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Qualify data as needed.	Data reviewer	Accuracy/bias – contamination control	< ½ LOQ

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Equipment Blank	Once per sampling event at Site 28	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Qualify data as needed.	Data reviewer	Accuracy/bias – contamination control	< ½ LOQ
Method blank	One per extraction batch of 20 or fewer field samples of similar matrix	< ½ Limit of Quantitation (LOQ) and 1/10 the amount in any sample or 1/10 the regulatory limit.	Correct problem, recalibrate and reanalyze affected samples or Qualify data as needed. Results less than 10 times the concentration in the method blank will be B flagged.	Analyst	Laboratory Accuracy/bias – contamination control	<1/2 LOQ
Laboratory Control Sample/Laboratory Control Sample Duplicate	One set per extraction batch of 20 or fewer field samples of similar matrix (See Worksheet #12)	See Worksheet #12	Correct problem, recalibrate and reanalyze affected samples	Analyst	Accuracy/ Precision	% Recovery RPD
Matrix Spike	One set per extraction batch of 20 or fewer field samples of similar matrix	See Worksheet #12 and Worksheet #24	Qualify data as needed	Analyst	Accuracy	% Recovery

QC Sample	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Matrix Spike/Matrix Spike Duplicate	One set per extraction batch of 20 or fewer field samples of similar matrix per analyte	See Worksheet #12 and Worksheet #24)	Qualify data as needed	Analyst	Precision	RPD
Initial Calibration Verification	Immediately following an initial calibration	As described in the analytical SOP(See Worksheet #12 and Worksheet #24)	Correct problem and recalibrate	Analyst	Accuracy	As described in the respective analytical SOP
Continuing Calibration Verification	As described in the analytical SOP but before and after any samples are analyzed	As described in the analytical SOP(See Worksheet#12 and Worksheet #24)	Recalibrate and reanalyze affected samples	Analyst	Accuracy	As described in the analytical SOP
Surrogate samples (organic analyses)	Surrogate spike for every sample, including QC and standards as presented in the analytical SOP	(See Worksheet #12)	Samples will be re-analyzed as long as twice the holding time has not been exceeded. If the surrogate recoveries continue to fall outside of QC limits, document the corrective action in the narrative, and report the first set of analytical results.	Analyst	Accuracy	% Recovery

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QAPP WORKSHEET #29
PROJECT DOCUMENTS AND RECORDS TABLE

Sample Collection Documents and Records	On-Site Documents and Records	Off-Site Analysis Documents and Records	Data Assessment Documents and Records	Other
Site Safety meeting sign-in sheets	X			Data and reports generated during this investigation will be archived at Bristol, and all information will also be provided to the USACE in the final report and accompanying project deliverables.
Contractor Quality Control Daily Report	X			
Field prep and data collection sheets and logbooks	X			
Sampling instrument calibration and decontamination logs	X			
Field notes and field forms	X			
Site entry and exit logs	X			
Shipping manifest/airbills/chain-of-custody	X	X	X	
Identification of QC samples	X	X	X	
Meteorological data	X			
Documentation of deviations from methods	X	X	X	
Corrective action forms and corrective action results	X	X	X	
Communication logs/telephone logs/email	X	X	X	
Definitions of laboratory qualifiers		X	X	
Documentation of laboratory method deviations, analytical audit checklist, and laboratory assessment	X	X	X	

Sample Collection Documents and Records	On-Site Documents and Records	Off-Site Analysis Documents and Records	Data Assessment Documents and Records	Other
Laboratory sample identification numbers, including identification of QC samples	X	X	X	
Electronic Data Deliverables		X	X	
Instrument calibration, initial precision and accuracy tests.	X	X	X	
Reporting forms, completed with actual results	X	X	X	
Sample chronology (time of receipt, tracking, extraction, and analysis) and associated forms	X	X	X	
Tabulated data summary forms and raw data for field samples, standards, QC checks, and QC samples		X	X	
Field-screening results and raw data	X		X	

QAPP WORKSHEET #30
ANALYTICAL SERVICES TABLE

In an effort to not duplicate information in the QAPP, please refer to the following worksheets for the following data:

- Worksheet #11: Tables 11-1 and 11-2 for analytical groups per site and sample IDs.
- Worksheet #19 for preparation and analytical methods.
- Worksheet #2 and Worksheet #24 for laboratory performance criteria.

All samples collected for this site will be analyzed by either TestAmerica in Tacoma, Washington, or TestAmerica in Denver, Colorado. RSK-175 methane analysis will be performed by TestAmerica-Denver. In the event that TestAmerica-Denver cannot analyze the RSK-175 samples, TestAmerica-Savannah, in Savannah, Georgia, will analyze the samples following approval by the USACE project chemist. TestAmerica-Savannah is a DoD ELAP-accredited laboratory. Samples will be shipped to either TestAmerica-Tacoma or TestAmerica-Denver, and TestAmerica will follow internal shipping procedures as outlined in SOP CA-C-S-004 (See Attachment 4):

The POC for TestAmerica-Tacoma is Terri Torres. Her contact information is:

5755 8th Street East
Tacoma, Washington 98424
(253)-922-2310.

The POC for TestAmerica-Denver is Michelle Johnston. Her contact information is:

4955 Yarrow Street
Arvada, Colorado 80002
(303)-736-0100.

The turnaround times for the analyses vary from 2 to 14 working days.

TestAmerica-Tacoma will be used as the primary laboratory when possible. TestAmerica-Denver will be used as the backup laboratory in case of instrument failure or over capacity. TestAmerica-Tacoma and TestAmerica-Denver are ELAP and ADEC contaminated site accredited. TestAmerica-Denver also utilizes the same Laboratory Information Management System as TestAmerica-Tacoma, therefore, only a single laboratory report, including EDDs, will be provided following completion of analysis and reporting. The laboratory reports indicate which laboratory performed the analysis in the section immediately following the case narrative.

QAPP Worksheet #31
Planned Project Assessment Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Action (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Action (Title and Organizational Affiliation)
Field Documentation Audit	At conclusion of field event	Internal	Bristol	Russell James, CQCSM, and Marty Hannah, QA/QC Manager, Bristol	Russell James, CQCSM, Bristol	Marty Hannah, QA/QC Manager, Bristol	Molly Welker, Project Manager, Bristol
Laboratory Technical System Audit (TSA)	Before the start of sampling	Internal	Contract Laboratory	Laboratory QA Manager	Daver Wunderlich-QA Manager, Terri Torres, Analytical Laboratory Project Manager	Terri Torres, Analytical Laboratory Project Manager or appropriate persons depending on the area of the findings	Martin Hannah Analytical Task Manager, Bristol
Data Completeness Review	All data reviewed	Internal	Bristol	Martin Hannah Analytical Task Manager, Bristol	Appropriate persons depending on the area of the findings	Appropriate persons depending on the area of the findings	Molly Welker, Project Manager, Bristol
Third-Party Data Verification	Once	External	AECOM	Cathy Larson, Data Verification Chemist, AECOM	Marty Hannah, QA/QC Manager, Bristol	Marty Hannah, QA/QC Manager, Bristol	Martin Hannah Analytical Task Manager, Bristol
Management Systems Review	Once	Internal	Bristol	Marty Hannah, QA/QC Manager-Bristol	Molly Welker, Project Manager, Bristol	Molly Welker, Project Manager, Bristol	Molly Welker, Project Manager, Bristol

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Action (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Action (Title and Organizational Affiliation)
Cooler Receipt Form	Per sample shipment	Internal/ external	Bristol/USACE	Bristol Chemist/USACE Chemist	Bristol Chemist	Bristol Chemist/ Laboratory PM	USACE Chemist
Completion of ADEC Laboratory Data Checklist	Once per Laboratory Data Package	Internal	Bristol	Bristol Chemist	Bristol Chemist	Bristol Personnel	USACE Chemist/ADEC

QAPP WORKSHEET #32
ASSESSMENT FINDINGS AND CORRECTIVE RESPONSE ACTIONS

Assessment Type	Nature of Deficiencies Documentation[(a)]	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Field Documentation Audit	Audit Memo	Molly Welker, Project Manager, Bristol	Within 1 week of audit.	E-mail to file	Carey Cossaboom, Project Manager, USACE; Mary J. Abbott, Contract Manager, USACE; Ron Broyles, Contract Officer Representative, USACE., USACE Project Chemist	Immediate correction - written documentation due within 1 week
Laboratory TSA	Audit Memo	Martin Hannah Analytical Task Manager, Bristol	Within 1 week of audit.	E-mail or Memo to Laboratory QA Manager and the Project Manager	Carey Cossaboom, Project Manager, USACE; Mary J. Abbott, Contract Manager, USACE; Ron Broyles, Contract Officer Representative, USACE. USACE Project Chemist	Immediate correction - written documentation due within 1 week
Data Review TSA	Data Evaluation Summary Report	Martin Hannah Analytical Task Manager, Bristol	30 days after review	Reissuance of report	Carey Cossaboom, Project Manager, USACE; Mary J. Abbott, Contract Manager, USACE; Ron Broyles, Contract Officer Representative, USACE. USACE Project Chemist	21 days for reissuance

Assessment Type	Nature of Deficiencies Documentation[a]	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Management Systems Review	Quarterly Project Review Summary	Molly Welker, Project Manager, Bristol	7 days after audit	E-mail or Memo to file	Molly Welker, Project Manager, Bristol	Immediate correction - written documentation due within 1 week
Cooler Receipt Form	ADEC Laboratory Checklist	USACE Chemist/USACE Project Manager	Within 24 hours of receiving cooler receipt form	Change of Analysis. Possible recollection of samples	Carey Cossaboom, Project Manager, USACE; Mary J. Abbott, Contract Manager, USACE; Ron Broyles, Contract Officer Representative, USACE. USACE Project Chemist	Immediate correction - written documentation due within 1 week

[a]Documentation of deficiencies will also include deviations from the QAPP, including how the deviation may affect the quality or integrity of the data collected.

QAPP Worksheet #33
QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Field Documentation Audit Reports	7 days following audit	7 days following audit	Russell James, CQCSM-Bristol	Molly Welker, Project Manager, Bristol; File Copy
Laboratory TSA Reports	Per Laboratory SOP	Verbally at time of findings/Written report within 90 days of final analytical report	Contract Laboratory QA Manager	Martin Hannah, Project QA/QC Manager, Bristol and Molly Welker, Project Manager, Bristol; File Copy
Laboratory Data Reports	Within 14 days of receipt of final report	Various throughout project	Marty Hannah	USACE Project Delivery Team
Chemical Data Quality Review	Draft and Final report	90 Days after receipt of all final laboratory reports	Cathy Larson, Data Verification Chemist, AECOM	Martin Hannah, Project QA/QC Manager, Bristol, and Molly Welker, Project Manager, Bristol
QAPP Addendum	Per QAPP Revision change	Immediately after changes are accepted	Molly Welker, Bristol PM	USACE Project Delivery Team
ADEC Laboratory Data Checklists	One per laboratory data package	30 days after receipt of laboratory reports	Bristol Chemist	USACE Project Delivery Team
Field Change Request Form	Per requested change	Immediately after accepted change	Molly Welker, Bristol PM	USACE Project Delivery Team

QAPP Worksheet #34
Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Analytical Data	All laboratory reports for samples submitted for analysis from the project. ADEC checklists will be prepared by the Bristol Project Chemist.	Internal/External	Martin Hannah, Bristol Analytical Task Manager
Laboratory Data Packages	The laboratory data packages will be verified internally by the laboratory performing the work for completeness prior to submittal to Bristol. A data verification report will be prepared by a third-party data verification chemist.	External Internal	Terri Torres or Michelle Johnston, TestAmerica-Tacoma and Test-America-Denver Project Managers Cathy Larson, AECOM Data Verification Chemist and Martin Hannah, Bristol Analytical Task Manager
Planning	All planning documents prepared for the project.	Internal	Molly Welker, Project Manager, Bristol
Project Quality	Project Quality Documentation (QAPP, analytical methods, QC requirements) will be reviewed internally for completeness	Internal	Martin Hannah, Bristol Project QA/QC Officer
Investigation Plans	Project investigation plans (QAPP, CQCP, IDW Plan, SSHP and Accident Prevention Plan, Staff certifications, SOPs, analytes, locations) will be reviewed internally for completeness.	Internal	Molly Welker, Project Manager, Bristol
Laboratory QA	External documentation related to laboratory quality (ELAP certification, QA Plan, and LOD and MDL studies) will be verified for completeness.	Internal	Martin Hannah, Bristol Analytical Task Manager
Sampling Documents	Field notes, chains-of-custody, and other pertinent information will be reviewed for completeness and accuracy	Internal	Martin Hannah, Bristol Analytical Task Manager

QAPP WORKSHEET #35
VALIDATION (STEPS IIA AND IIB) PROCESS TABLE

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	QAPP and SOPs	Ensure that the sampling methods/procedures outlined in the QAPP were followed and that any deviations were noted/accepted.	Molly Welker, Bristol PM, Russell James, Field Technical Lead and CQCSM, Marty Hannah, Bristol Analytical Task Manager
IIb	QAPP and SOPs	Determine potential impacts from noted/accepted deviations, in regard to project requirements	Molly Welker, Bristol PM Russell James, Field Technical Lead and CQCSM, and Martin Hannah, Analytical Task Manager
IIa	Chain-of-Custody	Examine chain-of-custody forms against project requirements (analytical methods, sample identification, etc.).	Martin Hannah, Bristol Analytical Task Manager; Data Verification Chemist-AECOM
IIb	Laboratory Data Package	Examine packages against project requirements and chain-of-custody forms (holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.)	AECOM-Data Verification Chemist, Marty Hannah, Bristol Analytical Task Manager
IIb	Field duplicate-replicate (QA/QC) results	Compare results of field duplicate-replicate sample analyses with RPD criteria	AECOM-Data Verification Chemist

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QAPP WORKSHEET #36
VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE

Step IIa/b	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (Title-Organization)
IIa/b	Soil and Water	All	Low	QAPP Worksheets #11, 12, 15, 19, 24 and 28	AECOM-Data Validation Chemist, Martin Hannah, Bristol Analytical Task Manager,
IIa	Soil and Water	All	Low	Laboratory SOPs	Marty Hannah, Bristol Analytical Task Manager, Data Validation Chemist-AECOM
IIa/b	Soil and Water	All	Low	Project QAPP, DoD QSM 4.2, EM 200-1-6, ADEC Laboratory QA Policy	AECOM-Data Validation Chemist, Marty Hannah, Bristol Analytical Task Manager,
IIb	Soil and Water	Field duplicate results	Variable	Compare results of field duplicate sample analyses with RPD criteria	AECOM-Data Verification Chemist
IIb	Soil and Water	All	Variable	Data Qualifiers	TestAmerica Laboratory, Martin Hannah, Bristol Analytical Task Manager, Data Validation Chemist-AECOM
IIb	Soil and Water	All	Low	LOQ/LOD	Martin Hannah, Bristol Analytical Task Manager, Data Validation Chemist-AECOM

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QAPP WORKSHEET #37
USABILITY ASSESSMENT

The usability assessment will consider whether data meet PQOs as they relate to the decision(s) to be made, and evaluates whether data are suitable for making that decision. The usability assessment is a comprehensive data review and will be performed only on data of known and documented quality (i.e., verified data collected as part of the confirmation sampling).

To accomplish this step of data review, the project team will do the following:

- Summarize the usability assessment process and all usability assessment procedures, including interim steps and any statistics, equations, and computer algorithms that will be used to assess data;
- Describe the documentation that will be generated during usability assessment;
- Identify the personnel (by title and organizational affiliation) responsible for performing the usability assessment;
- Describe how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies; and
- Describe the evaluative procedures used to assess overall measurement error associated with the project and include the data quality indicators (DQIs).

A summary of the DQIs used in preparing the usability assessment is provided below. Following the discussion for each data quality indicator, the usability documentation resulting from that particular DQI assessment is detailed.

The 2012 Remedial Action Report will contain all tabulated confirmation sample results with proper data qualifiers. The final report qualifiers will likely not match the laboratory reports due to differing criteria used in the assessment, such as blind field duplicates and MS/MSD evaluation criteria. When extraction and instrument blanks have reportable results, affected samples are "B" flagged to indicate potential bias to sample results. Sample results less than 10 times the concentration reported in the method or instrument blank, will be reported at the stated concentration and also B flagged in accordance with DoD QSM 4.2. Non-detect results will not be flagged, as there is no bias if all other data quality parameters (surrogates) are within acceptance limits.

The following table contains a summary of qualifiers that may be assigned to analytical results.

Qualifier	Definition
ND (LOD)	Analyte result is less than the DL. The non-detect result has the LOD value in parentheses.
J	Analyte result is considered an estimated value because the level is below the laboratory LOQ but above the DL (formerly method detection limit)
MH, ML, MN	Analyte result is considered an estimated value biased (high, low, uncertain) due to matrix effects
B	Analyte result is considered a high biased estimated value due to contamination present in the method or trip blank. Results less than 10 times the reported method blank concentration will be B flagged to indicate bias.
QH, QL, QN	Analyte result is considered an estimated value biased (high, low, uncertain) due to a quality control failure such as surrogate recoveries outside of acceptance limits.
R	Analyte result is rejected – result is not usable. Note that "R" replaces the chemical result (no result shall be reported with an "R" flag).

Summary of Data Quality Indicators

Precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity are the DQIs used to assess the data produced during the project. Each DQI is described below, including a definition of the terminology, the referenced process for calculating the indicator, and the referenced measurement performance criteria for this project. A description of how the DQIs should be incorporated into the usability section is found under each parameter heading.

Precision

Precision will be expressed in terms of relative percent difference (RPD) between the values resulting from primary and duplicate sample analyses. The RPD is calculated as follows:

$$RPD = [|(x1 - x2)| / x\text{-}]\ [100]$$

Where:

- x^1 = analyte concentration in the primary sample,
- x^2 = analyte concentration in the duplicate sample, and
- x^- = average analyte concentration of the primary and the duplicate sample.

For MI samples, precision will be expressed in terms of relative standard deviation (RSD) between the values resulting from primary and replicate sample analyses. The RSD is calculated as follows:

$$RSD = (s / x^-)\ (100)$$

Where:

- s = standard deviation, and
- x^- = average analyte concentration of the primary and replicate samples.

The QC measures for precision include field duplicates, field replicates (for MI samples), laboratory duplicates, laboratory control sample/laboratory control sample duplicates (LCS/LCSDs), and matrix spike/matrix spike duplicates (MS/MSDs). The primary measurement of extraction/analytical batch precision is the RPD of the LCS/LCSD. The primary measurement of field precision is the field duplicate RPD. Because the of the challenging soil matrix at NE Cape, (tundra, glacial till, NOM), the failure of MS/MSD precision will result in only qualifying (flagging) the field duplicate results or parent result of the MS/MSD QC samples and not the entire sample batch. If one or both analytical results are less than the LOQ, results will be evaluated, but not qualified. If MS/MSD parent sample results are greater than 4 times the spike amount, recoveries will be calculated and evaluated, but parent sample results will not be qualified.

In order to meet the needs of the data users, project data must meet the measurement performance criteria for precision specified in QAPP Worksheet #12, Measurement Performance Criteria Tables. The project precision acceptance limit is 50% RPD for soil field duplicates and 30% RPD for water field duplicates. MI sample replicates will be evaluated with a control limit of <30% RSD.

Imprecision may be the result of one or more of the following: field instrument variation, analytical measurement variation, poor sampling technique, sample transport problems, or spatial variation (heterogeneous sample matrices). To identify the cause of imprecision, the field sampling design rationale and sampling techniques will be evaluated by the reviewer, and both field and analytical duplicate/replicate sample results will be reviewed. If poor precision is indicated in both the field and analytical duplicates/replicates, then the laboratory may be the source of error. If poor precision is limited to the field duplicate/replicate results, then the sampling technique, field instrument variation, sample transport, and/or spatial variability may be the source of error.

The usability report will:

- Discuss and compare overall field duplicate/replicate precision data from data collected for the project for each matrix, analytical group, and concentration level; and
- Discuss and describe the limitations on the use of project data when overall precision is poor or when poor precision is limited to a specific sampling or laboratory (analytical) group, data set or SDG, matrix, analytical group, or concentration level.

Accuracy / Bias

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) that are due to sampling and analytical operations. Accuracy will be expressed in terms of percent recovery (%R) of spike concentrations. Accuracy expressed as %R is calculated as follows:

$$\%R = [(A-B)/C]\ [100]$$

Where:

- A = spiked sample concentration,
- B = measured sample concentration (without spike), and
- C = concentration of spike added.

Examples of QC measures for accuracy include MSs, surrogate recoveries (organic analyses) LCSs, and laboratory method blanks. In order to meet the needs of the data users, project data must meet the measurement performance criteria for accuracy/bias specified in QAPP Worksheet #12, Measurement Performance Criteria Tables.

The usability report will:

- Discuss and compare overall contamination and accuracy/bias for data collected for the project for each matrix, analytical group, and concentration level;
- Describe the limitations on the use of project data if extensive contamination and/or inaccuracy or bias exists, or when inaccuracy is limited to a specific sampling or laboratory group, data set or SDG, matrix, analytical group, or concentration level; and
- Discuss the impact of any qualitative and quantitative trends in bias on the sample data.

Representativeness

Representativeness expresses the extent to which collected data define site contamination. Sample collection, handling, preservation, and analytical procedures are designed to obtain the most representative sample possible.

Representative samples will be achieved by the following:

- Collection of samples from locations representing site conditions;

- Use of appropriate sample preservation techniques;
- Use of appropriate sampling procedures, including proper equipment;
- Use of appropriate analytical methods for the required parameters and LOQs; and,
- Analysis of samples within the required holding times.

The usability report will:

- Discuss and compare overall sample representativeness for each matrix, analytical group, and concentration level; and
- Will describe the limitations on the use of project data when overall non-representative sampling has occurred, or when non-representative sampling is limited to a specific sampling, group, data set or SDG, matrix, analytical group, or concentration level.

Comparability

Comparability is the degree to which different methods, data sets, and decisions agree or can be represented as similar. Comparability describes the confidence (expressed qualitatively or quantitatively) that two data sets can contribute to a common analysis and interpolation. In order to meet the needs of the data users, project data must meet the measurement performance criteria for comparability specified in QAPP Worksheet #12, Measurement Performance Criteria Tables.

Additional detail regarding the process of assessing comparability will be in accordance with, UFP-QAPP Manual, Section 2.6.2.5 (EPA, 2005). Different situations require different assessments of comparability, as in the following:

- If two or more sampling procedures or sampling teams will be used to collect samples, describe how comparability will be assessed for each matrix, analytical group, and concentration level;
- If replicate samples are analyzed, the specific method and percent difference formula that will be used to assess replicate sample comparability for individual data points will be discussed.

The usability report will:

- Discuss and compare overall comparability for the project for each matrix, analytical group, and concentration level;
- Document overall comparability, describe the procedures used to perform overall assessment of comparability and include mathematical and statistical formulas for evaluating screening and confirmatory data comparability;
- Discuss if the project is long-term monitoring; project data should be compared with previously generated data to ascertain the possibility of false positives and false negatives, and positive and negative trends in bias. Data comparability is extremely important in these situations;
- Discuss anomalies detected in the data that may reflect a changing environment or indicate sampling and/or analytical error. Comparability criteria should be established to evaluate these data sets to identify outliers and the need for resampling as warranted;
- Describe the limitations on the use of project data when project-required data comparability is not achieved for the overall project or when comparability is limited to a specific sampling or laboratory group, data set or SDG, matrix, analytical group, or concentration level;
- Document the failure to meet screening/confirmatory comparability criteria and discuss the impact on usability;
- Document the failure to meet replicate sampling comparability criteria and discuss the impact on usability;
- If data are not usable to adequately address environmental questions or support project decision-making, address how this problem will be resolved and discuss the potential need for resampling; and
- If long-term monitoring data are not comparable, address whether the data indicate a changing environment, or are a result of sampling or analytical error.

Sensitivity and Quantitation Limits

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, DL, LOD, and limit of quantitation (LOQ) studies, and the lowest calibration standards at or below the LOQ. In order to meet the needs of the data users, the project data must meet the measurement performance criteria for sensitivity and project LOQs specified in Worksheet #12 and Tables 15-1 and 15-2, Measurement Performance Criteria Tables. The process for assessing sensitivity is detailed in the UFP-QAPP Manual, Section 2.6.2.3 (EPA, 2005) and the DoD QSM Version 4.2 in Sections C.3 and D.1.2.1.

The laboratory will establish a DL, typically the method detection limit (MDL), using a scientifically valid and documented procedure. The DL is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The DL is the laboratory's "best case" sensitivity for a given analytical method. The laboratory may establish DLs for each method, matrix, and analyte for each instrument the laboratory plans to use for the project using the statistical method presented in the Title 40 Code of Federal Regulations, Part 136 (40 CFR Part 136), Appendix B.

The LOD will be established quarterly by spiking a blank matrix at two to three times the DL for single analyte standards, or one to four times the DL for multi-analyte standards. This spike concentration is the LOD for each analyte and is specific for each matrix, method, and instrument.

The LOQ will be determined at least quarterly for each analyte of concern following a documented procedure at the laboratory. The validity of the LOQ will be determined by the analysis of a QC sample containing the analyte at one to two times the estimated LOQ and within the calibration range of the instrument. The LOQ is valid if the recovery of the analyte is within the test method's acceptance recovery limits for accuracy.

The following requirements apply to the determination of DL, LOD, and LOQ:

- The apparent signal-to-noise ratio at the LOD must be at least three and in the results must meet all method requirements for analyte identification (e.g., ion abundance, second column confirmation, or pattern recognition). If no measurement of noise is available for a given method, then the LOD must yield a result that is at least three standard deviations greater than the mean blank concentration.

- If multiple instruments are used, the laboratory must verify the DL, LOD, and LOQ on each instrument.
- If the LOD verification fails, then the laboratory must repeat the DL and LOD determinations at higher concentrations.
- The laboratory will maintain documentation of the DL, LOD, and LOQ studies and these measures of instrument sensitivity will be performed at least quarterly.

A non-detectable result will be reported as less than the LOD. The "J" flag will be applied to the detectable results that fall between the DL and the LOQ, in order to indicate the relative inaccuracy associated with the result. No detectable results will be reported below the DL.

The usability report will:

- Discuss and compare overall sensitivity and quantitation limits (QLs) from multiple data sets collected for the project for each matrix, analytical group, and concentration level.
- Discuss the impact of that lack of sensitivity or higher QLs on data usability. If information is available, the report will indicate that sensitivity or QLs were not achieved.
- Describe the limitations on the use of project data if project-required sensitivity and QLs are not achieved for all project data, or when sensitivity is limited to a specific sampling or laboratory group, data set or SDG, matrix, analytical group, or concentration level.
- Address high moisture content and laboratory dilutions due to presence of high concentrations of target and/or non-target analytes that may elevate reporting limits.

The TestAmerica laboratory reporting limits are capable of meeting sensitivity requirements, and the COPCs can be detected below the project evaluation criteria.

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under correct, normal circumstances. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. The completeness target is 80%. Completeness measures the effectiveness in sample collection, analysis, and result reporting of the entire investigation, and is calculated on a per-analyte basis by the following equation:

$$\%Completeness = \frac{Number\ of\ valid\ results}{Number\ of\ possible\ results} \times 100$$

For any instances of samples that could not be analyzed for any reason (holding time violations in which resampling and analysis were not possible, samples spilled or broken, etc.), the numerator of this calculation becomes the number of possible results minus the number of possible results not reported.

Completeness – A completeness check will be done on all of the data generated by the laboratory. Completeness will be calculated for each analyte as follows from the UFP-QAPP Manual Section 2.6.2.6: *For each analyte, completeness will be calculated as the number of data points for each analyte that meets the measurement performance criteria for precision, accuracy/bias, and sensitivity, divided by the total number of data points for each analyte). A discussion will follow summarizing the calculation of data completeness. Any conclusions about the completeness of the data for each analyte will be drawn and any limitations on the use of the data will be described.*

For this project, 80% of usable sample data is considered the minimal acceptance criteria for completeness. The goal is to achieve 100% completeness.

The usability report will:

- Discuss and compare overall completeness for each matrix, analytical group, and concentration level; and
- Describe the limitations on the use of project data if project-required completeness is not achieved for the overall project, or when completeness is limited to a specific sampling or laboratory group, data set or SDG, matrix, analytical group, or concentration level.
- A Chemical Data Quality Review report will include the usability report.

Activities

A preliminary usability assessment will be performed by the analytical task manager or designee to ensure that the PQOs are properly evaluated and the full scope is considered while field personnel are still on site. If, for whatever reason, (Precision, Accuracy/Bias, Comparability, Sensitivity, Completeness) Measurement Performance Criteria are not achieved and it has been determined that certain project data are not usable, then the project team will determine if it is necessary to take further action, such as resampling to ensure that DQOs have been met. Resampling will not occur if it is determined that site heterogeneity or matrix interference are the root causes of failure to achieve PQOs. Resampling may occur if initial sampling, sample design, or analytical error is the root cause of failure to meet PQOs.

The items listed under **Considerations for Usability Assessment** below are examples of specific items that will be considered during the project under the usability assessment.

Describe the evaluative procedures used to assess overall measurement error with the project:

Reconciliation – Each of the PQOs presented in Worksheet #12 will be examined to determine if the objective was met. This examination will include a combined overall assessment of the results of each analysis pertinent to an objective. Each analysis will first be evaluated separately in terms of the major impacts observed from the DQIs, and measurement performance criteria assessments. Based on the results of these assessments, the quality of the data will be determined. Based on the quality determined, the usability of the data for each analysis will be determined. Based on the combined usability of the data from all analyses for an objective, it will be determined if the PQO was met and whether project action limits were exceeded. The final report will include a summary of all the points that went into the reconciliation of each objective. As part of the reconciliation of each objective, conclusions will be drawn and any limitations on the usability of any of the data will be described.

Identify the personnel responsible for performing the usability assessment Laboratory PM designee, Bristol Analytical Task Manager, Project QA/QC Manager, and third-party data reviewer (AECOM Data Review Chemist).

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies.

A usability report will be written that discusses precision, accuracy/bias, representativeness, comparability and completeness as detailed within this worksheet. This narrative report will include worksheets, tables and supporting documentation to assess the PQOs and any conclusions and limitations of the associated data. The specific details of each section of the usability assessment documentation can be found above under the individual DQIs.

Considerations for Usability Assessment:

Data Deliverables and QAPP, Deviation: Ensure that all necessary information was provided.

Deviations: Determine the impact of deviations on the usability of data.

Sampling Locations: Determine if alterations to sample locations continue to satisfy the project objectives.

Chain-of-Custody: Establish that problems with documentation or custody procedures do not prevent the data from being used for the intended purpose.

Holding Times: Determine the acceptability of data where holding times were exceeded.

Damaged Samples: Determine whether the data from damaged samples are usable. If the data cannot be used, determine whether resampling is necessary.

SOPs and Methods: Evaluate the impact of deviations from SOPs and specified methods on data.

QC Samples: Evaluate the implications of unacceptable QC sample results on the data usability for the associated samples. For example, consider the effects of observed blank contamination.

Matrix: Evaluate matrix effects (interference or bias).

Meteorological Data and Site Conditions: Evaluate the possible effects of meteorological (e.g., wind, rain, temperature) and site conditions on sample results. Review field reports to identify whether any unusual conditions were present and how the sampling plan was executed.

Comparability: Ensure that results from different data collection activities achieve an acceptable level of agreement.

Completeness: Evaluate the impact of missing information. Ensure that enough information was obtained for the data to be usable (completeness as defined in PQOs documented in the QAPP).

Background: Determine if background levels have been adequately established (if appropriate).

Critical Samples: Establish that critical samples and critical target analytes/COCs, as defined in the QAPP, were collected and analyzed. Determine if the results meet criteria specified in the QAPP.

Data Restrictions: Describe the exact process for handling data that do not meet PQOs (i.e., when measurement performance criteria are not met). Depending on how those data will be used, specify the restrictions on use of those data for environmental decision making.

Usability Decision: Determine if the data can be used to make a specific decision considering the implications of all deviations and corrective actions.

Usability Report: Discuss and compare overall precision, accuracy/bias, representativeness, comparability, completeness, and sensitivity for each matrix, analytical group, and concentration level. Describe limitations on the use of project data if criteria for data DQIs not met.

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ATTACHMENT 1

Bristol Standard Operating Procedures

BERS-01	Soil Sampling SOP
BERS-02	Groundwater Sampling SOP
BERS-03	Sample Management SOP
BERS-04	Field Measurement and Test Equipment SOP
BERS-05	Equipment Decontamination SOP
BERS-08	Water Level Measurement SOP
BERS-09	Investigation-Derived Waste (IDW) Management SOP
BERS-10	General Air Monitoring & Sampling SOP
BERS-11	Field Documentation SOP
BERS-12	Trenching SOP
BERS-13	General Backfill and Compaction SOP
BERS-14	*MULTI INCREMENT* Sampling
BERS-15	Document Control System SOP
BERS-17	Trimble GeoXH® Global Positioning Systems
BERS-22	UTV Operations

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

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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.

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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.

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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.

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BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

WATER LEVEL MEASUREMENT

STANDARD OPERATING PROCEDURE BERS-08

Record of Changes

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0	01/15/08	B. Allen	S. Ruth
1	2/23/10	M. Faust	B. Allen

WATER LEVEL MEASUREMENT

STANDARD OPERATING PROCEDURE

Purpose and Scope: The purpose of this document is to provide sufficient and appropriate instructions for the determination of the depth-to-water and floating chemical product (i.e., gasoline, kerosene) in an open borehole, cased borehole, monitoring well, or piezometer.

Summary: Prior to measurement, water levels in piezometers and monitoring wells are allowed to stabilize for a minimum of 24 hours after well construction and development. A survey mark is placed on the casing for use as a reference point for measurement. The distance from water surface to reference point on well casing is measured at least twice and recorded.

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

Interferences and Potential Problems: Generally, water level measurements taken in boreholes, piezometers, or monitoring wells are used to construct water table or potentiometric surface maps, and to determine flow direction, as well as many other aquifer characteristics. Situations that may impact the accuracy of water level measurements include:

- The magnitude of the observed changes between wells appears too large;
- Atmospheric pressure changes;
- Aquifers that are tidally influenced;
- Aquifers affected by river stage, impoundments, and/or unlined ditches;
- Aquifers stressed by intermittent pumping of production wells;
- Aquifers being actively recharged due to precipitation event;
- Occurrence of pumping; and
- During storm events over a shallow aquifer where recharge is rapid.

Additional sources of error may include the following:

- The chalk used on steel tape may contaminate the well.
- Cascading water may obscure the water mark, or cause it to be inaccurate.
- Many types of electric sounders use metal indicators at 5-foot intervals around a conducting wire. To ensure accuracy, these intervals should be checked with a survey tape (preferably with units divided in hundredths of a foot).

- If there is product or oil present on the water, it can insulate the contacts of the probe on an electric sounder, or give false readings due to thickness of the oil. If this situation is suspected, it is recommended that interface probes be used to determine the thickness and density of the oil layer in order to determine the correct water level.
- Turbulence in the well and/or cascading water can make water level determination difficult with either an electric sounder or steel tape.

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-specific 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.

There are a number of devices that can be used to measure water levels. The device must be capable of attaining an accuracy of 0.02 feet, and calibrated on a regular basis.

Field equipment for performing water level measurements include:

- Air monitoring equipment (e.g., photoionization detector [PID] or flame ionization detector [FID])
- Well depth measurement device
- Electronic water level indicator
- Metal tape measure
- Chalk
- Ruler
- Watch
- Logbook
- Paper towels
- Groundwater water level data forms
- pH meter (optional)
- Specific conductivity meter (optional)
- Thermometer (optional).

Site Preparation: The following steps will be followed before measurement activities are performed:

- Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.
- Obtain necessary sampling and monitoring equipment.
- Decontaminate or pre-clean equipment, and ensure that it is in working order.
- Perform a general site survey prior to site entry in accordance with the Site-Specific Health and Safety Plan.
- Identify and mark all sampling locations.

Water Level Measurement: A survey mark should be placed on the north side of the casing for use as a reference point for measurement. Generally, the reference point is marked on the top of the well casing, and is established at the time the well is surveyed. The measuring point should be documented in the site logbook and on a groundwater level data form. Every attempt should be made to notify future field personnel of such reference points in order to ensure comparable data and measurements.

Prior to measurement, water levels in piezometers and monitoring wells should be allowed to stabilize for a minimum of 24 hours after well construction/development. In low-yield situations, recovery may take longer. Measurements should be made to the closest 0.01 feet.

The following procedures will be followed to determine groundwater elevation:

1. Make sure that water level measuring equipment is in good operating condition.
2. To the extent known, measure wells in order of increasing contamination.
3. Clean all equipment entering the well.
4. Remove locking well cap, note well ID, time of day, elevation (top of casing) and date in site logbook or an appropriate groundwater level data form.
5. Remove well casing cap.
6. If required by site-specific conditions, monitor headspace of well with a PID or FID to determine presence of volatile organic compounds, and record in site logbook.
7. Lower electric water level measuring device or equivalent into the well until water surface is encountered.
8. Measure the distance from the water surface to the reference measuring point on the well casing or protective barrier post, and record in the site logbook. In addition, note that the water level measurement was from the top of the steel casing, the top of the PVC riser pipe, the ground surface, or some other position on the wellhead.
9. Groundwater level data should be documented as follows:
    - Logger Name – Person taking field notes;
    - Site Name;

- Date the water levels are measured;
- Location – Monitor well number and physical location;
- Time (24-hour clock) at which the water level measurement was recorded;
- Depth to Water – Water level measurement in feet, tenths, or hundredths of feet, depending on the equipment used. Two measurements are required to ensure accuracy;
- Comments – Any information the field personnel deems applicable may be included here;
- Measuring Point – Marked measuring point on PVC riser pipe, protective steel casing, or concrete pad surrounding well casing, from which all water level measurements for individual wells should be measured. This provides consistency in future water level measurements.

10. Measure total depth of well (at least twice to confirm measurement) and record in field logbook or on groundwater level data form.
11. Remove all downhole equipment; replace well casing cap and locking steel caps.
12. Rinse all downhole equipment and store for transport to next well.
13. Decontaminate all equipment.
14. Note any physical changes, such as erosion or cracks in protective concrete pad or variation in total depth of well, in field logbook and on groundwater level data form.

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 they should be documented.
- Each well should be tested at least twice in order to compare results.

Calculations and Data Reduction: Calculations and data reduction will be performed using the following equations and rules:

Groundwater elevation above mean sea level: $E_w = E - D$

where:

E_w = Elevation of water above mean sea level or local datum (feet or meters)

E = Elevation above sea level or local datum at point of measurement (feet or meters)

D = Depth to water (feet or meters)

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

STANDARD OPERATING PROCEDURE BERS-09

Record of Changes

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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

GENERAL AIR MONITORING AND SAMPLING

STANDARD OPERATING PROCEDURE BERS-10

Record of Changes

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1	02/23/10	L. Maserjian	B. Allen

GENERAL AIR MONITORING AND SAMPLING

STANDARD OPERATING PROCEDURE

Summary: *Air monitoring* is defined as the use of direct-reading instruments, and other screening or monitoring equipment and techniques that provide instantaneous (real-time) data on the levels of airborne contaminants. Examples of air monitoring equipment include hand-held photoionization detectors (PID), flame-ionization detectors (FID), oxygen/combustible gas detectors, and remote optical sensors.

Air sampling is defined as sampling and analytical techniques that require either off- or on-site laboratory analysis, and therefore do not provide immediate results. Typically, air sampling occurs after the use of real-time air-monitoring equipment has narrowed the number of possible contaminants, and has provided some qualitative measurement of contaminant concentration. Air sampling techniques provide more accurate information than most air monitoring technologies in detecting, identifying, and quantifying specific chemical compounds. Examples of air sampling equipment include sampling bags, sorbent tubes and cartridges, and impingers.

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

Interference and Potential Problems: The primary potential problem associated with air monitoring/sampling is non-representative sampling. Representative air samples will accurately reflect the concentrations of contaminants of concern at a given time, and the selected time period will be representative of either "typical" or "worst case" conditions.

To ensure that air monitoring/sampling activities are representative, the site-specific sampling strategy must be developed and implemented to minimize potential interference. An adequately developed sampling strategy will generate sufficient information to identify sources of contaminant emissions, establish either natural background or upwind conditions, establish baseline concentrations of contaminants (i.e., prior to intrusive activities), identify contaminants of concern, and document ranges of contaminant concentrations on site and downwind.

- Factors affecting the representativeness of samples and measurements collected at a site include:
- Meteorology and topography of sampling locations.
- Distinction between meteorology during the sampling period and typical meteorology during the entire period of concern.
- Number of distinct sampling events and duration of sampling activities as compared to the anticipated length of exposure.
- Type of release (e.g., sampling during a drum rupture or instantaneous release; sampling a continuous release from contaminated soil).

- Timing of sampling activities with respect to expected “ambient” or “worst case” emissions (e.g., increased volatile emissions during warmer daylight hours).
- Suspected upwind emissions sources (e.g., burning of fossil fuels, emissions from vehicular traffic, exhaust from smoke stacks, and natural sources of pollution).
- Analytes of concern (e.g., photo-reactivity of certain parameters of concern with non-related compounds).

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 QAPP and will be met.

Equipment & Material: Equipment selection will be based on the objectives of the sampling program, whether air monitoring or air sampling is required, and the analytes of concern. Prior to deployment in the field, the requisite sampling equipment and materials will be identified, secured, calibrated, and inspected for signs of damage or potential contamination.

Air monitoring equipment includes portable screening devices and specialized analytical instruments to provide continuous or sequential, direct air concentrations for a specific location or area in either a real-time or semi-real-time mode. Portable monitoring devices, which provide *qualitative* information on airborne contamination, include:

- PID (sensitive to aromatic and olefinic compounds);
- FID (sensitive to volatile organic compounds [VOCs]);
- Combustible gas indicators (to test for potentially explosive atmospheres);
- Compound-specific toxic atmosphere analyzers;
- Aerosol/particulate monitors;
- Colorimetric chemical detector tubes;
- Radiation meters;
- Gold film monitors for hydrogen sulfide and mercury vapors; and
- Infrared detectors.

Specialized analytical instruments used for *quantitative* air monitoring include direct air sampling portable gas chromatographs, trace atmospheric gas analyzers based on mass spectrometry, and remote optical sensing equipment.

Specific analytical methods have been developed for air samples. These methods typically specify equipment requirements for sampling. Common air sampling equipment include total suspended particulate samplers (variable based on size of particulates to be measured), area and personal sampling pumps, and canister sampling systems (relying on pressure differentials for sample collection).

Common air sampling media and devices include SUMMA canisters (for VOCs and permanent gas analysis); Tedlar® sampling bags (for VOCs, fixed gases, and methane); polyurethane foam sorbent (for pesticides, polychlorinated biphenyls [PCBs], dioxins, furans, and polynuclear aromatic hydrocarbons [PAHs]; impingers (for bubbling air samples through solution); sorbent tubes and cartridges; particulate filters; and passive dosimeters.

In addition to the equipment and media listed above, air monitoring and sampling support equipment may include the following: data loggers compatible with selected monitoring and sampling devices (to minimize the amount of time workers spend on site), site logbook, camera, small screwdriver set, aluminum foil, Teflon® tape, inert tubing, glass cracker, calibration and decontamination supplies and equipment, chain-of-custody forms, and labeling, packaging, and shipping supplies. Extension cords and multiple plug outlet may also be needed based on the air monitoring/sampling devices selected.

Air monitoring and air sampling equipment and supplies will be further specified in the governing Quality Assurance Project Plans (QAPPs).

Air Monitoring

Initial Air Monitoring Survey

The initial air monitoring survey involves collection of preliminary data on airborne contaminant concentrations at hazardous waste sites. An organic vapor analyzer is typically used during this survey. When warranted, intrinsically safe or explosion-proof instruments should be used.

Sufficient data should be obtained with real-time instruments during the initial survey to screen the site for various contaminants. Preliminary data may be used to determine appropriate levels of personal protection, establish site work zones, and map candidate areas for more thorough qualitative and quantitative studies involving air sampling. The initial survey may also indicate the need for a more comprehensive evaluation of hazards and analyses for specific compounds.

On Site Air Monitoring

Because site activities and weather conditions change, a continuous and ongoing program to monitor the ambient atmosphere must be established. This program should remain active, as necessary, during all on site activity.

Offsite Monitoring

Perimeter monitoring is typically conducted with the same instruments employed for onsite monitoring. Because air is a dynamic matrix, physical boundaries like property lines and fences do not necessarily delineate the site boundary or area influenced by a release. Whenever possible, atmospheric hazards in the areas adjacent to the hazardous waste site should be monitored with direct-reading instruments.

Air monitoring data should be obtained at breathing-zone height in three or four locations downwind of the source. Monitoring at varying locations off site will provide useful information regarding pollutant migration. Negative instrument readings off site should not be interpreted as the complete absence of all airborne toxic substances; rather, it is possible that the particular compound or class of compounds, to which the monitoring instrument responds, is not present or the concentration of the compound is below the instrument's detection limit.

Air Sampling

Introductory Considerations

The goal of air sampling is to accurately assess a site's effect on air quality. This effect is expressed in terms of overall average and/or maximum air concentrations. Unlike soil concentrations, air concentrations at points of interest can vary by orders of magnitude throughout the period of concern. This variability is a major consideration in designing an air sampling strategy. Determining the location of potential sources is essential to the selection of sampling locations.

Downwind air concentration is determined by the amount of material being released from the site into the air (i.e., the emission rate), and by the degree to which the contamination dilutes as it is transported. On-site activities and site meteorology greatly influence contaminant emission rates, while local meteorology and topography govern downwind dilution.

Air Sampling Strategy

The sampling strategy must be developed and documented in the site QAPP prior to initiating on-site sampling activity to ensure that representative data are obtained. Sampling objectives should be fully detailed to ensure collection of appropriate data and achievement of adequate data quality.

The sampling strategy typically requires that the concentration of contaminants at the source or area of concern, as well as background, contributions be quantified. It is important to establish background levels of contaminants in order to develop a reference point from which to evaluate the source data. Field blanks and lot blanks, as well as various other types of quality control samples, can be utilized to determine other sources. The impact of extraneous sources on sampling results can frequently be accounted for by placing samplers upwind, downwind, and crosswind from the subject sources.

Location and Number of Individual Sampling Points

Choose the number and location of sampling points according to the sensitivity of the sampling and analytical methods being used, the variability of contaminant concentration over time at the site, the level of precision required, and cost limitations.

Determine the number of locations and placement of samplers by considering the nature of the response, local terrain, meteorological conditions, location of the site (with respect to other conflicting background sources), size of the site, and the number, size, and relative proximity of separate on-site or upwind emission sources. Avoid natural obstructions when choosing air sampling station locations, and account for channeled air flow around those obstructions.

Consider the duration of sampling activities when choosing the location and number of samples to be collected. For example, if the sampling period is limited to a few hours, one or two upwind and several downwind samples would typically be adequate, especially around major emission sources. For longer term sampling events, consider moving upwind and downwind sampling locations daily, based on weather forecasts. Weather monitoring becomes critical where complex terrain and local meteorological effects frequently change wind direction.

Sampling sites must be secure from vandals and mishap. Secure all sampling locations to maintain chain of custody, to prevent tampering with samples or loss of sampling units. High-volume sampling methods often require the use of 110 VAC electric power. When portable generators are used, the power quality may affect sampler operation. Also, be aware that the generators themselves could be a potential pollution source if their placement is not carefully considered.

Air quality dispersion models can be used to place samplers. The models incorporate source information, surrounding topography, and meteorological data to predict the general distance and directions of maximum ambient concentrations. Modeling results should be used to select sampling locations in areas of maximum pollutant concentrations. Additional site-specific detail on selecting sampling locations will be included in the site QAPP.

Time, Duration, and Frequency of Sampling Events

After choosing appropriate sampling or monitoring locations, determine appropriate sampling times, duration, and frequency.

The time of day, duration, and frequency of sampling events is governed by factors, such as schedule of typical activity at the site, timing of emissions from the site and surrounding pollutant sources, diurnal meteorological effects on downwind dispersion, the time period of concern as defined by the project objective, and cost and other logistical considerations.

The duration or period of air sampling is commonly divided into two categories: (1) instantaneous or “grab” samples that are usually collected in less than five minutes, and (2) average or integrated samples that are collected over a significantly longer period of time. Integrated samples are not suited to determining cyclical releases of contaminants, because periodic or cyclical events are averaged out by the proportionally long sampling duration.

The schedule and duration of site activity is the primary factor in determining the tie, duration, and frequency of samples. If the site will be undergoing removal activities 24 hours a day, continuous air sampling may be warranted. If site activities will be conducted for only eight hours a day, and no emissions are likely to occur during the remaining 16 hours, sampling duration could be limited to the workday, but off-peak air samples should be collected to ensure that emissions are not persisting after the conclusion of daily cleanup activities. For some sites, emissions are still a factor several hours after daily site activities have been completed. Because of the typically decreased downwind dispersion in the evening, higher downwind concentrations than were present during daytime site activities may be detected. For sites where this is possible, the sampling duration needs to be lengthened accordingly.

Sampling duration and flow rate dictate the volume of air collected, and to a major degree, the detection limit. The analytical method selected will provide a reference to flow rate and volume. Flow rates are limited to the capacity of the pumps being employed and the contact time required by the collection media.

Air quality dispersion models can predict the maximum air contaminant concentration expected from a source. The meteorological and site conditions expected to cause the highest concentration are known as worst-case conditions, and can be identified by analyzing the modeling results.

Additional site-specific detail on selecting air sampling locations will be included in the site QAPP.

Quality Control

The following procedures apply:

- The manufacturer's instructions should be reviewed prior to instrument use. Instruments must be utilized in accordance with manufacturer's instructions. Equipment checkout must occur prior to and after monitoring/sampling, and results must be documented.
- Equipment examination and calibration activities should occur prior to field deployment and after each monitoring/sampling event. All results and findings, as well as any corrective actions, should be documented.
- All samples must be recorded on an Air Sampling Worksheet.
- Blanks will be collected at the frequency and locations specified in the site 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.

Calculations and Data Reduction: Volume is obtained by multiplying the sample time in minutes by the flow rate. Sample volume should be indicated on the chain-of-custody record. Adjustments for temperature and pressure differences may be required. Results are usually provided in parts per million, parts per billion, milligrams per cubic meter, or micrograms per cubic meter. Refer to the analytical method or regulatory guidelines for other applicable calculations.

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

FIELD DOCUMENTATION

STANDARD OPERATING PROCEDURE BERS-11

Record of Changes

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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

EXCAVATION AND TRENCHING

STANDARD OPERATING PROCEDURE BERS-12

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	03/9/10	C. Croley	G. Jarrell
1	4/20/10	M. Faust	P. Curl

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

EXCAVATION AND TRENCHING

STANDARD OPERATING PROCEDURE

Summary: The standards covering excavation and trenching safety are included in Title 29 Code of Federal Regulations, Part 1926.650-652 (Subpart P) [29 CFR 1926.650-652, subpart P], and U.S. Army Corps of Engineer's Safety and Health Requirements Manual 385-1-1 (15 September 2008). The Federal Standards require protective systems to be in place when anyone enters an excavation or trench that is more than 5 feet (1.5 meters) in depth. Bristol Environmental Remediation Services, LLC (Bristol), as a member of the Bristol Alliance of Companies, through their Corporate Health and Safety Manual, follows a more conservative guideline of requiring protective systems to be in place for excavations or trenches of 4 feet (1.2 meters) in depth.

Definitions:

1. A "Protective System" means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
2. An "Excavation" means any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal. Bristol's use of excavations is normally in conjunction with the installation or removal of underground storage tank facilities.
3. A "Trench" (trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters). Trenching is normally used in conjunction with contaminated site assessments where samples are collected for field screening or analysis, or when piping is being installed or removed.
4. A "Confined or Enclosed Space" means any space having a limited means of egress, which is subject to the accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere. Confined or enclosed spaces include, but are not limited to, storage tanks, process vessels, bins, boilers, ventilation or exhaust ducts, sewers, underground utility vaults, tunnels, pipelines, and open-top spaces more than 4 feet in depth, such as trenches, pits, tubs, vaults, and vessels.

Personnel Qualifications: All personnel associated with trenching and excavation will be trained in the safe practices applicable to excavating and trenching. Personnel will be trained in the applicable elements of 29 CFR1926.651, 1926.652 and subpart P. Additional training may be required for trenches that are considered to be a confined space, or present other work-related hazards.

Intent: It is not intended that Bristol personnel routinely conduct work activities in any excavation or trench.

Excavation/Trenching Plans: Written plans, although not always required, are suggested as an effective checklist prior to beginning excavation/trenching activities. Any excavation/trenching activities that fall under the USACE 385-1-1 safety guidelines require a written and approved plan prior to the start of work.

Work Permit: Excavations will require a Confined Space Work Permit when the depth of an excavation exceeds 4 feet, and personnel will access the excavation (Attachment 1).

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

- Excavator or backhoe.
- Materials required to demark the excavation/trench and equipment from the general public.
- Pre-engineered protective system (i.e., trench box) if personnel are to be entering an excavation/trench in excess of four feet in depth.
- Manufactured materials and equipment used for protective systems must be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent personnel exposure to hazards.
- Materials and equipment used for protective systems must be free from damage or defects that might impair their proper function.

Health and Safety Requirements: Excavation/Trenching should only be conducted in accordance with an approved site health and safety plan. General safety requirements are listed below:

- Prior to the commencement of trenching activities, all locations must be verified free and clear of underground and overhead utilities.
- Each person in an excavation must be protected from cave-ins by an adequate protective system, except when:
  - Excavations are made entirely in stable rock; or
  - Excavations are less than 4 feet in depth and examination of the ground provides no indication of a potential cave-in.
- Spoil piles should be kept a minimum of 2 feet from any edge of an excavation/trench, no matter what the sidewall angle of repose may be.

- Protective systems must have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.
- Daily inspections of excavations, the adjacent areas, and protective systems, must be made for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection must be conducted prior to the start of work and as needed throughout the shift. Inspections must also be made after every rainstorm or other hazard-increasing occurrence.
- Adequate barrier physical protection must be provided at all trenches. During excavation, appropriate warning signs, flagging, or barricading shall be in place as fall protection. Upon completion of exploration and similar operations, trenches must be backfilled.
- Excavations located in close proximity to recognized roadways must be barricaded on the traffic side with illuminated or reflective materials barricades.
- Walkways or bridges with standard guardrails must be provided where personnel or equipment are to cross over trenches that are 4 feet in depth or greater.
- While the excavation is open, underground installations must be protected, supported, or removed as necessary to safeguard personnel.
- A stairway, ladder, ramp, or other safe means of egress must be located in shored trench excavations that are 4 feet or more in depth, so as to require no more than 25 feet of lateral travel for personnel.
- Personnel are not permitted underneath loads handled by lifting or digging equipment. Personnel are required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spilled or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped to provide adequate protection for the operator during loading and unloading operations.
- Where oxygen-deficiency (atmospheres containing less than 19.5% oxygen) or a hazardous atmosphere exists, or could reasonably be expected to exist, such as in trenches in landfill areas or in areas where hazardous substances are stored nearby, the atmospheres in the excavation must be tested before personnel enter excavations regardless of depth.
- If the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems, such as shoring, bracing, or underpinning, must be provided (and inspected and approved by a Professional Engineer) to ensure the stability of such structures for the protection of personnel.
- Personnel may not work in trenches in which there is accumulated water, or where water is accumulating, unless adequate precautions have been taken to protect personnel against the hazards posed by water accumulation. The precautions necessary to protect personnel adequately vary with each situation, but could include special support or shield systems

- to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.
- If evidence of a situation that could result in possible cave-ins, slides, failure of protective systems, hazardous atmospheres, or other hazardous conditions is identified, exposed workers shall be removed from the hazard and all work in the excavation/trench stopped until all necessary safety precautions have been implemented.
- Adequate protection must be provided to protect personnel from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection must consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.
- The slopes and configurations of sloping and benching systems must be selected and constructed by the employer or his designee and must be in accordance with the requirements of the following:
  - Soil type must be determined utilizing the guidelines set forth in CFR 1926 Subpart P.
  - Benching and sloping requirements will be based on the determination of soil type and are listed in CFR 1926 subpart P.
  - If benching and sloping will not be utilized, then a pre-engineered shoring system shall be utilized to protect personnel from cave-in.
    - If trench boxes are used, the top of the trench box must extend a minimum of 18 inches above the point where the vertical soil wall meets the soil slope.

ATTACHMENT 1

Confined Space Entry Permit

Bristol **Confined Space Entry (CSE) Permit** **Display at Site**

Client:		Location:	
Date/Time Issued:		Date/Time Expires:	
Permit Initiator:		Entry Supervisor:	
Purpose for CSE:		Work to be Performed	

Standby Personnel:	1. 2. 3. 4.	Authorized Entrants:	1. 2. 3. 4.

Atmospheric Check (Prior to Entry) **Tester's Signature: ___________________________**

Time:	% Oxygen:	% LEL:	Toxic ppm:

Energy Isolation Complete: ☐ yes ☐ no **Signature: ______________________________**

Ventilation: ☐ Mechanical ☐ Natural

Atmospheric Check (During Entry) **Tester's Signature: ___________________________**

Time:	% Oxygen:	% LEL:	Toxic ppm:
Time:	% Oxygen:	% LEL:	Toxic ppm:
Time:	% Oxygen:	% LEL:	Toxic ppm:
Time:	% Oxygen:	% LEL:	Toxic ppm:

Communication Procedures: ____

Rescue Procedures: ____

Rescue Equipment: ____

PPE Required: ____

Entry Supervisor Signature: ______________________________

CSE Owner/Client signature: _____________________________

Debrief required: ☐ yes ☐ no Return form to project manager when CSE complete.

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

GENERAL BACKFILL AND COMPACTION

STANDARD OPERATING PROCEDURE BERS-13

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	03/9/10	C. Croley	G. Jarrell

GENERAL BACKFILL AND COMPACTION

STANDARD OPERATING PROCEDURE

Summary: After an excavation or trench has been completed, it will be backfilled and compacted. Proper backfill and compaction are important for maintaining the integrity of the ground surface. Compaction is defined as the method of mechanically increasing the density of soil. Backfill and compaction is commonly associated with underground storage tank (UST) removals and contaminated soil excavation. Backfill and compaction criteria will be based on the final use of the finished grade, i.e., foundation, traffic, or non-traffic areas. Backfill and compaction procedures for sites where density testing is not required are described in this Standard Operating Procedure.

There are five principle reasons to compact soil:

- Increases the load-bearing capacity;
- Prevents soil settlement and frost damage;
- Provides stability;
- Reduces water seepage, swelling, and contraction; and
- Reduces settling of soil.

Personnel Qualifications: Personnel will be trained and certified as hazardous site workers per 29 CFR 1910.120(e). Lead field personnel will have at least two years field experience with supervision of heavy equipment operators. If applicable, additional qualification requirements will be specified in the site QA Project Plan and met.

General Procedures for Backfill and Compaction:

Backfill material will be specified in the site work plan or QA plan. Generally, common fill from a local supplier will be used with the goal of using non-frost susceptible (NSF) materials, if possible, when working in cold climates.

The backfill material will be placed into the excavation or trench and spread into one foot lifts. If possible, each lift will be wetted. Each lift will be compacted using the heavy equipment (tracks or bucket). By following this procedure, compaction densities of 90% or greater are typically achieved. The surface backfill will be slightly mounded to provide positive drainage. Reseeding requirements will be specified in the site work plan or QA plan.

If clean sand and/or pea gravel is used as backfill for the excavation/trench compaction is not necessary.

If a clean, fine-grained soil (sand) is used for backfill in an excavation/trench, that is in native soil that has large, clean properties (coarse clean gravel), a filter fabric may have to be placed in the bottom of the excavation/trench, prior to backfilling operations to prevent soil migration, which would result in settlement.

Health and Safety Requirements: Backfilling should only be conducted in accordance with an approved site health and safety plan. General safety requirements are listed below.

- Personnel will stay clear of heavy equipment during operation
- The bucket of the excavator will be put on the ground while not in use
- All site personnel will wear specified personal protective equipment (PPE)/reflective vests
- Backup alarms will be required on all heavy equipment

Interferences and Potential Problems: Improper compaction may cause settlement of the soil, which may result in unnecessary maintenance costs where structures are present. Improper compaction can cause erosion problems.

BRISTOL ENVIRONMENTAL
REMEDIATION SERVICES, LLC

MULTI-INCREMENT® SAMPLING

STANDARD OPERATING PROCEDURE BERS-14

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	02/23/10	L. Maserjian	P. Curl

MULTI INCREMENT® SAMPLING

STANDARD OPERATING PROCEDURE

Method Summary: *MULTI INCREMENT*®[1] sampling involves the extraction of a representative portion of material from within a single decision unit. In *MULTI INCREMENT* sampling, several increments from the same decision unit are combined to form one sample that is submitted for laboratory analysis. The procedures for *MULTI INCREMENT* sampling are specifically designed to minimize sampling errors caused by spatial and compositional heterogeneity.

Current sampling protocols involve the selection of multiple individual samples, where the separate results are then evaluated to answer questions regarding the distribution of contamination. The error associated with any measured pollutant concentration has contributions from the analysis, as well as where and how the sample was taken. The error associated with sampling is believed to contribute 70% or more of the overall measurement uncertainty, yet quality assurance protocols and certification programs focus almost exclusively upon the errors due to instrumental analysis.

The goal of *MULTI INCREMENT* sample collection is to obtain a mean concentration for a specified area by reducing sampling errors. Potential advantages of *MULTI INCREMENT* sampling include:

- Reduction of overall sampling error: final results are more closely representative of the arithmetic mean concentration of the analyte(s) of interest within the decision unit.
- Fewer samples are sent to the analytical laboratory for analysis, resulting in a potential reduction in analytical costs.
- The method can be useful as an initial screening procedure for sites with little or no historic information.
- *MULTI INCREMENT* sampling can be very effective for the determination of the arithmetic mean of constituents that exhibit a high degree of spatial/distributional heterogeneity.
- Various studies have shown that concentrations of contaminants that were measured using *MULTI INCREMENT* sampling were statistically more representative than traditional sampling and analytical protocols.
- The EPA may accept *MULTI INCREMENT* sampling for use in risk assessments in the future.

[1]*MULTI INCREMENT*® is a registered trademark of EnviroStat, Inc.

Different states may have their own guidance for performing *MULTI INCREMENT* sampling, which should be followed and incorporated into site-specific work plans. This SOP summarizes typical *MULTI INCREMENT* procedures.

***MULTI INCREMENT* Soil Sampling Procedures**

I. Decision Unit Identification

A decision unit is defined as the area or volume in question. To be valid, *MULTI INCREMENT* sampling must be used in conjunction with an appropriate decision unit. The decision units must be clearly stated in the work plan and approved, prior to conducting work.

Decision units are restricted to actual source zones, and must not incorporate large uncontaminated areas. *MULTI INCREMENT* is not to be used to "dilute" contamination. Two examples of well-defined decision units are a stockpile and an open excavation. In the case of an open excavation, *MULTI INCREMENT* sampling would be used for collecting a soil sample to confirm that the contaminated material has been removed.

In the case of underground storage tank (UST) excavations, the piping and dispenser areas may need to be separate decision units from the main UST footprint.

II. Sampling Locations

For *MULTI INCREMENT* sampling, one analytical sample is composed of many increments within a decision unit. The increments are selected randomly. There are several types of random sampling techniques, including simple random (each location has an equal chance of being selected), stratified random (subgroups are identified and sampled), and systematic random (on a grid).

In addition to the increment locations, the sample increment depths must also be considered. In areas of subsurface contamination, more than one decision unit can be used for different depths, e.g., one decision unit at two feet below ground surface (bgs) and another at four feet bgs.

III. Sampling Methods

The *MULTI INCREMENT* Soil Sampling Process will involve:

1. Collecting a small amount of soil increments from randomly-located increments (at least 30 increments, 30 to 50 increments is standard).
2. Combining these soil increments into one "bulk" *MULTI INCREMENT* sample.
3. Sieving the "bulk" *MULTI INCREMENT* sample (some laboratories will perform sieving).

4. Sub-sampling the "bulk" *MULTI INCREMENT* sample (some laboratories will perform sub-sampling) into the required sample mass for that analyses.
5. Submitting the one *MULTI INCREMENT* sample for analysis.

Equipment Required

- Large stainless steel spoon or scoop
- Large clean container (a large stainless steel bowl, Ziploc® bags, or 5-gallon bucket)
- #10 (2 millmeter) sieve
- Steel cookie sheet or other tray
- Small spatula or spoon
- Sample containers
- Scale
- For volatile samples: volatile sample container (pre-tared, narrow mouth, approximately 250 to 500 milliliters) or disposable plastic coring device (such as En Core® samplers)

<u>Non-Volatile Analyses *MULTI INCREMENT* Sampling Procedures</u>

Prior to planning the field strategy, the laboratory must be contacted to determine the sample mass required for each analysis. In general, a minimum of 30 grams of soil is required in order to have a large enough sample mass.

For surface samples, remove the soil to a depth of at least six inches (depending on site conditions and analyses required) prior to collecting the sample. When sampling from an excavator bucket, sample from the center and remove at least six inches of soil. For subsurface sampling, collect the soil directly from the hand auger, split spoon, or Macro-Core®.

For each sample increment: Using a large spoon or scoop, collect the sample increment from the appropriate sample location and depth according to the work plan. Scoop approximately 30 to 60 grams (1 to 2 ounces) into the large, clean container, then move to the next sample increment location and repeat. Be careful of oversize material which will mean more mass may be needed from each increment to end up with the 30 to 50 gram sub-sample after sieving.

After the 30 to 50 sample increments have been collected into the bucket, use the #10 sieve to sieve the soil into another clean container (can also be sieved into the bucket at the time of collection).

Once the <u>entire</u> "bulk" *MULTI INCREMENT* sample has been sieved, approximately 500 to 1,000 grams of material should be available. Spread this sieved *MULTI INCREMENT* sample on the steel tray and spread evenly to an approximate ½ inch thickness. Roughly divide the tray into 30 to 50 sections using the small spatula. Then, collect approximately 1.0 gram (approximately ½ tablespoon) from each of the sections. Make sure to scrape any fines from the spatula along the bottom of the tray in case fines have settled there. Place each sub-section sample into one sample jar (provided by laboratory). The final sample mass per jar submitted to the laboratory must meet the minimum amount of material required by the laboratory.

Repeat the process on the same tray of soil to be submitted to the laboratory for percent moisture, or as backup if re-analysis is required.

Soil drying may be necessary to facilitate sieving of the <2 mm fraction. Drying is only performed if necessary. Drying is performed at ambient room temperature, not at an elevated "baking" temperature.

Volatile Analysis *MULTI INCREMENT* Sampling Procedures

Volatile organics analyses require that samples be field preserved with a minimum 1:1 ratio of sample preservative to sample material (1.0 gram soil to 1.0 milliliter methanol). This is a minimum required ration, and additional soil mass is preferred as long as it is completely submerged by the methanol. The quantity that will be collected from each increment should be determined prior to contacting the laboratory. If the core-type sampler will collect 2 to 5 grams of material, and there are 30 increment locations, a pre-tared sample container containing 150 milliliters of methanol should be provided by the laboratory. It is recommended to use a narrow-mouth amber glass container. The container should be sized so that methanol is not lost due to splashing during the sampling event.

If sampling both volatile and non-volatile samples, the sampler should go to each of the sample increment locations and collect the volatile increments first, as follows:

Remove at least 6 inches of soil (depending on site conditions and analyses required) from the sample location. Collect a "plug" of soil, using the core-type sampler, from each random increment location. Each "plug" will be immediately placed into a pre-tared, narrow-mouth, laboratory bottle containing the methanol preservative. Place the lid back on the container between increments. Use a separate disposable core-type sampler for each increment.

No sieving or sub-sampling will be performed for the volatile samples. A non-preserved sample must also be collected for moisture determination (collect a 2 to 5 gram plug of material into a 4-ounce sample jar). This can be collected at the same time as the volatile sample collection.

Soil types that cannot be sampled using a core-type sampler (hard gravelly material) will require use of a "spoon" type sampling device to place sample material into a wide-mouth sample jar.

In order to guarantee that the 1:1 methanol to soil ratio is met, the sampling tools should be "field-calibrated" by weighing the soil to be sampled on a small balance to determine the approximate mass required from each random increment location. If the final sample mass does not meet the minimum requirements, additional soil increments from randomly-selected locations may be added. If additional methanol is added, it must be documented on the chain-of-custody form.

Quality Assurance/Quality Control

Triplicate Sampling: Triplicate (two additional samples along with the project sample) samples must be collected for *MULTI INCREMENT* sampling to verify that the *MULTI INCREMENT* sample truly represents the decision unit. Triplicate samples are different from duplicate samples, because they are not located at the same point as the project sample, but within the same increment. A minimum of one triplicate set is required for *MULTI INCREMENT* sampling projects. For sites with only one decision unit, triplicate sampling and analysis is required. For sites with multiple decision units, a minimum of one triplicate sample set should be collected for every 10 decision units (a rate of 10%).

Triplicate samples must be collected from decision units with known or suspected reportable levels of contamination because non-detect results may prohibit the relative standard deviation (RSD) and 95% upper control limit (UCL) calculations for evaluating the *MULTI INCREMENT* sampling representativeness.

Triplicates should be collected in the same increment as the project sample, but not at the same location. A practical way to achieve this is to move to the right or left (forward or backward) a pre-determined distance from the project sample, and collect another increment for the second sample. The same procedure would be followed for the third sample (move in another direction). The method of obtaining triplicates and number of triplicate samples must be described in the work plan.

RSD and 95% UCL Calculations: An RSD of 30% or less is required for *MULTI INCREMENT* sampling. At RSDs greater than 35%, the data distribution starts to become non-normal and confidence in the representativeness of the *MULTI INCREMENT* sample results diminish. RSD is calculated as presented below:

$$RSD(\%) = 100s/x_m$$

Where:

s = standard deviation

x_m = mean

The 95% UCL are calculated using the standard deviation and mean. The 95% UCL is especially relevant for concentrations at or near the action level. The 95% UCL is calculated as presented below:

$$95\%UCL = x_m + [ts/n_{sqrt}]$$

Where:

n = number of samples

x_m = mean

t = 95% one-side student t factor (e.g., for n=3, t=2.92)

n_{sqrt} = square root of “n” (e.g, the square root of 3 = 1.73205…)

s = standard deviation

For *MULTI INCREMENT* triplicate data sets that include one or two non-detect results, the lowest value reported by the laboratory, either the method detection limit (MDL) or practical quantitation limit (PQL), should be substituted for the sample result to perform both calculations. If all three *MULTI INCREMENT* results are non-detect, the calculations are not required.

The standard deviation, mean, RSD, and 95% UCL will be calculated for each decision unit. The mean and standard deviation calculated from the triplicate sample are used for calculating the 95% UCL for the other decision units. In these situations, the ts/n_{sqrt} calculated from the triplicate *MULTI INCREMENT* sample are added to the *MULTI INCREMENT* result(s) for the remaining decision units. For example, if the *MULTI INCREMENT* result for a second decision unit at the site was 232 mg/kg, the 95% UCL for this decision unit would be 232 mg/kg + ts/n_{sqrt}.

Interferences and Potential Problems:

<u>Highly organic samples (peat)</u>: Soil material, such as peat, are not conducive to sieving; therefore, *MULTI INCREMENT* sampling is not appropriate without alternate sample collection and preparation procedures.

<u>Wet samples:</u> Sieving wet samples can be difficult and might leave material behind. Drying samples for semivolatile and non-volatile analyses has not shown a significant decrease in contaminant concentrations, but may require a lot of time and space.

<u>Sample Grinding</u>: Grinding may be required for samples to be analyzed for metals or any other analytes where the analytical sample size is small. Some laboratories offer grinding and *MULTI INCREMENT* preparation.

<u>Volatile samples</u>: Field studies have found that using a spoon or spatula with a wide-mouth jar results in loss of volatiles. A core-type sampler, or a narrow-mouth jar are recommended for use in collecting volatile soil samples.

<u>*MULTI INCREMENT* Sampling is NOT designed for</u>: *MULTI INCREMENT* sampling is not designed for identifying hot spots, delineating the extent of contamination, or determining the maximum concentration of contamination in soil from an area.

BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

DOCUMENT CONTROL SYSTEM

STANDARD OPERATING PROCEDURE BERS-15

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	01/14/10	L. Pheasant	P. Curl

DOCUMENT CONTROL SYSTEM

When preparing a report, plan, or client deliverable, schedule the formatting and editing of the document with the Document Production Manager. If, at any time, you have questions about where your document is in the process, the Document Production Manager will be able to assist you and answer any questions you may have.

At a minimum, a discussion between the Project Manager (PM) or Primary Author (PA) and the Document Production Manager should take place to decide how the document should be processed. Mutual understanding about time/budget considerations, special needs, client requirements, reasons for deviations from the norm, etc., will prevent much frustration for author, editor, and Document Production Team.

Schedule work as far in advance of the client deadline as possible.

Document Production Checklist

When the document is ready for formatting and editing, fill out a Document Production Checklist (green sheet) (Attachment 1), attach it to your document, and give it to the Document Production Manager. The Document Production Manager will add the deliverable to the Document Production Schedule, located on the Intranet, where it can be tracked. The green sheet is the record of who reviewed the document, along with what was done and provides information on number of copies and distribution. The green sheet should be kept with the project files as a record of the document production.

Document Tracking

All documents must have specific deadlines. Once the document has been submitted, the Document Production Manager will present it to the Document Processor for formatting. The document will then be given to the Editor. After the document has been edited, and the Editor has resolved any discrepancies with the PM/PA, the Editor will return the document to the Document Processor. The Document Processor will make the necessary redline changes. After final edits are made, the document will go to the PM/PA for final approval. Once the PM/PA has reviewed the document, it will be returned to the Document Production Manager for reproduction.

The written content of the document must be at least 90 to 95 percent complete before submission to the Document Production Manager. If there are sections to be added/changed after submitting it to the Document Production Team, submit them via e-mail, in a separate document, and explain where the information is to be inserted. Do not make electronic changes to the document until it has been returned to you for review. If changes must be made, use Track Changes, so that the Editor knows which changes to review.

This precaution is taken to ensure that documents maintain their integrity (particularly large documents), and that the Document Production Manager and/or Editor are aware of any changes made after the document has been submitted.

The physical content of documents submitted for formatting/editing should be complete. This means all text, figures, forms, photographs, inserts, etc., must be provided. (If the figures, photographs, tables, etc., are not ready, a placeholder must be inserted and edited when available).

Document Labeling and Location

The Document Production Manager will insert the file name and path in the footer on the last page of every document (font size will be 6 or 7 point). This will ensure that the document can be located at a later date/time. The contract number and Bristol job number will be inserted in the header of the document. An unbound reproduction-ready original of the document will be placed in the project files. An electronic copy of the final document will be placed in the project file on the Bristol computer network, which is backed up daily.

ATTACHMENT 1

Document Production Checklist

DOCUMENT PRODUCTION CHECKLIST

Job No. ____________ Phase Code ____________ Job Name: ____________

Project Manager: ____________ Deliverable Type (report, plan, tech memo, etc.): ____________

Primary Author: ____________ File Path: ____________

(File Path Cont.) ____________

ACTION	TO BE DONE BY	DATE DUE	DATE COMPLETED/INITIALS
Document Set-up/Templates	Document Processor	Date Document Submitted →	
DOCUMENT PREPARATION			
Formatting	Document Processor		
Technical Edit	Editor		
FINAL REVIEW			
Content	PM		
Tech Edit/Comment Resolution	Editor		
Redline Changes	Document Processor		
Approval for Production	PM		
PRODUCTION			
Production/Printing	Document Production Asst.		
Create PDF	Document Production Asst.		
Approval for Release to Client	PM		
DUE DATE			← **Date Due To Client**

BOUND: Comb-bound _____ Unbound _____ 3-Ring Binder ______

ELECTRONIC: CD: ______ DVD: ________

NO. OF COPIES: ________ Project File ______ Field ______

Special Client Requirements (example: special format, single-sided, etc.):

Notes/Comments:

Additional notes may be written on back of form

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	

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.

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BRISTOL ENVIRONMENTAL REMEDIATION SERVICES, LLC

Anchorage, Alaska

UTV OPERATIONS

STANDARD OPERATING PROCEDURE BERS-22

Record of Changes

Revision No.	Date	Prepared by	Approved by
0	03/07/11	P. Meehan	P. Curl

UTV OPERATIONS

STANDARD OPERATING PROCEDURE

Purpose: The purpose of this standard operating procedure (SOP) is to provide specific procedures and minimum requirements for the safe operation of utility vehicles (UTV)s used to execute Bristol Environmental Remediation Services (BERS) projects.

Scope: This SOP provides the detailed information needed to conduct UTV operations in support of BERS activities. It also applies to transportation of project personnel in UTVs operated by non-project staff where noted.

Training: All personnel assigned to UTV operations will attend a site-specific orientation. The purpose of this orientation will be to review site-specific and emergency response procedures. The topics to be covered during the orientation are listed below. Course attendance sheets with attached curriculums will be used to document completion of each orientation session.

TRAINING SCHEDULE

1. Introduction
   a. Project summary
2. Presentation
   a. Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP) review
   b. SOP and administrative review
   c. UTV Operations
3. Equipment / PPE training
   a. Hearing Protection
   b. Fire extinguishers
   c. Communications
   d. Emergency Repair Tool Kit
   e. Inclinometers
   f. Flares
4. Safety
   a. Load Capacity
   b. Safe driving
   c. Operation on slopes
   d. First aid/CPR
   e. Review emergency response equipment
   f. Talk/walk-through of emergency procedures

UTV Operators

Project personnel who operate a UTV during the course of the project shall first demonstrate to the SSHO that they are experienced in operating UTVs similar to those used for the project, that they possess basic mechanical knowledge necessary to troubleshoot common mechanical problems that may occur, and that they are knowledgeable of the requirements of this SOP, and the project APP/SSHP. The SSHO shall document the list of qualified UTV operators and submit to Bristol administrative personnel for retention in the project files.

UTV Passengers
Project personnel riding as passengers on a UTV shall receive a safety briefing from the UTV operator and shall comply with all UTV procedures. Non-project personnel shall not be allowed on project UTVs without the approval of the SSHO.

Ensure that team members sign that they have read and understand this SOP.

Precautions:

- Make sure the UTV is in top operating condition and that there are no tripping hazards. The UTV should be free of fire hazards and have clean storage and passenger spaces;
- Safety equipment is on board and maintained in good condition;
- Operators have a complete knowledge of the operation and handling characteristics of the UTV;
- Know the current location and know destination. Use of global positioning systems (GPS) is suggested during all operations;
- Maintain a safe speed at all times to avoid collision;
- Keep an eye out for changing weather conditions, and act accordingly; and
- Maintain a clear, unobstructed view forward at all times. "Scan" the path back and forth; avoid "tunnel" vision. Most collisions are caused by inattention.

Responsibility:

Site safety and health officer
The SSHO shall be responsible for implementation of this UTV safety program in the field as described below. The SSHO and UTV operator will provide safety briefing to all occupants of the vehicle prior to each departure (or on a daily basis if personnel remain the same).

UTV Operator
The UTV operator shall be responsible for the safety of all personnel aboard his or her vehicle and for the integrity of all UTV and safety equipment on board the vehicle. The UTV operator will provide safety briefing to all occupants of the UTV prior to each departure (or on a daily basis if personnel remain the same). An initial safety briefing shall be documented on a daily safety briefing form. The UTV operators shall utilize the vehicle checklists provided in Attachment 1 as appropriate during the performance of their duties.

UTV Passengers/Project Personnel
UTV passengers shall comply with all provisions of this SOP, and the project SSHP and shall obey the instructions of the UTV operator while aboard.

Equipment: The SSHO will ensure that all personnel conducting UTV operations carry appropriate equipment and have appropriate PPE. At a minimum, this includes the following:

1. Hearing Protection;
2. Fire extinguishers;
3. Communications;
4. Emergency Repair Tool Kit;
5. Inclinometers; and
6. Flares.

Procedure: The following procedures describe the specific activities required for UTV operation.

THE UTV

Each designated operator shall be thoroughly familiar with all aspects of UTV operation and will have been trained in the practical use of the vehicle.

Attachment 2 is provided as a UTV operation demonstration checklist. The UTV operations will, at a minimum, consist of negotiating steep terrain, backing, turning, braking, proper loading of equipment, basic troubleshooting, and daily preventative maintenance checks.

The UTVs are four-wheeled, direct steer, off-road vehicles. Configuration is determined by careful recon of the area of operation prior to starting work.

- The top of the vehicle provides a large sail area for the wind and makes the vehicle top heavy as well.
- When crossing through water make sure the wheels of the vehicle maintain contact with the ground. If water depth is in question, a guide may proceed in front of the vehicle to test depth and overall accessibility.
- The Polaris is equipped with a 500cc liquid-cooled 32 hp engine.
- The Polaris gearbox has two forward speeds, reverse, and neutral.

- The gear should be selected that best suits the terrain and load to be carried.
- The Polaris steering box operates the same as a car.
- The Polaris has 4 wheel hydraulic disc breaks

If the vehicle is equipped with an enclosed cab of any sort, make sure there is plenty of ventilation to avoid exposure to exhaust and engine fumes.

- Engine exhaust contains carbon monoxide, an odorless, colorless, toxic gas that will cause injury or death.
- Inspect the engine exhaust weekly.
- Listen for a change in exhaust or engine noise that may indicate a leak.

Note: If an exhaust leak is suspected, place the vehicle out of service and report it to the SSSHO and mechanic.

PASSENGERS

Passengers shall remain seated and wear seat belts while the UTV is in operation. Passengers will inform the operator when exiting or entering the passenger compartment. Riding in the rear passenger compartment of a UTV can be extremely rough.

LOAD CAPACITY

UTVs shall not be loaded (passengers and gear) beyond the weight capacity printed on the information plate attached to the vehicle. In addition, several factors must be considered when loading a UTV: distribute the load evenly, keep the load low, and do not overload the UTV.

TOOL KIT

Project UTVs shall carry a tool kit sufficient for the operator to troubleshoot common mechanical problems such as fouled spark plugs, flooded carburetor, electrical shorts, etc. UTVs operated in remote areas shall also carry spare parts (shear pins, patch kits, air pumps, etc.) as appropriate. The tool kit shall be maintained by the operator and supplies used up shall be replaced immediately.

COMMUNICATIONS

Project UTVs shall carry operational communications. UTVs shall not be operated if communication is not possible. Exceptions to this requirement must be approved by the

SUXOS.

VEHICLE ACCIDENT REPORT

Project personnel involved in a vehicle accident shall follow the procedure for incident reporting in the SSHP.

GOOD HOUSEKEEPING

Project personnel shall properly stow and secure all gear and equipment against unexpected shifts when underway. Passenger areas and open spaces must be kept clear and free from clutter to minimize slip, trip, and fall hazards.

FUEL MANAGEMENT

UTV operators shall utilize the "one-third rule" in vehicle fuel management. The rule is to use one-third of the fuel to get to the destination, one-third to return, and keep one-third in reserve.

UTV OPERATION CHECKLISTS

Operators shall use the UTV operation checklists contained in Attachment 1 as appropriate to assist them in the performance of their duties. The checklists cover starting, stopping, towing, engine inspection, pre-operational and post-operational preparations, and troubleshooting.

UTV OPERATED BY NON-PROJECT PERSONNEL

In the case that a UTV with operator is hired to perform project activities, Sections 4.3 through 4.13 of this procedure are applicable. In addition to these requirements, the operator shall be trained, certified and authorized to carry the number of personnel assigned to the vehicle. A safety inspection and briefing shall be conducted by the SSHO prior to departure.

OPERATING THE UTV

Pre-Operational Checks

Before operating the UTV, it should be thoroughly checked out as to its condition and an inspection sheet filled out.

- See Attachment 1 to this SOP;
- All discrepancies should be noted on the sheet and corrected prior to operating the vehicle;
- Inform the SSHO or supervisor of any problem with the vehicle so that repairs can be made promptly; and,

- If the SSHO is not available, leave the checklist on the seat with a description of the problem written in the comments or on the back so that the problem may be addressed as soon as possible.

Operational Checks

- Board vehicle and ensure all passengers buckle safety belts;
- Start engine and listen for any unusual sounds;
- A cold engine may require the use of the choke when starting;
- Allow the engine to warm up before getting underway;
- As you begin to travel, listen again for any unusual noise coming from the gearbox or drive train;
- Check gauges and inclinometer for proper orientation; and,
- Test brakes and steering for proper orientation.

Operating the UTV in Remote Areas

Safe driving habits when traveling in remote areas are required.
If possible, when driving up hills, approach the hill "head on" to minimize the possibility of sliding sideways or rolling over. Accelerate slowly to prevent loss of traction.
Caution: Never accelerate or brake suddenly when driving up or down a hill. Sudden acceleration or braking can cause the vehicle to roll over, causing serious injury or death.

- When traction is lost, the vehicle may slide sideways or backwards;
- Apply the brakes gently and evenly to stop the slide;
- Try to avoid steep hills;
- When a steep hill can't be avoided, be prepared to shift occupant weigh forward, or have occupants exit vehicle to decrease the possibility of rolling over;
- When necessary, set a dead-man at the top of the hill, attach cable and use winch to assist in pulling vehicle to top of hill. It may be necessary to remove some or all equipment to lighten the load.

When driving down hill, try to approach the hill "head on" to minimize the possibility of sliding sideways or rolling over.

- Shift the gearbox into the lowest gear and keep the speed of the engine up just enough to keep the clutch engaged;
- This allows the engine to brake the vehicle and keeps the brakes from overheating; and,
- If the brakes need to be used to control forward speed, apply them gently so as not to break traction.

Operating on a Side Slope

- It at all possible, <u>**do not**</u> drive the UTV on a side slope.
- In the event of a side slope cannot be avoided, limit operation to 15 degrees;

- Side slope operation greatly increases the risk of rolling the vehicle;
- Operation of vehicles on a side slope requires the constant use of the brakes for steering correction as the vehicle tends to head downhill; and,
- This may cause the brake to overheat or fade.

Carrying Passengers on the UTV
Keep the UTV as low as possible and the weight evenly distributed.
Use extreme caution when negotiating inclines with a loaded vehicle.

- Heavy loads and loads carried high on the vehicle decrease the stability of the vehicle and may cause it to roll;
- Keep the weight of the load near the floor of the vehicle. This will lower the center of gravity and help keep the vehicle stable;
- The maximum load of the vehicle (posted on the vehicle and available in the owners manual) shall not be exceeded; and,
- Secure the load to prevent shifting of the weight while driving.

When carrying passengers, endure they use safety buckles and keep arms and legs inside the vehicle at all times.

- It may be advisable to have passengers exit the vehicle when operating over rough or steep terrain;
- UTVs are not known for comfort when operating over rough terrain; and,
- Limit the number of personnel in the UTV to the number of safety buckles available.

Post-Operational Checks
When securing the UTV check the following:

- Check the fuel level;
- If the fuel level is low, inform the SSHO or mechanic;
- Remove tools and personal gear;
- Close doors and fasten snaps/latches; and,
- Chock the wheels (even on flat surfaces).
- Plan for the Next Operation
- Inform the SSHO or mechanic of any needs for the UTV;
- Inform the SSHO or mechanic of any problems associated with the vehicle, so appropriate maintenance may be performed.

DAILY SAFETY BRIEFING

The Site Superintendent and the SSHO will hold a morning safety meeting prior to start of work for all of the field teams, which will include the following:

- Review of emergency procedures, prior work day safety findings
- Discussion of slips trips and falls, PPE and other pertinent safety issues, i.e. compliance and munitions identification.
- Description of daily activities.

Reference Documents:

Individuals using this procedure should become familiar with the following documents:

40 CFR 261.4 (a) (13): Protection of Environment, Identification and listing of hazardous waste

Accident Prevention Plan

Site Safety and Health Plan

Work Plan

USACE EM 385-1-1

Manufacturer's Instruction Manual's

ATTACHMENT 1

EQUIPMENT INSPECTION CHECKLIST

Equipment No.	Date	Inspector Name	Hours	Location

A. SERVICE CHECKS:

ITEM	*OK*	*AMT NEEDED*	*ITEM*	*OK*	*AMT ADDED*
Radiator & Freeze Protection			Batteries		
Engine			Lubrication Points		
Transmission			Fuel Level		
Hydraulic System			Drain Fuel Sediment		
Differentials			Pivot Shaft		
Planetaries / Final Drives			Air Induction & Filter		

B. EQUIPMENT INSPECTION

	CONDITION Bad/Good/ Excellent	*Attn Needed*	*Explanation*	*Corrected? (Y/N)*
Fan & Shrouds				
Belts Pulleys				
Exhaust & Rain Cap				
Battery & Cables				
Hydraulic Cylinders				
Operators Compartment				
Hoses & Lines				
Fuel / Oil Leaks				
Cracks				
Cutting Edges				
Sprockets				
Rollers & Idlers				
Tracks or Tires				
Trans Operation				
Service Brakes				
Parking Brake				
Gauges Operational				
Wipers & Washer				
Lights				
Horn				
Seat & Seat Belts				
Windows				

Machine Damage:

NOTES (continued)**:**

Deficiencies noted: ☐ Yes ☐ No Explain: ______________________

Deficiencies fixed: ☐ Yes ☐ No Date: ______________

Inspection 100% complete ☐ Yes ☐ No

USACE Rep. Signature ______________________ Date all items passed inspection: __________

Bristol Representative ______________________ Date: __________

ATTACHMENT 2

VEHICLE OPERATION DEMONSTRATION FORM

NAME________________________________ DATE______________________

SUXOS____________________________________

UTV USED FOR OPERATION DEMONSRATION _________________________

_____________ INSPECT SAFETY EQUIPMENT

_____________ SAFETY BRIEFING FOR PASSENGERS

_____________ START UP PROCEDURES

_____________ FUNCTIONAL TEST (STEERING AND THROTTLE)

_____________ BRING UTV UP TO 75% THROTTLE FOR AT LEAST ONE MINUTE

_____________ STOP UTV, SHUT DOWN ENGINE, AND RESTART

_____________ RETURN TO BRISTOL BASE

_____________ SECURE UTV

______________________________________PERFORMED ALL OF THE ABOVE TASKS AND IS QUALIFIED AS A UTV OPERATOR

SIGNED____

SSHO

ATTACHMENT 2

Field Forms

Groundwater Low Flow Purging Form

Groundwater Sampling Information
To accompany Low Flow Purge Form

Water Level Form

Well Development Form

Photograph Log

Sample Label

Sample Record Log

TestAmerica Chain-of-Custody (blank)

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC

GROUNDWATER LOW-FLOW PURGING FORM

Job Name: NE Cape HTRW RAs
Well No.: ______
Job Number: 34120057
Well Type: ☐ Monitor ☐ Extraction ☐ Other ______
Casing Height: ______
Company: Bristol
Well Material: ☐ PVC ☐ St. Steel ☐ Other ______
Date: ______ Time: ______
Purged by: ______ ______
(Signature)

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches):
☐ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other ______

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

Water Level Depth (WL in feet BTOC): ______

PURGE METHOD

☐ Pump – Type: ______
☐ Submersible ☐ Centrifugal ☐ Bladder ☐ Peristaltic

☐ Other – Type: ______

PUMP INTAKE SETTING

☐ Near Bottom ☐ Near Top ☐ Other
Depth in feet (BTOC): ______ Screen Interval in Feet (BTOC)

Tubing Type/Size: ______

PURGE TIME

______ Start ______ Stop ______ Elapsed

PURGE RATE

Initial ______ gpm Final ______ gpm

ACTUAL PURGE VOLUME

______ gallons

FIELD PARAMETER MEASUREMENT

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

GROUNDWATER LOW-FLOW PURGING FORM (continued)

FIELD PARAMETER MEASUREMENT (Continued)

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

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

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC

Job Name NE Cape HTRW RAs

Job Number 341200057 Date ______ Time: ______

Recorded by ______ Sampled by ______
(Signature)

WELL INFORMATION

Well Number ______ **Well Location** ______

Casing Diameter (D in inches):

☐ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other ______

Total Depth of Casing (TD in feet BTOC):

Water Level Depth (WL in feet BTOC):

WELL SAMPLING

SAMPLING METHOD

☐ Bailer – Type: ______ ☐ Grab – Type ______

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

SAMPLING DISTRIBUTION

Sample No.	Volume	Analysis Requested	Preservatives	Lab	Comments

QUALITY CONTROL SAMPLES

Duplicate Samples

Original Sample No.	Duplicate Sample No.

Blank Samples

Type	Sample No.

Other Samples

Type	Sample No.

Bristol
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REMEDIATION SERVICES, LLC

WATER LEVEL FORM

Project: NE Cape HTRW RAs

Date: ____________________

Personnel: ____________________

Water Level Instrument: ____________________

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

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ENVIRONMENTAL REMEDIATION SERVICES, LLC

WATER LEVEL FORM

page ___ of ____

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

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WATER LEVEL FORM

page ___ of ____

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

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WELL DEVELOPMENT FORM

Project: NE Cape HTRW RAs ____________ Well No.: ____________

Personnel: ____________ Development Method ____________ Date: ____________

Time	Depth to Water (ft.)	Gallons Removed	Turbidity (Ntu)	pH	Temp ºC	Conduct-ivity	Recovery Rate Inches/min	Recovery Rate gpm	Observations

Total Gallons Removed ____________

PHOTOGRAPH LOG

DATE	TIME	LOCATION	DESCRIPTION OF PHOTOGRAPH	VIEW DIRECTION	PHOTOGRAPHER/COMMENTS

SAMPLE LABEL

2012 NE Cape HTRW Remedial Actions
Contract No. W911KB-12-C-0003

Analysis:______________________________Preservation:________________________

Date:____________________________________Time:___________________________

Collector:____

Sample No.:____

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC

SAMPLE RECORD LOG

Sample Identification	Sample Location (LOCID)	Date	Time	Matrix	Depth (ft)	Sampler	Field Screening (ppm)	Analyses & Preservative						Sample Type (Project or Duplicate)	MS/MSD Collected	COC #	Sample Shipping Date		Comments

Tacoma
5755 8th Street East

Tacoma, WA 98424
phone 253.922.2310 fax 253.922.5047

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.

Client Contact	**Project Manager:**	**Site Contact:**	**Date:**	COC No:
Your Company Name here	**Tel/Fax:**	**Lab Contact:**	**Carrier:**	_______ of ______ COCs
Address	**Analysis Turnaround Time**			Job No. 34120057
City/State/Zip	Calendar (C) or Work Days (W) __________			
(xxx) xxx-xxxx Phone	TAT if different from Below _________			
(xxx) xxx-xxxx FAX	☐ 2 weeks			SDG No.
Project Name: NE Cape HTRW Ras	☐ 1 week			
Site: Northeast Cape	☐ 2 days			
P O #	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type	Matrix	# of Cont.	Filtered Sample																		Sample Specific Notes:

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ____________

Possible Hazard Identification
☐ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* *Poison B* ☐ *Unknown* ☐

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For __________ Months*

Special Instructions/QC Requirements & Comments:

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:

ATTACHMENT 3

TestAmerica Laboratories, Inc.

ELAP Certification and Quality Assurance Manual

ELAP Certification

LABORATORY
ACCREDITATION
BUREAU

Certificate of Accreditation

ISO/IEC 17025:2005 ***Certificate Number L2236***

TestAmerica Laboratories, Inc

5755 8th Street East
Tacoma, WA 98424

has met the requirements set forth in L-A-B's policies and procedures, all requirements of ISO/IEC 17025:2005 "General Requirements for the competence of Testing and Calibration Laboratories" and the U.S. Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP).*

The accredited lab has demonstrated technical competence to a defined "Scope of Accreditation" and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Accreditation Granted through: January 19, 2013

R. Douglas Leonard, Jr., Managing Director
Laboratory Accreditation Bureau
Presented the 19th of January 2010

*See the laboratory's Scope of Accreditation for details of the DoD ELAP requirements
Laboratory Accreditation Bureau is found to be in compliance with ISO/IEC 17011:2004 and recognized by ILAC (International Laboratory Accreditation Cooperation) and NACLA (National Cooperation for Laboratory Accreditation).

LABORATORY ACCREDITATION BUREAU

Certificate # L2236

Scope of Accreditation
For
TestAmerica Laboratories, Inc.

5755 8th Street East
Tacoma, WA 98424
Dave Wunderlich
1-253-922-2310

In recognition of a successful assessment to ISO/IEC 17025:2005 and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM v4.1) based on the National Environmental Laboratory Accreditation Conference Chapter 5 Quality Systems Standard (NELAC Voted Revision June 5, 2003), accreditation is granted to TestAmerica Laboratories, Inc. to perform the following tests:

Accreditation granted through: January 19, 2013

Testing - Environmental

Non-Potable Water		
Technology	**Method**	**Analyte**
ICP-AES	6010B/200.7	Silver
ICP-AES	6010B/200.7	Aluminum
ICP-AES	6010B/200.7	Arsenic
ICP-AES	6010B/200.7	Boron
ICP-AES	6010B/200.7	Barium
ICP-AES	6010B/200.7	Beryllium
ICP-AES	6010B/200.7	Calcium
ICP-AES	6010B/200.7	Cadmium
ICP-AES	6010B/200.7	Cobalt
ICP-AES	6010B/200.7	Chromium
ICP-AES	6010B/200.7	Copper
ICP-AES	6010B/200.7	Iron
ICP-AES	6010B/200.7	Potassium
ICP-AES	6010B/200.7	Magnesium
ICP-AES	6010B/200.7	Manganese
ICP-AES	6010B/200.7	Molybdenum
ICP-AES	6010B/200.7	Sodium
ICP-AES	6010B/200.7	Nickel
ICP-AES	6010B/200.7	Lead
ICP-AES	6010B/200.7	Antimony
ICP-AES	6010B/200.7	Selenium

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Non-Potable Water		
Technology	**Method**	**Analyte**
ICP-AES	6010B/200.7	Silicon
ICP-AES	6010B/200.7	Tin
ICP-AES	6010B/200.7	Titanium
ICP-AES	6010B/200.7	Strontium
ICP-AES	6010B/200.7	Thallium
ICP-AES	6010B/200.7	Vanadium
ICP-AES	6010B/200.7	Zinc
ICP-MS	6020/200.8	Silver
ICP-MS	6020/200.8	Arsenic
ICP-MS	6020/200.8	Barium
ICP-MS	6020/200.8	Beryllium
ICP-MS	6020/200.8	Cadmium
ICP-MS	6020/200.8	Cobalt
ICP-MS	6020/200.8	Chromium
ICP-MS	6020/200.8	Copper
ICP-MS	6020/200.8	Manganese
ICP-MS	6020/200.8	Molybdenum
ICP-MS	6020/200.8	Nickel
ICP-MS	6020/200.8	Lead
ICP-MS	6020/200.8	Antimony
ICP-MS	6020/200.8	Selenium
ICP-MS	6020/200.8	Thallium
ICP-MS	6020/200.8	Uranium
ICP-MS	6020/200.8	Vanadium
ICP-MS	6020/200.8	Zinc
CVAAS	7470A/245.1	Mercury
ICP-AES	7195/6010B	Hexavalent Chromium
GC/MS	8260B/624	1,1,1,2-Tetrachloroethane
GC/MS	8260B/624	1,1,1-Trichloroethane
GC/MS	8260B/624	1,1,2,2-Tetrachloroethane
GC/MS	8260B/624	1,1,2-Trichloroethane
GC/MS	8260B/624	1,1-Dichloroethane
GC/MS	8260B/624	1,1-Dichloroethene
GC/MS	8260B/624	1,1-Dichloropropene
GC/MS	8260B/624	1,2,3-Trichlorobenzene
GC/MS	8260B/624	1,2,3-Trichloropropane
GC/MS	8260B/624	1,2,4-Trichlorobenzene
GC/MS	8260B/624	1,2,4-Trimethylbenzene
GC/MS	8260B/624	1,2-Dibromo-3-Chloropropane
GC/MS	8260B/624	1,2-Dichlorobenzene

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Non-Potable Water

Technology	Method	Analyte
GC/MS	8260B/624	1,2-Dichloroethane
GC/MS	8260B/624	1,2-Dichloropropane
GC/MS	8260B/624	1,3,5-Trimethylbenzene
GC/MS	8260B/624	1,3-Dichlorobenzene
GC/MS	8260B/624	1,3-Dichloropropane
GC/MS	8260B/624	1,4-Dichlorobenzene
GC/MS	8260B/624	2,2-Dichloropropane
GC/MS	8260B/624	2-Chlorotoluene
GC/MS	8260B/624	2-Hexanone
GC/MS	8260B/624	4-Chlorotoluene
GC/MS	8260B/624	4-Isopropyltoluene
GC/MS	8260B/624	Acetone
GC/MS	8260B/624	Benzene
GC/MS	8260B/624	Bromobenzene
GC/MS	8260B/624	Bromodichloromethane
GC/MS	8260B/624	Bromoform
GC/MS	8260B/624	Bromomethane
GC/MS	8260B/624	Carbon disulfide
GC/MS	8260B/624	Carbon tetrachloride
GC/MS	8260B/624	Chlorobenzene
GC/MS	8260B/624	Chlorobromomethane
GC/MS	8260B/624	Chlorodibromomethane
GC/MS	8260B/624	Chloroethane
GC/MS	8260B/624	Chloroform
GC/MS	8260B/624	Chloromethane
GC/MS	8260B/624	cis-1,2-Dichloroethene
GC/MS	8260B/624	cis-1,3-Dichloropropene
GC/MS	8260B/624	Dibromomethane
GC/MS	8260B/624	Dichlorodifluoromethane
GC/MS	8260B/624	Ethylbenzene
GC/MS	8260B/624	Ethylene Dibromide
GC/MS	8260B/624	Hexachlorobutadiene
GC/MS	8260B/624	Isopropylbenzene
GC/MS	8260B/624	Methyl Ethyl Ketone
GC/MS	8260B/624	Methyl Isobutyl Ketone
GC/MS	8260B/624	Methyl tert-butyl ether
GC/MS	8260B/624	Methylene Chloride
GC/MS	8260B/624	m-Xylene & p-Xylene
GC/MS	8260B/624	Naphthalene
GC/MS	8260B/624	n-Butylbenzene

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Non-Potable Water

Technology	Method	Analyte
GC/MS	8260B/624	N-Propylbenzene
GC/MS	8260B/624	o-Xylene
GC/MS	8260B/624	sec-Butylbenzene
GC/MS	8260B/624	Styrene
GC/MS	8260B/624	tert-Butylbenzene
GC/MS	8260B/624	Tetrachloroethene
GC/MS	8260B/624	Toluene
GC/MS	8260B/624	trans-1,2-Dichloroethene
GC/MS	8260B/624	trans-1,3-Dichloropropene
GC/MS	8260B/624	Trichloroethene
GC/MS	8260B/624	Trichlorofluoromethane
GC/MS	8260B/624	Vinyl chloride
GC/MS	8270C/625	1,2,4-Trichlorobenzene
GC/MS	8270C/625	1,2-Dichlorobenzene
GC/MS	8270C/625	1,3-Dichlorobenzene
GC/MS	8270C/625	1,4-Dichlorobenzene
GC/MS	8270C/625	bis(2-chloroisoprolyl)ether
GC/MS	8270C/625	2,4,5-Trichlorophenol
GC/MS	8270C/625	2,4,6-Trichlorophenol
GC/MS	8270C/625	2,4-Dichlorophenol
GC/MS	8270C/625	2,4-Dimethylphenol
GC/MS	8270C/625	2,4-Dinitrophenol
GC/MS	8270C/625	2,4-Dinitrotoluene
GC/MS	8270C/625	2,6-Dinitrotoluene
GC/MS	8270C/625	2-Chloronaphthalene
GC/MS	8270C/625	2-Chlorophenol
GC/MS	8270C/625	2-Methylnaphthalene
GC/MS	8270C/625	2-Methylphenol
GC/MS	8270C/625	2-Nitroaniline
GC/MS	8270C/625	2-Nitrophenol
GC/MS	8270C/625	3 & 4 Methylphenol
GC/MS	8270C/625	3,3'-Dichlorobenzidine
GC/MS	8270C/625	3-Nitroaniline
GC/MS	8270C/625	4,6-Dinitro-2-methylphenol
GC/MS	8270C/625	4-Bromophenyl phenyl ether
GC/MS	8270C/625	4-Chloro-3-methylphenol
GC/MS	8270C/625	4-Chloroaniline
GC/MS	8270C/625	4-Chlorophenyl phenyl ether
GC/MS	8270C/625	4-Nitroaniline
GC/MS	8270C/625	Acenaphthene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	8270C/625	Acenaphthylene
GC/MS	8270C/625	Anthracene
GC/MS	8270C/625	1,2-Diphenylhydrazine as Azobenzene
GC/MS	8270C/625	Benzo[a]anthracene
GC/MS	8270C/625	Benzo[a]pyrene
GC/MS	8270C/625	Benzo[b]fluoranthene
GC/MS	8270C/625	Benzo[g,h,i]perylene
GC/MS	8270C/625	Benzo[k]fluoranthene
GC/MS	8270C/625	Benzoic acid
GC/MS	8270C/625	Benzyl alcohol
GC/MS	8270C/625	Bis(2-chloroethoxy)methane
GC/MS	8270C/625	Bis(2-chloroethyl)ether
GC/MS	8270C/625	Bis(2-ethylhexyl) phthalate
GC/MS	8270C/625	Butyl benzyl phthalate
GC/MS	8270C/625	Carbazole
GC/MS	8270C/625	Chrysene
GC/MS	8270C/625	Dibenz(a,h)anthracene
GC/MS	8270C/625	Dibenzofuran
GC/MS	8270C/625	Diethyl phthalate
GC/MS	8270C/625	Dimethyl phthalate
GC/MS	8270C/625	Di-n-butyl phthalate
GC/MS	8270C/625	Di-n-octyl phthalate
GC/MS	8270C/625	Fluoranthene
GC/MS	8270C/625	Fluorene
GC/MS	8270C/625	Hexachlorobenzene
GC/MS	8270C/625	Hexachlorobutadiene
GC/MS	8270C/625	Hexachloroethane
GC/MS	8270C/625	Indeno[1,2,3-cd]pyrene
GC/MS	8270C/625	Isophorone
GC/MS	8270C/625	Naphthalene
GC/MS	8270C/625	Nitrobenzene
GC/MS	8270C/625	N-Nitrosodimethylamine
GC/MS	8270C/625	N-Nitrosodi-n-propylamine
GC/MS	8270C/625	N-Nitrosodiphenylamine
GC/MS	8270C/625	Pentachlorophenol
GC/MS	8270C/625	Phenanthrene
GC/MS	8270C/625	Phenol
GC/MS	8270C/625	Pyrene
GC/MS SIM	8270C SIM	2-Methylnaphthalene
GC/MS SIM	8270C SIM	Acenaphthene

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Non-Potable Water

Technology	Method	Analyte
GC/MS SIM	8270C SIM	Acenaphthylene
GC/MS SIM	8270C SIM	Anthracene
GC/MS SIM	8270C SIM	Benzo[a]anthracene
GC/MS SIM	8270C SIM	Benzo[a]pyrene
GC/MS SIM	8270C SIM	Benzo[b]fluoranthene
GC/MS SIM	8270C SIM	Benzo[g,h,i]perylene
GC/MS SIM	8270C SIM	Benzo[k]fluoranthene
GC/MS SIM	8270C SIM	Chrysene
GC/MS SIM	8270C SIM	Dibenz(a,h)anthracene
GC/MS SIM	8270C SIM	Fluoranthene
GC/MS SIM	8270C SIM	Fluorene
GC/MS SIM	8270C SIM	Indeno[1,2,3-cd]pyrene
GC/MS SIM	8270C SIM	Naphthalene
GC/MS SIM	8270C SIM	Phenanthrene
GC/MS SIM	8270C SIM	Pyrene
GC-ECD	8011	1,2-Dibromoethane
GC-ECD	8011	1,2-Dibromo-3-Chloropropane
GC-ECD	8081A/608	4,4'-DDD
GC-ECD	8081A/608	4,4'-DDE
GC-ECD	8081A/608	4,4'-DDT
GC-ECD	8081A/608	Aldrin
GC-ECD	8081A/608	alpha-BHC
GC-ECD	8081A/608	alpha-Chlordane
GC-ECD	8081A/608	beta-BHC
GC-ECD	8081A/608	delta-BHC
GC-ECD	8081A/608	Dieldrin
GC-ECD	8081A/608	Endosulfan I
GC-ECD	8081A/608	Endosulfan II
GC-ECD	8081A/608	Endosulfan sulfate
GC-ECD	8081A/608	Endrin
GC-ECD	8081A/608	Endrin aldehyde
GC-ECD	8081A/608	Endrin ketone
GC-ECD	8081A/608	gamma-BHC (Lindane)
GC-ECD	8081A/608	gamma-Chlordane
GC-ECD	8081A/608	Heptachlor
GC-ECD	8081A/608	Heptachlor epoxide
GC-ECD	8081A/608	Methoxychlor
GC-ECD	8081A/608	Technical Chlordane
GC-ECD	8081A/608	Toxaphene
GC-ECD	8082/608	PCB-1016

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Non-Potable Water

Technology	Method	Analyte
GC-ECD	8082/608	PCB-1221
GC-ECD	8082/608	PCB-1232
GC-ECD	8082/608	PCB-1242
GC-ECD	8082/608	PCB-1248
GC-ECD	8082/608	PCB-1254
GC-ECD	8082/608	PCB-1260
GC-IT/MS	8151A mod.	2,4,5-T
GC-IT/MS	8151A mod.	2,4-D
GC-IT/MS	8151A mod.	2,4-DB
GC-IT/MS	8151A mod.	4-Nitrophenol
GC-IT/MS	8151A mod.	Dalapon
GC-IT/MS	8151A mod.	Dicamba
GC-IT/MS	8151A mod.	Dichlorprop
GC-IT/MS	8151A mod.	Dinoseb
GC-IT/MS	8151A mod.	MCPA
GC-IT/MS	8151A mod.	Mecoprop
GC-IT/MS	8151A mod.	Pentachlorophenol
GC-IT/MS	8151A mod.	Silvex (2,4,5-TP)
GC-FID	EPA 8015B/AK101/ NWTPH-Gx/NWVPH	Gasoline and Volatile Petroleum Hydrocarbons
GC-FID	EPA 8015B/AK102/ NWTPH-Dx/NWEPH	Diesel and Extractable Petroleum Hydrocarbons
GC-FID	EPA 8015B/AK102/ NWTPH-Dx/NWEPH	Motor Oil and Extractable Petroleum Hydrocarbons
Gravimetric	1664A	Oil & Grease
Colorimetric/RFA	9012A	Total Cyanides
Ion Chromatography	300.0/9056A	Bromide
Ion Chromatography	300.0/9056A	Chloride
Ion Chromatography	300.0/9056A	Fluoride
Ion Chromatography	300.0/9056A	Sulfate
Ion Chromatography	300.0/9056A	Nitrate
Ion Chromatography	300.0/9056A	Nitrite
TOC Analyzer (IR)	415.1/9060	TOC
Probe	9040/9045/150.1	pH
Conductivity meter	9050/120.1/SM2510B	Specific Conductance
Pensky-Martens closed-cup tester/ Setaflash	1010/1020	Ignitability/Flashpoint
Preparation	**Method**	**Type**
Separatory Funnel Liquid-Liquid Extraction	3510C	Semivolatile and Nonvolatile Organics

LABORATORY ACCREDITATION BUREAU

Non-Potable Water

Preparation	Method	Type
Continuous Liquid-Liquid Extraction	3520	Semivolatile and Nonvolatile Organics
Solvent Dilution	3580	Semivolatile and Nonvolatile Organics
Waste Dilution	3585	Volatile Organic Compounds
Purge and Trap	5030	Volatile Organic Compounds
Purge and Trap	5035	Volatile Organic Compounds
Acid Digestion (Aqueous)	3005/3010	Inorganics
Acid Digestion (Sediments, Sludges, and Soils)	3050	Inorganics
TCLP Extraction	1311	Toxicity Characteristic Leaching Procedure
Florisil Cleanup	3620B	Cleanup of pesticide residues and other chlorinated hydrocarbons
Silica Gel Cleanup	3630C	Column Cleanup
Gel Permeation Cleanup	3640A	Separation of Synthetic Macromolecules
Sulfur Cleanup	3660B	Sulfur Cleanup Reagent
Sulfuric Acid Cleanup	3665A	Cleanup for Quantitation of PCBs

Solid and Chemical Materials

Technology	Method	Analyte
ICP-AES	6010B	Silver
ICP-AES	6010B	Aluminum
ICP-AES	6010B	Arsenic
ICP-AES	6010B	Boron
ICP-AES	6010B	Barium
ICP-AES	6010B	Beryllium
ICP-AES	6010B	Calcium
ICP-AES	6010B	Cadmium
ICP-AES	6010B	Cobalt
ICP-AES	6010B	Chromium
ICP-AES	6010B	Copper
ICP-AES	6010B	Iron
ICP-AES	6010B	Potassium
ICP-AES	6010B	Magnesium
ICP-AES	6010B	Manganese
ICP-AES	6010B	Molybdenum
ICP-AES	6010B	Sodium
ICP-AES	6010B	Nickel
ICP-AES	6010B	Lead
ICP-AES	6010B	Antimony
ICP-AES	6010B	Selenium

Solid and Chemical Materials

Technology	Method	Analyte
ICP-AES	6010B	Silicon
ICP-AES	6010B	Tin
ICP-AES	6010B	Titanium
ICP-AES	6010B	Strontium
ICP-AES	6010B	Thallium
ICP-AES	6010B	Vanadium
ICP-AES	6010B	Zinc
ICP-MS	6020	Silver
ICP-MS	6020	Arsenic
ICP-MS	6020	Barium
ICP-MS	6020	Beryllium
ICP-MS	6020	Cadmium
ICP-MS	6020	Cobalt
ICP-MS	6020	Chromium
ICP-MS	6020	Copper
ICP-MS	6020	Iron
ICP-MS	6020	Manganese
ICP-MS	6020	Molybdenum
ICP-MS	6020	Nickel
ICP-MS	6020	Lead
ICP-MS	6020	Antimony
ICP-MS	6020	Selenium
ICP-MS	6020	Thallium
ICP-MS	6020	Uranium
ICP-MS	6020	Vanadium
ICP-MS	6020	Zinc
CVAAS	7471A	Mercury
ICP-AES	7195/6010B	Hexavalent Chromium
GC/MS	8260B	1,1,1,2-Tetrachloroethane
GC/MS	8260B	1,1,1-Trichloroethane
GC/MS	8260B	1,1,2,2-Tetrachloroethane
GC/MS	8260B	1,1,2-Trichloroethane
GC/MS	8260B	1,1-Dichloroethane
GC/MS	8260B	1,1-Dichloroethene
GC/MS	8260B	1,1-Dichloropropene
GC/MS	8260B	1,2,3-Trichlorobenzene
GC/MS	8260B	1,2,3-Trichloropropane
GC/MS	8260B	1,2,4-Trichlorobenzene
GC/MS	8260B	1,2,4-Trimethylbenzene

LABORATORY ACCREDITATION BUREAU

Solid and Chemical Materials

Technology	Method	Analyte
GC/MS	8260B	1,2-Dibromo-3-Chloropropane
GC/MS	8260B	1,2-Dichlorobenzene
GC/MS	8260B	1,2-Dichloroethane
GC/MS	8260B	1,2-Dichloropropane
GC/MS	8260B	1,3,5-Trimethylbenzene
GC/MS	8260B	1,3-Dichlorobenzene
GC/MS	8260B	1,3-Dichloropropane
GC/MS	8260B	1,4-Dichlorobenzene
GC/MS	8260B	2,2-Dichloropropane
GC/MS	8260B	2-Chlorotoluene
GC/MS	8260B	2-Hexanone
GC/MS	8260B	4-Chlorotoluene
GC/MS	8260B	4-Isopropyltoluene
GC/MS	8260B	Acetone
GC/MS	8260B	Benzene
GC/MS	8260B	Bromobenzene
GC/MS	8260B	Bromoform
GC/MS	8260B	Bromomethane
GC/MS	8260B	Carbon disulfide
GC/MS	8260B	Carbon tetrachloride
GC/MS	8260B	Chlorobenzene
GC/MS	8260B	Chlorodibromomethane
GC/MS	8260B	Chloroethane
GC/MS	8260B	Chloroform
GC/MS	8260B	Chloromethane
GC/MS	8260B	cis-1,2-Dichloroethene
GC/MS	8260B	cis-1,3-Dichloropropene
GC/MS	8260B	Dibromomethane
GC/MS	8260B	Dichlorodifluoromethane
GC/MS	8260B	Ethylbenzene
GC/MS	8260B	Ethylene Dibromide
GC/MS	8260B	Hexachlorobutadiene
GC/MS	8260B	Isopropylbenzene
GC/MS	8260B	Methyl Ethyl Ketone
GC/MS	8260B	Methyl Isobutyl Ketone
GC/MS	8260B	Methyl tert-butyl ether
GC/MS	8260B	Methylene Chloride
GC/MS	8260B	m-Xylene & p-Xylene
GC/MS	8260B	Naphthalene
GC/MS	8260B	n-Butylbenzene

Solid and Chemical Materials

Technology	Method	Analyte
GC/MS	8260B	N-Propylbenzene
GC/MS	8260B	o-Xylene
GC/MS	8260B	sec-Butylbenzene
GC/MS	8260B	Styrene
GC/MS	8260B	tert-Butylbenzene
GC/MS	8260B	Tetrachloroethene
GC/MS	8260B	Toluene
GC/MS	8260B	trans-1,2-Dichloroethene
GC/MS	8260B	trans-1,3-Dichloropropene
GC/MS	8260B	Trichloroethene
GC/MS	8260B	Trichlorofluoromethane
GC/MS	8260B	Vinyl chloride
GC/MS	8270C	1,2,4-Trichlorobenzene
GC/MS	8270C	1,2-Dichlorobenzene
GC/MS	8270C	1,3-Dichlorobenzene
GC/MS	8270C	1,4-Dichlorobenzene
GC/MS	8270C	bis(2-chloroisoprolyl)ether
GC/MS	8270C	2,4,5-Trichlorophenol
GC/MS	8270C	2,4,6-Trichlorophenol
GC/MS	8270C	2,4-Dichlorophenol
GC/MS	8270C	2,4-Dimethylphenol
GC/MS	8270C	2,4-Dinitrophenol
GC/MS	8270C	2,4-Dinitrotoluene
GC/MS	8270C	2,6-Dinitrotoluene
GC/MS	8270C	2-Chloronaphthalene
GC/MS	8270C	2-Chlorophenol
GC/MS	8270C	2-Methylnaphthalene
GC/MS	8270C	2-Methylphenol
GC/MS	8270C	2-Nitroaniline
GC/MS	8270C	2-Nitrophenol
GC/MS	8270C	3 & 4 Methylphenol
GC/MS	8270C	3,3'-Dichlorobenzidine
GC/MS	8270C	3-Nitroaniline
GC/MS	8270C	4,6-Dinitro-2-methylphenol
GC/MS	8270C	4-Bromophenyl phenyl ether
GC/MS	8270C	4-Chloro-3-methylphenol
GC/MS	8270C	4-Chloroaniline
GC/MS	8270C	4-Chlorophenyl phenyl ether
GC/MS	8270C	4-Nitroaniline
GC/MS	8270C	Acenaphthene

Solid and Chemical Materials

Technology	Method	Analyte
GC/MS	8270C	Acenaphthylene
GC/MS	8270C	Anthracene
GC/MS	8270C	1,2-Diphenylhydrazine as Azobenzene
GC/MS	8270C	Benzo[a]anthracene
GC/MS	8270C	Benzo[a]pyrene
GC/MS	8270C	Benzo[b]fluoranthene
GC/MS	8270C	Benzo[g,h,i]perylene
GC/MS	8270C	Benzo[k]fluoranthene
GC/MS	8270C	Benzoic acid
GC/MS	8270C	Benzyl alcohol
GC/MS	8270C	Bis(2-chloroethoxy)methane
GC/MS	8270C	Bis(2-chloroethyl)ether
GC/MS	8270C	Bis(2-ethylhexyl) phthalate
GC/MS	8270C	Butyl benzyl phthalate
GC/MS	8270C	Carbazole
GC/MS	8270C	Chrysene
GC/MS	8270C	Dibenz(a,h)anthracene
GC/MS	8270C	Dibenzofuran
GC/MS	8270C	Diethyl phthalate
GC/MS	8270C	Dimethyl phthalate
GC/MS	8270C	Di-n-butyl phthalate
GC/MS	8270C	Di-n-octyl phthalate
GC/MS	8270C	Fluoranthene
GC/MS	8270C	Fluorene
GC/MS	8270C	Hexachlorobenzene
GC/MS	8270C	Hexachlorobutadiene
GC/MS	8270C	Hexachloroethane
GC/MS	8270C	Indeno[1,2,3-cd]pyrene
GC/MS	8270C	Isophorone
GC/MS	8270C	Naphthalene
GC/MS	8270C	Nitrobenzene
GC/MS	8270C	N-Nitrosodimethylamine
GC/MS	8270C	N-Nitrosodi-n-propylamine
GC/MS	8270C	N-Nitrosodiphenylamine
GC/MS	8270C	Pentachlorophenol
GC/MS	8270C	Phenanthrene
GC/MS	8270C	Phenol
GC/MS	8270C	Pyrene
GC/MS SIM	8270C SIM	2-Methylnaphthalene
GC/MS SIM	8270C SIM	Acenaphthene

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Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS SIM	8270C SIM	Acenaphthylene
GC/MS SIM	8270C SIM	Anthracene
GC/MS SIM	8270C SIM	Benzo[a]anthracene
GC/MS SIM	8270C SIM	Benzo[a]pyrene
GC/MS SIM	8270C SIM	Benzo[b]fluoranthene
GC/MS SIM	8270C SIM	Benzo[g,h,i]perylene
GC/MS SIM	8270C SIM	Benzo[k]fluoranthene
GC/MS SIM	8270C SIM	Chrysene
GC/MS SIM	8270C SIM	Dibenz(a,h)anthracene
GC/MS SIM	8270C SIM	Fluoranthene
GC/MS SIM	8270C SIM	Fluorene
GC/MS SIM	8270C SIM	Indeno[1,2,3-cd]pyrene
GC/MS SIM	8270C SIM	Naphthalene
GC/MS SIM	8270C SIM	Phenanthrene
GC/MS SIM	8270C SIM	Pyrene
GC-ECD	8081A	4,4'-DDD
GC-ECD	8081A	4,4'-DDE
GC-ECD	8081A	4,4'-DDT
GC-ECD	8081A	Aldrin
GC-ECD	8081A	alpha-BHC
GC-ECD	8081A	alpha-Chlordane
GC-ECD	8081A	beta-BHC
GC-ECD	8081A	delta-BHC
GC-ECD	8081A	Dieldrin
GC-ECD	8081A	Endosulfan I
GC-ECD	8081A	Endosulfan II
GC-ECD	8081A	Endosulfan sulfate
GC-ECD	8081A	Endrin
GC-ECD	8081A	Endrin aldehyde
GC-ECD	8081A	Endrin ketone
GC-ECD	8081A	gamma-BHC (Lindane)
GC-ECD	8081A	gamma-Chlordane
GC-ECD	8081A	Heptachlor
GC-ECD	8081A	Heptachlor epoxide
GC-ECD	8081A	Methoxychlor
GC-ECD	8081A	Technical Chlordane
GC-ECD	8081A	Toxaphene
GC-ECD	8082	PCB-1016
GC-ECD	8082	PCB-1221
GC-ECD	8082	PCB-1232

Solid and Chemical Materials

Technology	Method	Analyte
GC-ECD	8082	PCB-1242
GC-ECD	8082	PCB-1248
GC-ECD	8082	PCB-1254
GC-ECD	8082	PCB-1260
GC-IT/MS	8151A mod.	2,4,5-T
GC-IT/MS	8151A mod.	2,4-D
GC-IT/MS	8151A mod.	2,4-DB
GC-IT/MS	8151A mod.	4-Nitrophenol
GC-IT/MS	8151A mod.	Dalapon
GC-IT/MS	8151A mod.	Dicamba
GC-IT/MS	8151A mod.	Dichlorprop
GC-IT/MS	8151A mod.	Dinoseb
GC-IT/MS	8151A mod.	MCPA
GC-IT/MS	8151A mod.	Mecoprop MCPP
GC-IT/MS	8151A mod.	Pentachlorophenol
GC-IT/MS	8151A mod.	Silvex (2,4,5-TP)
GC-FID	8015B/AK101/ NWTPH-Gx/NWVPH	Gasoline and Volatile Petroleum Hydrocarbons
GC-FID	8015B/AK102/ NWTPH-Dx/NWEPH	Diesel and Extractable Petroleum Hydrocarbons
GC-FID	8015B/AK102/ NWTPH-Dx/NWEPH	Motor Oil and Extractable Petroleum Hydrocarbons
Colorimetric/RFA	9012A	Total Cyanides
Ion Chromatography	300.0/9056A	Fluoride
Ion Chromatography	300.0/9056A	Chloride
Ion Chromatography	300.0/9056A	Fluoride
Ion Chromatography	300.0/9056A	Sulfate
Ion Chromatography	300.0/9056A	Nitrate
Ion Chromatography	300.0/9056A	Nitrite
TOC Analyzer (IR)	9060	TOC
Probe	9040/9045	pH/Corrosivity
Conductivity meter	9050	Specific Conductance
Pensky-Martens closed-cup tester/ Setaflash	1010/1020	Ignitability/Flashpoint
Preparation	**Method**	**Type**
Separatory Funnel Liquid-Liquid Extraction	3510C	Semivolatile and Nonvolatile Organics
Continuous Liquid-Liquid Extraction	3520	Semivolatile and Nonvolatile Organics
Ultrasonic Extraction	3550C	Semivolatile and Nonvolatile Organics
Solvent Dilution	3580	Semivolatile and Nonvolatile Organics

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Solid and Chemical Materials		
Preparation	**Method**	**Type**
Waste Dilution	3585	Volatile Organic Compounds
Purge and Trap	5030	Volatile Organic Compounds
Purge and Trap	5035	Volatile Organic Compounds
Acid Digestion (Aqueous)	3005/3010	Inorganics
Acid Digestion (Sediments, Sludges, and Soils)	3050	Inorganics
TCLP Extraction	1311	Toxicity Characteristic Leaching Procedure
Florisil Cleanup	3620B	Cleanup of pesticide residues and other chlorinated hydrocarbons
Silica Gel Cleanup	3630C	Column Cleanup
Gel Permeation Cleanup	3640A	Separation of Synthetic Macromolecules
Sulfur Cleanup	3660B	Sulfur Cleanup Reagent
Sulfuric Acid Cleanup	3665A	Cleanup for Quantitation of PCBs

Notes:

1) This laboratory offers commercial testing service.

Approved By: ______________________ Date: January 19, 2010

R. Douglas Leonard
Chief Technical Officer

Issued: 01/19/10

THE STATE OF ALASKA

Department of Environmental Conservation

Laboratory Certification Program

Certificate of Approval for Contaminated Sites Analysis

TestAmerica-Tacoma

5755 8th Street East
Tacoma, WA 98424

UST-022

has complied with the provisions set forth in 18 AAC 78 and is hereby recognized by The Department of Environmental Conservation as **Approved** for the analytical parameter listed on the accompanying Scope of Accreditation. This certificate is effective **3/4/11**, and expires **3/4/12**.

THE SEAL OF THE STATE OF ALASKA

Patryce D. McKinney
State of Alaska Certification Authority

Lance W. Morris
Laboratory Chemistry Certification Officer

THE STATE OF ALASKA
Department of Environmental Conservation
Laboratory Approval Program

Scope of Approval **Expiration: 03/04/2012**

TestAmerica-Seattle, WA **UST-022**
5755 8th Street East
Tacoma, WA 98424

is approved by the State of Alaska Department of Environmental Conservation, pursuant to 18 AAC 78, to perform analysis for the parameters listed below using the analytical methods indicated. Approval for all parameters is final. Approval is for the latest version of a method unless specified otherwise in a note. EPA refers to the U.S. Environmental Protection Agency. AK refers to Alaska Methods 101, 102 and 103 for the determination of gasoline, diesel and residual range organics in soil and water. ASTM refers to the American Society for Testing and Materials.

Contaminated Sites

Method/Test Name	Reference	Analyte	Matrix	Status
6010B	EPA	Total Arsenic	Soil	Approved
6010B	EPA	Total Barium	Soil	Approved
6010B	EPA	Total Cadmium	Soil	Approved
6010B	EPA	Total Chromium	Soil	Approved
6010B	EPA	Total Lead	Soil	Approved
6010B	EPA	Total Nickel	Soil	Approved
6010B	EPA	Total Vanadium	Soil	Approved
6010B	EPA	Total Arsenic	Water	Approved
6010B	EPA	Total Barium	Water	Approved
6010B	EPA	Total Cadmium	Water	Approved
6010B	EPA	Total Chromium	Water	Approved
6010B	EPA	Total Lead	Water	Approved
6010B	EPA	Total Nickel	Water	Approved
6010B	EPA	Total Vanadium	Water	Approved
6020	EPA	Total Arsenic	Soil	Approved
6020	EPA	Total Barium	Soil	Approved
6020	EPA	Total Cadmium	Soil	Approved
6020	EPA	Total Chromium	Soil	Approved
6020	EPA	Total Lead	Soil	Approved

Contaminated Sites

Method/Test Name	Reference	Analyte	Matrix	Status
6020	EPA	Total Nickel	Soil	Approved
6020	EPA	Total Vanadium	Soil	Approved
6020	EPA	Total Arsenic	Water	Approved
6020	EPA	Total Barium	Water	Approved
6020	EPA	Total Cadmium	Water	Approved
6020	EPA	Total Chromium	Water	Approved
6020	EPA	Total Lead	Water	Approved
6020	EPA	Total Nickel	Water	Approved
6020	EPA	Total Vanadium	Water	Approved
8021B	EPA	BTEX	Water	Approved
8082	EPA	Polychlorinated Biphenyls-PCB	Soil	Approved
8082	EPA	Polychlorinated Biphenyls-PCB	Water	Approved
8260B	EPA	BTEX	Soil	Approved
8260B	EPA	Total Volatile Chlorinated Solvents	Soil	Approved
8260B	EPA	BTEX	Water	Approved
8260B	EPA	Total Volatile Chlorinated Solvents	Water	Approved
8270C	EPA	PAH	Soil	Approved
8270C	EPA	PAH	Water	Approved
AK101	AK	Gasoline Range Organics	Soil	Approved
AK101	AK	Gasoline Range Organics	Water	Approved
AK101/8021B	EPA	BTEX-methanol preserved	Soil	Approved
AK102	AK	Diesel Range Organics	Soil	Approved
AK102	AK	Diesel Range Organics	Water	Approved
AK102-SV	AK	Diesel Range Organics-small volume	Water	Approved
AK103	AK	Residual Range Organics	Soil	Approved

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

TESTAMERICA DENVER

Arvada, CO

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (QSM v4.1); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 30th day of November 2009.

President & CEO
For the Accreditation Council
Certificate Number 2907.01
Valid to October 31, 2011

AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION
CORPORATE SEAL 1978
DISTRICT OF COLUMBIA
A2LA

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

TESTAMERICA DENVER
4955 Yarrow Street
Arvada, CO 80002
Karen Kuoppala   Phone: 303-736-1203
www.testamericainc.com

ENVIRONMENTAL

Valid To: October 31, 2011   Certificate Number: 2907.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM v4.1)) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

Atomic Absorption/ICP-AES Spectrometry, ICP/MS, Gas Chromatography, Gas Chromatography/Mass Spectrometry, Gravimetry, High Performance Liquid Chromatography, Ion Chromatography, Misc.- Electronic Probes (pH, O_2), Oxygen Demand, Hazardous Waste Characteristics Tests, Spectrophotometry (Visible), Spectrophotometry (Automated), IR Spectrometry, Titrimetry, Total Organic Carbon, Total Organic Halide

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Metals		
Aluminum	------------------------------------	EPA 6010B/6010C
Antimony	------------------------------------	EPA 6010B/6010C/6020/6020A
Arsenic	------------------------------------	EPA 6010B/6010C/6020/6020A
Barium	------------------------------------	EPA 6010B/6010C/6020/6020A
Beryllium	------------------------------------	EPA 6010B/6010C/6020/6020A
Boron	------------------------------------	EPA 6010B/6010C
Cadmium	------------------------------------	EPA 6010B/6010C/6020/6020A
Calcium	------------------------------------	EPA 6010B/6010C
Chromium	------------------------------------	EPA 6010B/6010C/6020/6020A
Cobalt	------------------------------------	EPA 6010B/6010C/6020/6020A
Copper	------------------------------------	EPA 6010B/6010C/6020/6020A
Iron	------------------------------------	EPA 6010B/6010C
Lead	------------------------------------	EPA 6010B/6010C/6020/6020A
Lithium	------------------------------------	EPA 6010B/6010C
Magnesium	------------------------------------	EPA 6010B/6010C
Manganese	------------------------------------	EPA 6010B/6010C/6020/6020A
Mercury	------------------------------------	EPA 7470A/7471A/7471B

5301 Buckeystown Pike, Suite 350 | Frederick, Maryland 21704-8373 | Phone: 301 644 3248 | Fax: 301 662 2974 | www.A2LA.org

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Molybdenum	------------------------------------	EPA 6010B/6010C/6020/6020A
Nickel	------------------------------------	EPA 6010B/6010C/6020/6020A
Potassium	------------------------------------	EPA 6010B/6010C
Selenium	------------------------------------	EPA 6010B/6010C/6020/6020A
Silica	------------------------------------	EPA 6010B/6010C
Silicon	------------------------------------	EPA 6010B/6010C
Silver	------------------------------------	EPA 6010B/6010C/6020/6020A
Sodium	------------------------------------	EPA 6010B/6010C
Strontium	------------------------------------	EPA 6010B/6010C
Thallium	------------------------------------	EPA 6010B/6010C/6020/6020A
Tin	------------------------------------	EPA 6010B/6010C
Titanium	------------------------------------	EPA 6010B/6010C
Tungsten	------------------------------------	EPA 6020/6020A
Vanadium	------------------------------------	EPA 6010B/6010C/6020/6020A
Zinc	------------------------------------	EPA 6010B/6010C/6020/6020A
Nutrients		
Nitrate (as N)	By calculation	EPA 9056/9056A
Nitrate-nitrite (as N)	EPA 353.2	EPA 9056/9056A
Nitrite (as N)	SM 4500-NO2 B	EPA 9056/9056A
Orthophosphate (as P)	------------------------------------	EPA 9056/9056A
Total phosphorus	------------------------------------	EPA 6010B/6010C
Demands		
Total organic carbon	------------------------------------	EPA 9060
Total organic halides	------------------------------------	EPA 9020B/9023
Wet Chemistry		
Alkalinity	SM 2320 B	------------------------------------
Ammonia	EPA 350.1	------------------------------------
Bromide	------------------------------------	EPA 9056/9056A
Total organic carbon	------------------------------------	EPA 9060
Chloride	------------------------------------	EPA 9056/9056A
Conductivity	------------------------------------	EPA 9050/EPA 9050A
Cyanide	------------------------------------	EPA 9010B/9012A/9012B
Extractable organic halides (EOX)	------------------------------------	EPA 9023
Ferrous Iron	SM 3500 Fe B, D	------------------------------------
Fluoride	------------------------------------	EPA 9056/9056A
Hexavalent Chromium	EPA 7196	EPA 7196 (water only)
pH	------------------------------------	EPA 9040B/9045C
Oil and Grease (HEM and SGT-HEM)	EPA 1664A	EPA 1664A/9071B
Percent moisture	------------------------------------	ASTM D2216
Perchlorate	------------------------------------	EPA 6860
Phenols	------------------------------------	EPA 9066
Solids, Total	SM 2540 B	------------------------------------
Solids, Total Suspended	SM 2540 D	------------------------------------
Solids, Total Dissolved	SM 2540 C	------------------------------------
Sulfate	------------------------------------	EPA 9038/9056/9056A
Sulfide, Total	------------------------------------	EPA 9034
Sulfide	------------------------------------	EPA 9030

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Purgeable Organics (volatiles)		
Acetone	------------------------------------	EPA 8260B
Acetonitrile	------------------------------------	EPA 8260B
Acrolein	------------------------------------	EPA 8260B
Acrylonitrile	------------------------------------	EPA 8260B
Allyl Chloride	------------------------------------	EPA 8260B
Benzene	------------------------------------	EPA 8260B/8021B/AK101
Bromobenzene	------------------------------------	EPA 8260B/8021B(water only)
Bromochloromethane	------------------------------------	EPA 8260B
Bromodichloromethane	------------------------------------	EPA 8260B/8021B(water only)
Bromoform	------------------------------------	EPA 8260B/8021B(water only)
Bromomethane	------------------------------------	EPA 8260B
2-Butanone	------------------------------------	EPA 8260B
n-Butyl alcohol	------------------------------------	EPA 8260B/8015B/8015C
n-Butylbenzene	------------------------------------	EPA 8260B
Sec-Butylbenzene	------------------------------------	EPA 8260B
Tert-Butylbenzene	------------------------------------	EPA 8260B
Carbon disulfide	------------------------------------	EPA 8260B
Carbon tetrachloride	------------------------------------	EPA 8260B
Chlorobenzene	------------------------------------	EPA 8260B / 8021B
2-Chloro-1,3-butadiene	------------------------------------	EPA 8260B
Chloroethane	------------------------------------	EPA 8260B
2-Chloroethyl vinyl ether	------------------------------------	EPA 8260B/8021B(water only)
Chloroform	------------------------------------	EPA 8260B/8021B(water only)
1-Chlorohexane	------------------------------------	EPA 8260B
Chloromethane	------------------------------------	EPA 8260B/8021B(water only)
Chloroprene	------------------------------------	EPA 8260B
3-Chloroprene	------------------------------------	EPA 8260B
4-Chlorotoluene	------------------------------------	EPA 8260B
2-Chlorotoluene	------------------------------------	EPA 8260B
Cyclohexane	------------------------------------	EPA 8260B
Cyclohexanone	------------------------------------	EPA 8260B
Dibromochloromethane	------------------------------------	EPA 8260B
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504	EPA 8260B/8011/8021B (water only)
Dibromochloromethane	------------------------------------	EPA 8260B/8021B(water only)
Dichlorodifluoromethane	------------------------------------	EPA 8260B
Dibromomethane	------------------------------------	EPA 8260B/8021B(water only)
1,2 Dibromomethane (EDB)	EPA 504	EPA 8260B/8011/8021B (water only)
1,2-Dichlorobenzene	------------------------------------	EPA 8260B/8021B
1,3-Dichlorobenzene	------------------------------------	EPA 8260B/8021B
1,4-Dichlorobenzene	------------------------------------	EPA 8260B/8021B
cis-1,4-Dichloro-2-butene	------------------------------------	EPA 8260B/8021B(water only)
trans-1,4-Dichloro-2-butene	------------------------------------	EPA 8260B
1,1-Dichloroethane	------------------------------------	EPA 8260B/8021B(water only)
1,2-Dichloroethane	------------------------------------	EPA 8260B/8021B(water only)
1,1-Dichloroethene	------------------------------------	EPA 8260B/8021B(water only)
1,2-Dichloroethene	------------------------------------	EPA 8260B
cis-1,2-Dichloroethene	------------------------------------	EPA 8260B/8021B(water only)
trans-1,2-Dichloroethene	------------------------------------	EPA 8260B/8021B(water only)

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Dichlorofluoromethane	------------------------------------	EPA 8260B
1,2-Dichloropropane	------------------------------------	EPA 8260B/8021B(water only)
1,3-Dichloropropane	------------------------------------	EPA 8260B
2,2-Dichloropropane	------------------------------------	EPA 8260B/8021B(water only)
1,1-Dichloropropene	------------------------------------	EPA 8260B/8021B(water only)
1,3-Dichloropropene	------------------------------------	EPA 8260B
cis-1,3-Dichloropropene	------------------------------------	EPA 8260B/8021B(water only)
trans-1,3-Dichloropropene	------------------------------------	EPA 8260B/8021B(water only)
Diethyl ether	------------------------------------	EPA 8260B
Di-isopropylether	------------------------------------	EPA 8260B
1,4-Dioxane	------------------------------------	EPA 8260B
Ethanol	------------------------------------	EPA 8260B/8015B/8015C
Ethyl acetate	------------------------------------	EPA 8260B
Ethyl benzene	------------------------------------	EPA 8260B/8021B/AK101
Ethyl methacrylate	------------------------------------	EPA 8260B
Gas Range Organics (GRO)	------------------------------------	EPA 8015B/8015C/AK101
Hexane	------------------------------------	EPA 8260B
2-Hexanone	------------------------------------	EPA 8260B
Hexachlorobutadiene	------------------------------------	EPA 8260B
Isobutyl alcohol (2-Methyl-1-propanol)	------------------------------------	EPA 8260B/8015B/8015C
Isopropyl alcohol	------------------------------------	EPA 8260B
Isopropylbenzene	------------------------------------	EPA 8260B
1,4-Isopropyltoluene	------------------------------------	EPA 8260B
Iodomethane	------------------------------------	EPA 8260B
Methacrylonitrile	------------------------------------	EPA 8260B
Methanol	------------------------------------	EPA 8015B/8015C
Methyl acetate	------------------------------------	EPA 8260B
Methyl cyclohexane	------------------------------------	EPA 8260B
Methylene chloride	------------------------------------	EPA 8260B
Methyl ethyle ketone (MEK)	------------------------------------	EPA 8260B
Methyl isobutyl ketone	------------------------------------	EPA 8260B
Methyl methacrylate	------------------------------------	EPA 8260B
Methyl tert-butyl ether (MtBE)	------------------------------------	EPA 8260B/8021B
4-Methyl-2-pentanone	------------------------------------	EPA 8260B
Naphthalene	------------------------------------	EPA 8260B/8021B(water only)
2-Nitropropane	------------------------------------	EPA 8260B
2-Pentanone	------------------------------------	EPA 8260B
2-Propanol	------------------------------------	EPA 8260B
Propionitrile	------------------------------------	EPA 8260B
n-Propylbenzene	------------------------------------	EPA 8260B
Styrene	------------------------------------	EPA 8260B
1,1,1,2-Tetrachloroethane	------------------------------------	EPA 8260B/8021B(water only)
1,1,2,2-Tetrachloroethane	------------------------------------	EPA 8260B/8021B(water only)
Tetrachloroethene	------------------------------------	EPA 8260B/8021B(water only)
Tetrahydrofuran	------------------------------------	EPA 8260B
Toluene	------------------------------------	EPA 8260B / 8021B/AK101
Total Petroleum Hydrocarbons (TPH)	------------------------------------	EPA 1664A
1,2,3-Trichlorobenzene	------------------------------------	EPA 8260B/8021B(water only)
1,1,1-Trichloroethane	------------------------------------	EPA 8260B
1,1,2-Trichloroethane	------------------------------------	EPA 8260B
Trichloroethene	------------------------------------	EPA 8260B/8021B(water only)

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Trichlorofluoromethane	------------------------------------	EPA 8260B/8021B(water only)
1,2,3-Trichlorobenzene	------------------------------------	EPA 8260B
1,2,4-Trichlorobenzene	------------------------------------	EPA 8260B/8021B(water only)
1,2,3-Trichloropropane	------------------------------------	EPA 8260B/8021B(water only)
1,1,2-Trichloro-1,2,2-trifluoroethane	------------------------------------	EPA 8260B
1,2,3-Trimethylbenzene	------------------------------------	EPA 8260B
1,2,4-Trimethylbenzene	------------------------------------	EPA 8260B/8021B(water only)
1,3,5-Trimethylbenzene	------------------------------------	EPA 8260B
Vinyl acetate	------------------------------------	EPA 8260B
Vinyl chloride	------------------------------------	EPA 8260B/8021B(water only)
Xylenes, total	------------------------------------	EPA 8260B/8021B/AK101
1,2-Xylene	------------------------------------	EPA 8260B/8021B/AK101
M+P-Xylene	------------------------------------	EPA 8260B/8021B/AK101
Methane	------------------------------------	RSK-175
Ethane	------------------------------------	RSK-175
Ethylene (Ethene)	------------------------------------	RSK-175
Acetylene	------------------------------------	RSK-175
Acetylene Ethane	------------------------------------	RSK-175
Extractable Organics (semivolatiles)		
Acenaphthene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Acenaphthylene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Acetophenone	------------------------------------	EPA 8270C/8270D
2-Acetylaminofluorene	------------------------------------	EPA 8270C/8270D
Alachlor	------------------------------------	EPA 8270C/8270D
4-Aminobiphenyl	------------------------------------	EPA 8270C/8270D
Aniline	------------------------------------	EPA 8270C/8270D
Anthracene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Aramite	------------------------------------	EPA 8270C/8270D
Atrazine	------------------------------------	EPA 8270C/8270D
Azobenzene	------------------------------------	EPA 8270C/8270D
Benzaldehyde	------------------------------------	EPA 8270C/8270D
Benzidine	------------------------------------	EPA 8270C/8270D
Benzoic acid	------------------------------------	EPA 8270C/8270D
Benzo (a) anthracene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Benzo (b) fluoranthene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Benzo (k) fluoranthene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Benzo (ghi) perylene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Benzo (a) pyrene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Benzyl alcohol	------------------------------------	EPA 8270C/8270D
Bis (2-chloroethoxy) methane	------------------------------------	EPA 8270C/8270D
Bis (2-chloroethyl) ether	------------------------------------	EPA 8270C/8270D
Bis (2-chloroisopropyl) ether (2,2'Oxybis(1-chloropropane)	------------------------------------	EPA 8270C/8270D
Bis (2-ethylhexyl) phthalate	------------------------------------	EPA 8270C/8270D
4-Bromophenyl phenyl ether	------------------------------------	EPA 8270C/8270D
Butyl benzyl phthalate	------------------------------------	EPA 8270C/8270D
2-sec-Butyl-4,6-dinitrophenol	------------------------------------	EPA 8270C/8270D
Carbazole	------------------------------------	EPA 8270C/8270D
4-Chloroanilene	------------------------------------	EPA 8270C/8270D
Chlorobenzilate	------------------------------------	EPA 8270C/8270D

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
4-Chloro-3-methylphenol	------------------------------------	EPA 8270C/8270D
1-Chloronaphthalene	------------------------------------	EPA 8270C/8270D
2-Chloronaphthalene	------------------------------------	EPA 8270C/8270D
2-Chlorophenol	------------------------------------	EPA 8270C/8270D
4-Chlorophenyl phenyl ether	------------------------------------	EPA 8270C/8270D
Chrysene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Cresols	------------------------------------	EPA 8270C/8270D
Diallate	------------------------------------	EPA 8270C/8270D
Dibenzo (a,h) anthracene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Dibenzofuran	------------------------------------	EPA 8270C/8270D
1,2-Dichlorobenzene	------------------------------------	EPA 8270C/8270D
1,3-Dichlorobenzene	------------------------------------	EPA 8270C/8270D
1,4-Dichlorobenzene	------------------------------------	EPA 8270C/8270D
3,3'-Dichlorobenzidine	------------------------------------	EPA 8270C/8270D
2,4-Dichlorophenol	------------------------------------	EPA 8270C/8270D
2,6-Dichlorophenol	------------------------------------	EPA 8270C/8270D
Diethyl phthalate	------------------------------------	EPA 8270C/8270D
Dimethoate	------------------------------------	EPA 8270C/8270D
3,3-Dimethylbenzidine	------------------------------------	EPA 8270C/8270D
p-Dimethylaminoazobenzene	------------------------------------	EPA 8270C/8270D
7,12-Dimethylbenz(a)anthracene	------------------------------------	EPA 8270C/8270D
Alpha-,alpha-Dimethylphenethylamine	------------------------------------	EPA 8270C/8270D
2,4-Dimethylphenol	------------------------------------	EPA 8270C/8270D
Dimethyl phthalate	------------------------------------	EPA 8270C/8270D
Di-n-butyl phthalate	------------------------------------	EPA 8270C/8270D
Di-n-octyl phthalate	------------------------------------	EPA 8270C/8270D
1,3-Dinitrobenzene	------------------------------------	EPA 8270C/8270D
1,4-Dinitrobenzene	------------------------------------	EPA 8270C/8270D
2,4-Dinitrophenol	------------------------------------	EPA 8270C/8270D
2,4-Dinitrotoluene	------------------------------------	EPA 8270C/8270D
2,6-Dinitrotoluene	------------------------------------	EPA 8270C/8270D
Diphenylamine	------------------------------------	EPA 8270C/8270D
1,2-Diphenylhydrazine	------------------------------------	EPA 8270C/8270D
Disulfoton	------------------------------------	EPA 8270C/8270D
Diesel Range Organics (DRO)	------------------------------------	EPA 8015B/8015C, AK102, TX 1005
Ethyl methanesulfonate	------------------------------------	EPA 8270C/8270D
Famphur	------------------------------------	EPA 8270C/8270D
Fluoroanthene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Fluorene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Gasoline Range Organics	------------------------------------	TX 1005
Hexachlorobenzene	------------------------------------	EPA 8270C/8270D
Hexachlorobutadiene	------------------------------------	EPA 8270C/8270D
Hexachlorocyclopentadiene	------------------------------------	EPA 8270C/8270D
Hexachloroethane	------------------------------------	EPA 8270C/8270D
Hexachloropropene	------------------------------------	EPA 8270C/8270D
Indeno (1,2,3-cd) pyrene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Isodrin	------------------------------------	EPA 8270C/8270D
Isophorone	------------------------------------	EPA 8270C/8270D
Isosafrole	------------------------------------	EPA 8270C/8270D
Methapyrilene	------------------------------------	EPA 8270C/8270D
3-Methylcholanthrene	------------------------------------	EPA 8270C/8270D

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
2-Methyl-4,6-Dinitrophenol	------------------------------------	EPA 8270C/8270D
Methyl methane sulfonate	------------------------------------	EPA 8270C/8270D
2-Methylcholanthrene	------------------------------------	EPA 8270C/8270D
1-Methylnaphthalene	------------------------------------	EPA 8270C/8270D/8270SIM
2-Methylnaphthalene	------------------------------------	EPA 8270C/8270D/8270SIM
2-Methylphenol	------------------------------------	EPA 8270C/8270D
3+4-Methylphenol	------------------------------------	EPA 8270C/8270D
Naphthalene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
1,4-Naphthoquinone	------------------------------------	EPA 8270C/8270D
1-Naphthylamine	------------------------------------	EPA 8270C/8270D
2-Naphthylamine	------------------------------------	EPA 8270C/8270D
2-Nitroaniline	------------------------------------	EPA 8270C/8270D
3-Nitroaniline	------------------------------------	EPA 8270C/8270D
4-Nitroaniline	------------------------------------	EPA 8270C/8270D
Nitrobenzene	------------------------------------	EPA 8270C/8270D
2-Nitrophenol	------------------------------------	EPA 8270C/8270D
4-Nitrophenol	------------------------------------	EPA 8270C/8270D
Nitroquinoline-1-oxide	------------------------------------	EPA 8270C/8270D
N-Nitrosodiethylamine	------------------------------------	EPA 8270C/8270D/8070A
N-Nitrosodimethylamine	------------------------------------	EPA 8270C/8270D/8070A
N-Nitrosodi-n-butylamine	------------------------------------	EPA 8270C/8270D
N-Nitrosodi-n-propylamine	------------------------------------	EPA 8270C/8270D
N-Nitrosodiphenylamine	------------------------------------	EPA 8270C/8270D/8070A
N-Nitrosomethylethylamine	------------------------------------	EPA 8270C/8270D
N-Nitrosomorpholine	------------------------------------	EPA 8270C/8270D
N-Nitrosopiperidine	------------------------------------	EPA 8270C/8270D
N-Nitrosopyrrolidine	------------------------------------	EPA 8270C/8270D
5-Nitro-o-toluidine	------------------------------------	EPA 8270C/8270D
2,2-oxybis(1-chloropropane)	------------------------------------	EPA 8270C/8270D
Parathion, methyl	------------------------------------	EPA 8270C/8270D
Parathion, ethyl	------------------------------------	EPA 8270C/8270D
Pentachlorobenzene	------------------------------------	EPA 8270C/8270D
Pentachloroethane	------------------------------------	EPA 8270C/8270D
Pentachloronitobenzene	------------------------------------	EPA 8270C/8270D
Pentachlorophenol	------------------------------------	EPA 8270C/8270D
Phenacetin	------------------------------------	EPA 8270C/8270D
Phenanthrene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Phenol	------------------------------------	EPA 8270C/8270D
1,4-Phenylenediamine	------------------------------------	EPA 8270C/8270D
Phorate	------------------------------------	EPA 8270C/8270D
2-Picoline	------------------------------------	EPA 8270C/8270D
Pronamide	------------------------------------	EPA 8270C/8270D
Pyrene	------------------------------------	EPA 8270C/8270D/8310/8270SIM
Pyridine	------------------------------------	EPA 8270C/8270D
Safrole	------------------------------------	EPA 8270C/8270D
Sulfotepp	------------------------------------	EPA 8270C/8270D
1,2,4,5-Tetrachlorobenzene	------------------------------------	EPA 8270C/8270D
2,3,4,6-Tetrachlorophenol	------------------------------------	EPA 8270C/8270D
Thionazin	------------------------------------	EPA 8270C/8270D
o-Toluidine	------------------------------------	EPA 8270C/8270D
1,2,4-Trichlorobenzene	------------------------------------	EPA 8270C/8270D

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
2,4,5-Trichlorophenol	-------------------------------------	EPA 8270C/8270D
2,4,6-Trichlorophenol	-------------------------------------	EPA 8270C/8270D
o,o,o-Triethyl phosphorothioate	-------------------------------------	EPA 8270C/8270D
1,3,5-Trinitrobenzene	-------------------------------------	EPA 8270C/8270D
Tris(2,3-Dibromopropyl) phosphate	-------------------------------------	EPA 8270C/8270D
Motor Oil (Residual Range Organics)	-------------------------------------	EPA 8015B/8015C, AK103
Pesticides/Herbicides/PCBs		
Aldicarb	-------------------------------------	EPA 8321A
Aldrin	-------------------------------------	EPA 8081A/8081B
Anilazine	-------------------------------------	EPA 8141A/8141B
Atrazine	-------------------------------------	EPA 8141A/8141B
Azinophos ethyl	-------------------------------------	EPA 8141A/8141B
Azinophos methyl	-------------------------------------	EPA 8141A/8141B
alpha-BHC	-------------------------------------	EPA 8081A/8081B
Beta-BHC	-------------------------------------	EPA 8081A/8081B
delta-BHC	-------------------------------------	EPA 8081A/8081B
Gamma-BHC	-------------------------------------	EPA 8081A/8081B
Bolstar	-------------------------------------	EPA 8141A/8141B
Carbaryl	-------------------------------------	EPA 8321A
Carbofuran	-------------------------------------	EPA 8321A
Alpha-Chlordane	-------------------------------------	EPA 8081A/8081B
Gamma-Chlordane	-------------------------------------	EPA 8081A/8081B
Chlordane (technical)	-------------------------------------	EPA 8081A/8081B
Chloropyrifos	-------------------------------------	EPA 8081A/8081B/8141A/8141B
Coumaphos	-------------------------------------	EPA 8141A/8141B
2,4-D	-------------------------------------	EPA 8151A/8321A
Dalapon	-------------------------------------	EPA 8151A/8321A
2,4-DB	-------------------------------------	EPA 8151A/8321A
2,4’-DDD	-------------------------------------	EPA 8081A/8081B
4,4’-DDD	-------------------------------------	EPA 8081A/8081B
2,4’-DDE	-------------------------------------	EPA 8081A/8081B
4,4’-DDE	-------------------------------------	EPA 8081A/8081B
2,4’,-DDT	-------------------------------------	EPA 8081A/8081B
4,4’,-DDT	-------------------------------------	EPA 8081A/8081B
Demeton-O	-------------------------------------	EPA 8141A/8141B
Demeton-S	-------------------------------------	EPA 8141A/8141B
Demeton, total	-------------------------------------	EPA 8141A/8141B
Diazinon	-------------------------------------	EPA 8141A/8141B
Dicamba	-------------------------------------	EPA 8151A/8321A
Dichlorovos	-------------------------------------	EPA 8141A/8141B
Dichloroprop	-------------------------------------	EPA 8151A/8321A
Dicofol	-------------------------------------	EPA 8081A/8081B
Dieldrin	-------------------------------------	EPA 8081A/8081B
Dimethoate	-------------------------------------	EPA 8141A/8141B
Dinoseb	-------------------------------------	EPA 8151A/8321A
Disulfoton	-------------------------------------	EPA 8141A/8141B
Diuron	-------------------------------------	EPA 8321A
Endosulfan I	-------------------------------------	EPA 8081A/8081B
Endosulfan II	-------------------------------------	EPA 8081A/8081B
Endonsulfan sulfate	-------------------------------------	EPA 8081A/8081B

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Endrin	-------------------------------------	EPA 8081A/8081B
Endrin aldehyde	-------------------------------------	EPA 8081A/8081B
Endrin ketone	-------------------------------------	EPA 8081A/8081B
EPN	-------------------------------------	EPA 8141A/8141B
Ethoprop	-------------------------------------	EPA 8141A/8141B
Ethyl parathion	-------------------------------------	EPA 8141A/8141B
Famphur	-------------------------------------	EPA 8141A/8141B
Fensulfothion	-------------------------------------	EPA 8141A/8141B
Fenthion	-------------------------------------	EPA 8141A/8141B
Heptachlor	-------------------------------------	EPA 8081A/8081B
Heptachlor epoxide	-------------------------------------	EPA 8081A/8081B
Hexachlorobenzene	-------------------------------------	EPA 8081A/8081B
Isodrin	-------------------------------------	EPA 8081A/8081B
Kepone	-------------------------------------	EPA 8081A/8081B
Malathion	-------------------------------------	EPA 8141A/8141B
MCPA	-------------------------------------	EPA 8151A/8321A
MCPP	-------------------------------------	EPA 8151A/8321A
Merphos	-------------------------------------	EPA 8141A/8141B
Methiocarb	-------------------------------------	EPA 8321A
Methoxychlor	-------------------------------------	EPA 8081A/8081B
Methyl parathion	-------------------------------------	EPA 8141A/8141B
Mevinphos	-------------------------------------	EPA 8141A/8141B
Mirex	-------------------------------------	EPA 8081A/8081B
Naled	-------------------------------------	EPA 8141A/8141B
Oxamyl	-------------------------------------	EPA 8321A
PCB-1016 (Arochlor)	-------------------------------------	EPA 8082/8082A
PCB-1221	-------------------------------------	EPA 8082/8082A
PCB-1232	-------------------------------------	EPA 8082/8082A
PCB-1242	-------------------------------------	EPA 8082/8082A
PCB-1248	-------------------------------------	EPA 8082/8082A
PCB-1254	-------------------------------------	EPA 8082/8082A
PCB-1260	-------------------------------------	EPA 8082/8082A
PCB-1262	-------------------------------------	EPA 8082/8082A
PCB-1268	-------------------------------------	EPA 8082/8082A
Phorate	-------------------------------------	EPA 8141A/8141B
Phosmet	-------------------------------------	EPA 8141A/8141B
Propazine	-------------------------------------	EPA 8141A/8141B
Propham	-------------------------------------	EPA 8321A
Propoxur	-------------------------------------	EPA 8321A
Ronnel	-------------------------------------	EPA 8141A/8141B
Simazine	-------------------------------------	EPA 8081A/8081B/8141A/8141B
Stirophos	-------------------------------------	EPA 8141A/8141B
Sulfotepp	-------------------------------------	EPA 8141A/8141B
2,4,5-T	-------------------------------------	EPA 8151A/8321A
Thionazin	-------------------------------------	EPA 8141A/8141B
Tokuthion	-------------------------------------	EPA 8141A/8141B
2,4,5-TP	-------------------------------------	EPA 8151A/8321A
Toxaphene	-------------------------------------	EPA 8081A/8081B
Trichloronate	-------------------------------------	EPA 8141A/8141B
o,o,o-triethylphos phorothioate	-------------------------------------	EPA 8141A/8141B
tris(2,3-Dibromopropyl)phosphate	-------------------------------------	EPA 8081A/8081B

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Explosives		
1,3,5-Trinitrobenzene	------------------------------------	EPA 8330A/8330B/8321A/8321B
1,3-Dinitrobenzene	------------------------------------	EPA 8330A/8330B/8321A/8321B
2,4,6-Trinitrotoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
2,4-Dinitrotoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
2,6-Dinitroltoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
2-Amino-4,6-dinitrotoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
2-Nitrotoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
3-Nitrotoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
4-Amino-2,6-dinitrotoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
4-Nitrotoluene	------------------------------------	EPA 8330A/8330B/8321A/8321B
Nitrobenzene	------------------------------------	EPA 8330A/8330B/8321A/8321B
Nitroglycerin	------------------------------------	EPA 8330A/8330B/8321A/8321B
Octahydro-1,3,5,7-tetrabitro-1,3,5,7-tetrazocine (HMX)	------------------------------------	EPA 8330A/8330B/8321A/8321B
Pentaerythritoltetranitrate (PETN)	------------------------------------	EPA 8330A/8330B/8321A/8321B
Picric acid	------------------------------------	EPA 8330A/8330B
RDX (hexahydro-1,3,5-trinitro-1,3,5-triazine)	------------------------------------	EPA 8330A/8330B/8321A/8321B
Tetryl (methyl2,4,6-trinitrophenylnitramine	------------------------------------	EPA 8330A/8330B/8321A/8321B
Hydrazines		
Hydrazine	------------------------------------	SOP DV WC-0077
Monomethyl hydrazine	------------------------------------	SOP DV WC-0077
1,1-Dimethylhydrazine	------------------------------------	SOP DV WC-0077
Perfluorinated Hydrocarbons (PFCs) and Perfluorinated Sulfonates (PFSs)		
Perfluorobutanoic acid	------------------------------------	SOP DV-LC-0012
Perfluoropentanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorohexanoic acid	------------------------------------	SOP DV-LC-0012
Perfluoroheptanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorooctanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorononanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorodecanoic acid	------------------------------------	SOP DV-LC-0012
Perfluoroundecanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorododecanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorotridecanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorotetradecanoic acid	------------------------------------	SOP DV-LC-0012
Perfluorobutane Sulfonate	------------------------------------	SOP DV-LC-0012
Perfluorohexane Sulfonate	------------------------------------	SOP DV-LC-0012
Perfluorooctane Sulfonate	------------------------------------	SOP DV-LC-0012
Perfluorodecane Sulfonate	------------------------------------	SOP DV-LC-0012
Perfluorooctane Sulfonamide	------------------------------------	SOP DV-LC-0012
Perfluorooctane Sulfonamide	------------------------------------	SOP DV-LC-0012
Hazardous Waste Characteristics		
Conductivity	------------------------------------	EPA 9050A

Parameter/Analyte	Non-Potable Water	Solid Hazardous Waste
Corrosivity	------------------------------------	EPA 9040B/9045C
Ignitibility	------------------------------------	EPA 1010/EPA 1010A
Paint Filter Liquids Test	------------------------------------	EPA 9095A
Synthetic Precipitation Leaching Procedure (SPLP)	------------------------------------	EPA 1312
ToxicityCharacteristic Leaching Procedure	------------------------------------	EPA 1311
Organic Prep Methods		
Separatory Funnel Liquid-Liquid Extraction	------------------------------------	EPA 3510C
Continuous Liquid-Liquid Extraction	------------------------------------	EPA 3520C
Soxhlet Extraction	------------------------------------	EPA 3540C
Microwave Extraction	------------------------------------	EPA 3546
Ultrasonic Extraction	------------------------------------	EPA 3550B
Ultrasonic Extraction	------------------------------------	EPA 3550C
Waste Dilution	------------------------------------	EPA 3580A
Solid Phase Extraction Volatiles Purge and trap Volatiles purge and trap for soils	------------------------------------	EPA 3535A EPA 5030B EPA 5035
Organic Cleanup Procedures		
Florisil Cleanup	------------------------------------	EPA 3620B
Florisil Cleanup	------------------------------------	EPA 3620C
Sulfur Cleanup	------------------------------------	EPA 3660B
Sulfuric Acid/Permanganate Cleanup	------------------------------------	EPA 3665A
Metals Digestion		
Acid Digestion Total Recoverable or Dissolved Metals	------------------------------------	EPA 3005A
Acid Digestion for Total Metals	------------------------------------	EPA 3010A
Acid Digestion for Total Metals	------------------------------------	EPA 3020A
Acid Digestion of Sediments, Sludges and Soils	------------------------------------	EPA 3050B

Quality Assurance Manual

(see NE Cape HTRW RAs WP-July 2012
F10AK096903_07.04_0509_a 200-1f CD)

ATTACHMENT 4

TestAmerica Laboratories, Inc.
Standard Operating Procedures

(see NE Cape HTRW RAs WP-July 2012
F10AK096903_07.04_0509_a 200-1f CD)

Denver ELAP Certification and Standard Operating Procedures

DV-GC-0010	DV-MS-0002
DV-GC-0016	DV-MS-0010
DV-GC-0021	DV-MT-0016
DV-GC-0023	DV-MT-0017
DV-GC-0024	DV-OP-0006
DV-GC-0025	DV-OP-0007
DV-GC-0027	DV-OP-0010
DV-IP-0010	DV-OP-0013
DV-IP-0014	DV-OP-0016
DV-IP-0015	DV-OP-0017
DV-LC-0002	DV-OP-0018

Tacoma Standard Operating Procedures

TA-CA-C-S-004 Rev 2	TA-MT-0217 Rev 22
TA-GS-0308 Rev 20	TA-MV-0312 Rev 20
TA-GS-0351 Rev 18	TA-MV-0376 Rev 9
TA-GS-0356 Rev 09	TA-QA-0001 Rev 21
TA-GS-0363 Rev 15	TA-QA-0003 Rev 15
TA-GV-0390 Rev 8	TA-QA-0032 Rev 11
TA-IP-0209 Rev 16	TA-QA-0601 Rev 11
TA-MS-0313 Rev 17	TA-QA-0606 Rev 9
TA-MT-0202 Rev 20	TA-WC-0157 Rev 13

ATTACHMENT 5

Field Laboratory
Standard Operating Procedures

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TABLES

ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AK102	Alaska Method determination of DRO
AK103	Alaska Method determination RRO
ASE	accelerated solvent extractor
CVS	Calibration Verification Standard
DCS	diesel calibration standard
DE	Diatomaceous Earth
DRO	diesel range organics
FID	flame-ionization detector
GC	gas chromatographic or gas chromatograph
ICAL	initial calibration
LCS	laboratory control sample
LFB	laboratory-fortified blank
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligram per liter
mL	microliter
MSDS	Material Safety Data Sheet
NOM	naturally occurring materials
OTP	ortho-terphenyl
PQLS	practical quantitation limits
psi	pounds per square inch
QC	quality control
RCS	residual calibration standard
RRO	residual range organics (motor oil range)
RSD	relative standard deviation
RTW	retention time window
SOP	Standard Operation Procedure
VOA	volatile organic analysis

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1.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the procedures for determining the concentration of diesel range organics and residual range organics (DRO/RRO) in soil using methodology developed by the Alaska Department of Environmental Conservation (ADEC), and described in the *Underground Storage Tank Procedures Manual* (ADEC, 2002).

1.1 OBJECTIVES

The objectives in the use of this method are to accurately determine the concentrations of diesel and residual range organics in soil.

1.1.1 Scope of Method

These methods are designed to measure the concentration of DRO and RRO in soil. DRO is determined by method AK102, and RRO is determined by method AK103. The diesel range corresponds to an n-Alkane range from the beginning of C_{10} to the beginning of C_{25}, and a boiling point range of approximately 170 degrees Celsius (°C) to 400 °C. An n-Alkane is a chemical compound that consists of only hydrogen and carbon, linked in a single bond in a straight chain. The residual range corresponds to an n-alkane range from the beginning of C_{25} to the end of C_{36}, and a boiling range of 400 °C to 500 °C. Both methods are performed sequentially on a single sample extract, and a single analytical run on a gas chromatograph. The methods differ in the range of quantitation, based on the elution of n-alkanes on the gas chromatographic (GC) column.

1.1.2 Practical Quantitation Limits

The practical quantitation limits (PQLs) for these methods have been adjusted to reflect site-specific cleanup levels. The PQLs for DRO and RRO have been elevated to approximately 500 milligrams per kilogram (mg/kg).

1.1.3 Dynamic Range

The dynamic range for method AK 102 is 500 milligrams per liter (mg/L) to 25,000 mg/L. The dynamic range for method AK 103 is 500 mg/L to 25,000 mg/L. The dynamic ranges reflect the concentration of target analytes in the sample extract. Dilutions may be performed as necessary to put the chromatographic envelope (sample extract concentration) within the linear range of the method. The determination of soil concentrations is based on the sample weight and the percent moisture in the sample (Sections 9.12.1 and 9.12.2).

2.0 METHOD SUMMARY

2.1 METHOD PROCEDURE

This method provides GC conditions for the detection of semivolatile petroleum products, such as diesel and motor oil. Other non-petroleum compounds with similar characteristics and boiling points may also be detected with this method.

Samples are extracted from approximately 20 grams of soil using methylene chloride as the solvent. A surrogate mixture of known concentration is spiked into all field and quality control (QC) samples to evaluate the efficiency of the extraction process. An aliquot (2 micro liters [µL]) of the extract is injected into a gas chromatograph equipped with a capillary column and a flame ionization detector (FID). The GC is temperature programmed to facilitate separation of organic compounds.

2.1.1 DRO Range

Quantitation of DRO is performed by comparing the total chromatographic area between and including the peak start of C_{10} to the peak start of C_{25}, including both resolved and unresolved compounds, based on the FID response compared to a diesel calibration standard. Integration is performed using forced baseline-baseline integration.

2.1.2 RRO Range

Quantitation of RRO is performed by comparing the total chromatographic area between and including the peak start of C_{25} to the peak end of C_{36}, including both resolved and unresolved components. Integration is performed using forced baseline-baseline integration.

2.2 METHOD DEVELOPMENT

This method was developed by the ADEC and is based, in part, on a modification of the American Petroleum Institute consensus “Method for the Determination of Diesel Range Organics,” Revision 2, 2/5/92, supplemented with information gathered by the State of Alaska, Department of Environmental Conservation, State Chemistry Laboratory, with support from the Storage Tank Program. It is also based in part on EPA Methods 8000 and 8100, SW – 846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* [1], adopted by reference in Title 18 Alaska Administrative Code, Chapter 78.090(i) [18 AAC

78.090(i)], Method OA-2 [2] and work by the EPA Total Petroleum Hydrocarbons Method Committee [3], and the State of Oregon, "Total Petroleum Hydrocarbon Methods" QAR 340-122-350, dated December 11, 1990.

3.0 DEFINITIONS

3.1 Diesel Range Organics (DRO)

All chromatographic peaks for DRO, both resolved and unresolved, eluting between the peak start of n-decane (C_{10}) and the peak start of n-pentacosane (C_{25}). Quantitation is based on direct comparison of the area within this range to the total area over the same (C_{10} - C_{25}) range of the calibration standard, as determined by FID response using forced baseline-baseline integration. Surrogate peak areas shall be determined by valley to valley integration.

3.2 Residual Range Organics (RRO)

All chromatographic peaks for RRO, both resolved and unresolved, eluting between the peak start of n-pentacosane (C_{25}) and the peak end of n-hextriacontane (C_{36}). Quantitation is based on direct comparison of the area within this range to the total area over the same (C_{25} – C_{36}) range of the calibration standard, as determined by FID response using forced baseline-baseline integration. Surrogate peak areas shall be determined by valley-to-valley integration.

3.3 Diesel Calibration Standard (DCS)

The DCS is Commercial #2 diesel fuel or equivalent hydrocarbon mixture, in which greater than 95% of the hydrocarbon mass elutes within the diesel change and is diluted to appropriate concentrations in methylene chloride. The DCS serves as a calibration standard for DRO. The DCS standard will be injected without any other standards present to demonstrate the 95% elution criteria is met, based on the area of integration.

3.4 Residuals Calibration Standard (RCS)

RCS is an equal blend of 30 weight and 40 weight motor oils (1:1), diluted to appropriate concentrations in methylene chloride. The RCS serves as a calibration standard for RRO. The RCS standard will be injected without any other standards present to demonstrate the elution range of the RCS.

3.5 Combined Calibration Standard

A stock standard mixture of DCS and RCS components is used for the initial and continuing calibration standards. Multiple concentrations of the combined calibration standards are used for the initial calibration. The standard concentrations vary from the PQL of 500 mg/L to 25,000 mg/L, which is the upper dynamic range of the calibrations. A 10,000 mg/L standard is used as the continuing calibration standard.

3.6 CONTINUING CALIBRATION STANDARD (CCS)

The continuing calibration standard is a mid-range working standard diluted from the stock standard solution and is used to verify that the analytical system is responding in a manner comparable to the time of initial calibration. The continuing calibration standard is analyzed at the beginning of an analytical sequence, and after every 20 samples to ensure that reported sample concentrations are accurate, as determined by the calibration.

3.7 CALIBRATION VERIFICATION STANDARD (CVS)

The CVS is a QC standard, but with diesel from a source other than that used to prepare the DCS, (i.e., a second source). It is used by the laboratory to verify the accuracy of calibration and source materials. Greater than 95 % of the hydrocarbon mass must elute within the diesel range, as described in Section 3.1.

3.8 SURROGATE MIXTURES

Ortho-terphenyl is used as the DRO surrogate and n-triacontane d^{62} is used as the RRO surrogate. The surrogate mixture contains equal concentrations of the surrogates, and it is spiked into all extracted samples before the extraction begins.

3.9 RETENTION TIME WINDOW (RTW) STANDARD

The RTW is a mixture of the normal (n-) alkanes, including n-decane, n-pentacosane, and n-hexatriacontane (C_{10}, C_{25} and C_{36}), which are analyzed once every 24-hour day or with each analytical batch of samples. This standard defines the integration windows for methods AK102 and AK103.

3.10 STANDARD SOIL

Baked Ottawa sand is used in QC samples (method blank and laboratory-fortified blank) to represent the soil matrix. Quality control samples are extracted and analyzed using the same procedures as field samples.

3.11 METHOD BLANK

The method blank (also known as a procedural blank), demonstrates that the apparatus and reagents used to verify that the handling, extraction, and analysis of field samples is valid and that the reported concentrations in field samples were not biased due to contamination introduced in the extraction and analysis process.

3.12 INSTRUMENT BLANK

An instrument blank demonstrates that the instrument is free from contamination. The instrument blank is not extracted, and consists of methylene chloride solvent used in the extraction process.

3.13 SOLVENT BLANK

A solvent blank demonstrates that the solvent (in this case methylene chloride) used in the method is free from contamination. It may also serve as an instrument blank.

3.14 LABORATORY-FORTIFIED BLANK (LFB)

An LFB is a method blank sample spiked with diluted commercial #2 diesel fuel and motor oil which is the same as that used to make the Combined Calibration Standard (see Section 7.5 of this method). There are 2 laboratory-fortified blanks extracted with every extraction batch. The spike recoveries are used to evaluate method control for accuracy and precision (see Table 1 of this method in Section 11.2). The laboratory-fortified blank is synonymous with a laboratory control sample (LCS).

3.15 METHOD DETECTION LIMIT (MDL)

The MDL is the minimum concentration of a compound that can be measured and reported with 99% confidence that the value is greater than zero, determined from analysis of a sample in a given matrix containing the analyte(s). The MDL is determined prior to the analysis of any samples.

3.16 PRACTICAL QUANTITATION LIMIT (PQL)

The PQL is defined as the concentration in the sample extract that can be accurately determined and has a reproducible result. The PQL is generally between 2 and 5 times the MDL.

4.0 INTERFERENCES

4.1 NON-TARGET ANALYTES

Other organic compounds, including, but not limited to, animal and vegetable oil and grease, chlorinated hydrocarbons, phenols, phthalate esters, and biogenic compounds, are measurable under the conditions of this method.

4.2 BIOGENIC INTERFERENCE

Some site conditions contain non-petroleum compounds from naturally occurring materials (NOMs), such as plants. Many of these compounds found in natural settings also occur at varying concentrations in crude oil and refined petroleum products. When NOM is present in a DRO or RRO sample, there is no practical method to distinguish NOMs from petrogenic sources. This interference is termed biogenic interference. Silica gel may be used to remove some of the polar compounds and reduce the magnitude of quantitative interference to varying degrees. Sample chromatograms of refined products usually have a distinct characteristic hump, or bell shape. Chromatograms from NOM samples do not exhibit the bell shape and typically have a ramped look that extends from the middle diesel range past the residual range. The analysts experience will be used for the interpretation of chromatograms when the presence of NOM is suspected. Silica gel may be employed to lessen the magnitude of interference.

4.3 GLASSWARE CLEANING

Method interferences are reduced by washing all glassware with hot soapy water, followed by a rinse with tap water and methylene chloride At least one blank must be analyzed with each extraction batch to demonstrate that the laboratory samples are free from method interferences.

4.4 REAGENT QUALITY

High purity reagents must be used to minimize interference problems. All reagents are screened for contamination before being introduced to field and QC samples.

4.5 Sample Carryover

Contamination by carryover can occur whenever high-level and low-level samples are sequentially analyzed. Whenever an unusually concentrated sample is encountered, the successive analysis will be evaluated for possible carryover.

4.6 Water

Water may be unintentionally extracted along with the target analytes during the extraction process, particularly when samples are wet. Water interferes with the proper concentration of the extract, and also interferes with the analysis. The water must be removed using steps outlined in Section 9.2.1.5.

5.0 SAFETY ISSUES

5.1 CHEMICAL EXPOSURE

The toxicity or carcinogenicity of each reagent in this method has not been precisely defined. However, each chemical compound should be treated as a potential health hazard. Exposure to these chemicals must be reduced to the lowest possible level by whatever means available, including personal protective equipment (PPE) and using fume hoods. A reference file of Material Safety Data Sheets will be maintained on site, and made available to all personnel involved in chemical analysis.

5.2 HEARING PROTECTION

Hearing protection will be used when performing sonication.

5.3 SAMPLE DRYING

The ADEC requires that moisture determinations must accompany all soils data (reported in mg/dry kg) in order to determine the results in the original soil condition. Because of the potential for high petroleum compound concentrations in the soil, all drying should be done under a functioning hood or with proper ventilation of the oven exhaust.

(Intentionally blank)

6.0 APPARATUS AND MATERIALS

6.1 Glassware

- 4-oz amber glass wide-mouth jars with Teflon®-lined screw caps
- 400 mL beakers
- Turbo-Vap tubes
- Two mL glass vials with Teflon-lined cap (autosampler vials)
- Disposable pipettes: Pasteur and volumetric
- Graduated cylinders: 250-mL
- Glass funnels
- Volumetric flasks: 10-mL, 25-mL, 50-mL, 250-mL, and 1000-mL
- Micro syringes 1-µL, 5-µL, 10-µL, 25-µL, 100-µL, and 500-µL.

6.2 Analytical Balance

An analytical balance capable of accurately weighing to 0.0001 grams will be used for preparing standards. A top-loading balance capable of weighing to the nearest 0.01 grams will be used for sample preparation and percent moisture determination.

6.3 Sonication

6.3.1 Ultrasonic Cell Disrupter (Sonicator)

A dual horn-type sonicator equipped with a titanium tip (Misonix, Inc., Model 2020 (475 watt)) with pulsing capability and a No. 200, ½-inch tapped disrupter horn is used to perform extraction method 3550B.

6.3.2 Sonabox

The sonicator will be operated in a sonabox to decrease sound. Hearing protection will also be worn by lab personnel during sonication steps to prevent hearing loss.

6.4 Solvent Concentrator

A solvent evaporator (TurboVap®) with a nitrogen gas source will be used to concentrate sample extracts to their final volume.

6.5 MISCELLANEOUS APPARATUS

- Stainless steel spatula.
- Weigh boats
- Glass wool

6.6 GAS CHROMATOGRAPH (GC)

A GC is an analytical system that measures concentrations of analytes introduced with an autosampler and syringes into an injection port. The components in the sample extract separate inside of a 30-meter analytical column before their response is measured on an FID. A data system capable of measuring peak areas using a forced baseline-baseline projection is required. The data system is capable of storing and processing chromatographic data.

6.6.1 Columns

Columns are Restek DB-5 30 M x 0.53 mm 1.0 micron film thickness or equivalent.

6.6.1.1 Optional Columns

Other columns may be used as long as they are capable of achieving the necessary resolution. The column must resolve C_{10} from the solvent front in a mid-range DCS or CVS.

7.0 REAGENTS AND STANDARDS

7.1 Reagent Water

Reagent water is free of organics, target analytes, and interfering substances.

7.2 Methylene Chloride

Methylene chloride – reagent grade or equivalent. At a minimum, the solvent must be shown to be free of DRO, as demonstrated by the analysis of a solvent blank.

7.3 Sodium Sulfate

Sodium sulfate – (ACS grade) granular, anhydrous. Sodium sulfate is used to remove water from samples in extraction method 3550B. Water interferes with the extraction and concentration of sample extracts. Sodium sulfate is purified by heating it in a shallow tray at 400 °C for 4 hours in a muffle furnace. Incomplete cleaning of sodium sulfate can result in DRO contamination of samples. Refer to Section 4.0 for other interferences

Note: Sodium sulfate should not be used with samples that will be extracted with the ASE.

7.4 Diatomaceous Earth

Diatomaceous Earth (DE) is used to dry samples for extraction method 3545. DE is purified by heating it in a shallow tray at 400 °C for 4 hours in a muffle furnace. Incomplete cleaning of DE can result in DRO contamination of samples.

7.5 Stock Standard Solutions

Stock Standard Solutions for AK102 and AK103 analyses are prepared in methylene chloride. Standard preparation will follow the procedures as described in Section 9.1. All standards prepared by the laboratory must be stored at less than 6 °C, and protected from light. The meniscus is marked and observed to ensure stock standard integrity. Standards must be replaced within 6 months of preparation. Prepared standards purchased from commercial suppliers may be kept indefinitely, and under the conditions, specified by the manufacturer if different than described in this paragraph. Stock standards often come in flame-sealed glass ampoules, and with proper storage are good for one year from receipt.

7.5.1 Surrogates

A Surrogate Control Standard is a working standard of 1 µg/mL each of OTP and hexatriacontane-d^{62} in methylene chloride is used as a working standard solution. A calculated volume of concentrated stock solution may be combined with initial and continuing calibration standards to verify that surrogate recoveries and chromatographic separation are adequate for the determination of extraction recovery efficiencies.

7.5.2 Diesel and Residual Range Calibration Standards

Diesel #2 is used to prepare stock calibration standards in methylene chloride. No fewer than 5 concentrations of this DCS are used for instrument calibration. Other than one standard concentration near the PQL, the expected range of concentrations found in project samples should define the working range of the GC.

7.5.2.1 Continuing Calibration Standard

A mid-range dilution of the diesel range and residual range blends serve as the Continuing Calibration Standard. The concentration is 10,000 mg/L.

7.5.3 Retention Time Window Standard

A Retention Time Window (RTW) Standard is a stock solution containing at a minimum, n-alkanes C_{10}, C_{25} and C_{36}, at a concentration of at least 2 µg/mL. This blend of alkanes is used to establish the RTW, which is used to define the integration ranges for DRO and RRO.

7.5.4 Stock Calibration Verification Standard (CVS)

The CVS is prepared from a second source of commercial Diesel #2 other than that used to prepare the DCS, as described in Section 7.5.2 of this method. A working solution is made at a recommended concentration of 5000 µg/mL in methylene chloride, which is near the mid-point of the calibration range.

8.0 SAMPLE COLLECTION, PRESERVATION, CONTAINERS, AND HOLDING TIMES

8.1 SAMPLE COLLECTION

Soils for field analyses may be collected in labeled Ziploc® bags or 4-oz amber glass jars with Teflon-lined lid. A separate Sampling and Analysis Plan and Field Standard Operating Procedures fully address the procedures used to collect field samples. Samples must be collected using clean sampling equipment, and new clean nitrile gloves. Sample gloves should be changed prior to the beginning of any collection activities and between samples.

8.2 SAMPLE PRESERVATION

All samples will be immediately placed in a gel iced cooler after collection, and stored at 4 ± 2 °C until extraction.

8.3 HOLDING TIMES

Sample extraction must be performed within 14 days [1]. All analyses of extracts must take place within 40 days.

(Intentionally blank)

9.0 PROCEDURE

9.1 STANDARDS PREPARATION

9.1.1 Initial and Continuing Calibration Standards and Surrogates

DRO calibration standards are prepared from neat #2 Diesel. RRO standards are prepared from equal portions of 30-weight and 40-weight motor oil. Neat standards are weighed on a 4-place analytical balance. Approximately 2.5 grams of #2 Diesel and 2.5 grams of the mixed motor oils are added to a 100-mL volumetric flask. Methylene chloride is added to the volumetric flask to a final volume of 100 mL, generating a combined stock standard solution at a concentration of 25,000 mg/L. Other initial and continuing calibration standards are prepared from this stock standard solution.

Initial and continuing calibration standards are prepared by diluting the stock standard solution in volumetric flasks on a volume:volume basis. Initial calibration standards are prepared at concentrations of 500, 2500, 5000, and 10,000 mg/L. The stock standard solution is used for the 25,000 mg/L solution, which is the upper dynamic range of the calibrations.

The 10,000 mg/L solution is used at the continuing calibration standard.

Ortho-terphenyl and n-triacontane-d62 are added to the stock calibration standard at 10 mg/L from a vendor-prepared solution (Ultra Scientific). Subsequent dilutions of the stock standard will result in surrogate concentrations of 0.2, 1, 2, and 4 mg/L.

9.2 ACCELERATED SOLVENT EXTRACTION

Method 3545A (ASE) is used for soil samples and the extraction solvent is methylene chloride.

9.2.1 Soil Preparation – Accelerated Solvent Extraction

The following sections outline procedures used to prepare sample extracts for analysis.

9.2.1.1 Remove Excessive Water

Decant any water layer that may accompany the solid layer in the sample. Note the apparent condition of the sample (presence of foreign materials, variable particle size, presence of oil sheen, multiple phases, etc., on the bench sheet).

9.2.1.2 Sample Weighing

Weigh approximately20 grams of the original sample in a tared weighing dish or extraction beaker on a 2-place balance. Add an equal weight of DE, and stir the mixture well with a clean stainless steel or Teflon spatula. The sample should have a grainy texture after mixing. If the sample clumps, add more DE until a grainy texture is achieved, and note the addition. (Do this for all samples and standards.)

9.2.1.3 Sample Transfer and Spiking

Place the soil-DE mixtures into the ASE 33-mL extraction tubes, and add surrogate to both field and QC samples. Prepare the method blank and LFBs in a similar fashion to field samples. Add a known amount of spiking solution to the duplicate LFBs. These QC samples should contain 20 grams of Ottawa sand and an equal amount of DE.

9.3 SONICATION EXTRACTION

9.3.1.1 Remove Excessive Water

Decant any water layer that may accompany the solid layer in the sample. Note the apparent condition of the sample (presence of foreign materials, variable particle size, presence of oil sheen, multiple phases, etc) on the bench sheet.

9.3.1.2 Sample Weighing

Weigh approximately 20 grams of the original sample in a tared weighing dish, or extraction beaker on a 2-place balance. Add an equal weight of DE or sodium sulfate, and stir the mixture well with a clean stainless steel spatula or spoon. The sample should have a grainy texture after mixing. If the sample clumps, add more DE or sodium sulfate until a grainy texture is achieved and note the addition. (Do this for all samples and standards.)

9.3.1.3 Sample Transfer and Spiking

Place the dried soil mixture into a 250-mL beaker and add surrogate to both field and QC samples. Prepare the method blank and LFBs in a similar fashion to field samples. Add a known amount of spiking solution to the duplicate LFBs. These QC samples should contain 20 grams of Ottawa sand.

9.3.1.4 Sonication

Add approximately 50 mL of methylene chloride to the sample after surrogate has been added. Place the beaker under the sonicator and sonicate for 90 seconds. Transfer the solvent extract to a Turbo-Vap tube through a lined glass filter funnel filled with sodium sulfate. Repeat sonication twice more by adding 50 mL of solvent each time.

9.4 SAMPLE CONCENTRATION

Samples must be concentrated to a measurable final volume of 10 mL, using a TurboVap solvent concentrator. TurboVap tubes are placed in the TurboVap, and solvents are evaporated under a gentle nitrogen stream in a heated water bath. Samples must not go dry, or the extraction process will need to be repeated with fresh soil.

9.5 MOISTURE DETERMINATION FOR SOLIDS

9.5.1 Moisture Determination Procedure

To determine percentage of moisture, pre-weigh an aluminum drying pan and record the weight to the nearest 0.01 grams. Tare the balance to zero with the aluminum pan on the balance and add 9 to 11 grams of the sample to the drying pan. Record the weight to the nearest 0.01 gram. Exclude any large rocks while making sure the moisture determination sample is representative (similar) to the extraction portion of the sample. Dry the sample a minimum of 4 hours or overnight in an oven at 105 °C. Allow the sample and pan to cool to room temperature before weighing. Place the sample and weighing pan on the balance and record the weight to the nearest 0.01 gram.

9.5.2 Percent Moisture Calculation for Soils

Subtract the aluminum boat weight from the dry weight and divide the result by the wet weight. Multiply the result by 100% to determine the percent dry weight. The wet weight is equal to 1.0 minus the dry weight, expressed as a decimal. The macro formula is:
% Moisture = [(A-C)/(A-B)] x 100. The % Solid = 1-% moisture.

Where:

A	=	weight of boat + wet sample
B	=	weight of boat
C	=	weight of boat + dry sample

Note: Make sure drying oven is placed under a hood or has proper exhaust ventilation. Heavily contaminated soils will produce strong organic vapors.

9.5.3 Dry Weight Calculation for Extracted Soil

mg/dry kg soil = (100-% moisture)/100)) x wet weight of sample

Note: Excel spreadsheets with formulas will be used to determine the percent moisture, dry weight of samples, and soil sample concentrations.

9.6 SAMPLE EXTRACT DILUTION TECHNIQUE

Measure 1.0 mL of sample into a 10-mL volumetric flask. Dilute sample to 10-mL with methylene chloride. Transfer to a labeled vial with a Teflon-lined lid. Note the dilution on the vial. Mark meniscus and store at <4 °C.

9.7 GAS CHROMATOGRAPHY

9.7.1 Method Conditions

Set helium column pressure to 20 pounds per square inch (psi). Set oven temperature to 40 °C for 2 minutes, then ramp at a rate of 15 °C/minute to 320 °C, and hold for 12 minutes (run time = 30.6 minutes). Set FID to 320 °C and injector to 280 °C. Method conditions may be modified to achieve proper separation of analytes. The instrument must be calibrated after any method conditions have changed.

9.7.2 Method Performance Criteria

GC run conditions and columns must be chosen to meet the following criteria:

- Resolution of the methylene chloride solvent front from C_{10}.
- The column must be capable of separating typical diesel and residual components from the surrogates. There may be potential problems with separating the resolution of n-C_{19} from OTP and n-C_{21} at varying relative concentrations.

9.8 CALIBRATION

9.8.1 Initial Calibration

To calibrate the GC, set up as in Section 9.7 of this method. A minimum of five concentrations of DCS must be used for the calibration. The lowest initial calibration standard concentration will establish the PQL for the method, and the highest concentration standard defines the upper quantitation limit. Samples exceeding the upper calibration limit must be diluted and reanalyzed.

9.8.2 Initial Calibration Curve Verification

The calibration curve must be confirmed using the CVS. This standard independently verifies the accuracy of the calibration. The concentration of the CVS should be within the expected concentration range of the samples to be analyzed. A relative standard deviation (RSD) of less than 20% of true value is the acceptance criteria for the CVS.

9.8.3 Continuing Calibration Standards (CCS)

The working calibration curve must be verified on each working day (24 hours) by the injection of a continuing calibration standard (see Section 3.6 of this method) at a concentration near the mid-point of the calibration curve (10,000 mg/L). The continuing calibration standard is a diluted aliquot of the same standard used to initially calibrate the instrument. An initial calibration standard near the mid-point of the curve may be used for the continuing calibration standard, and it is recommended. If the response for the continuing calibration standard varies from the predicted response by more than 25%, check the instrument for leaking septa, dirty injection liners and gas leaks. Recheck the calibration, if it is not within limits, a new calibration curve must be prepared. The instrument should be checked and cleaned prior to establishing a new 5-point calibration.

9.8.4 Calibration Curve Linearity

Acceptable criteria for the initial calibration are dependent on the type of curve fit applied to the initial calibration. Acceptance criteria for the most used types of calibration curves are listed below.

- A linear regression curve fit must have an R^2 of 0.995 or better,
- A quadratic fit must have an R^2 of 0.995 or better,
- Average of response factors, the average percent relative standard deviation (%RSD) is less than 20% over the working range.
- Other curve fits may be employed as long as they meet acceptance criteria outlined in EPA method 8000B [2].

9.9 ESTABLISHING RTWS

9.9.1 RTW Definition

The RTW for individual peaks is defined as the average RT plus or minus three times the standard deviation of the absolute retention times for each component. The RTWs for this method are defined in Section 3.9. RTWs are crucial to the identification of target compounds. RTWs are established to compensate for minor shifts in absolute retention times as a result of sampling loadings and normal chromatographic variability.

9.9.2 Chromatographic Separation Definition

Chromatographic processes achieve separation by passing a mobile phase over a stationary phase. Constituents in a mixture are separated because they partition differently between the mobile and stationary phases, and thus have different retention times. Compounds that strongly interact with the stationary phase elute slowly (i.e., long RTs), while compounds that remain in the mobile phase with little interaction with the stationary phase elute quickly (short RTWs).

Before establishing RTWs, be certain that the GC system is within optimum operating conditions (Section 6.7). Make three injections of the RTW Standard (Section 7.5.3) and surrogates (Section 7.5.1) throughout the course of a 72-hour period. Serial injections over less than a 72-hour period result in RTWs that are too tight.

9.9.3 Calculation of RTWs

1. Record the retention times for decane, pentacosane, and hexatriacontane using an RTW standard (Section 7.5.3) and the surrogates (Section 7.5.5.) from at least 3 injections over a minimum 72-hour period.
2. Calculate the mean and standard deviation of the three absolute retention times for the RTW standards and surrogates.
3. In those cases where the standard deviation for a particular analyte is zero, the laboratory will use ±0.05 minute as the default standard.
4. The width of the RTW for each analyte, surrogate, and major constituent is multi-component analytes is defined as ± 3 times the standard deviation of the mean absolute RT established during the 72-hour period. If the default standard deviation in Step 3 is used, the width of the window will be 0.05 minutes.

9.9.4 Reestablishing RTWs

The laboratory must calculate RTWs for each standard on each GC column, and whenever a new GC column is installed or instrument conditions change. RTWs must be verified regularly and updated no less frequently than once a year.

9.10 GAS CHROMATOGRAPH ANALYSIS

9.10.1 Injection Volume

Samples are analyzed by GC/FID. Injection volumes are 2 µL, using the conditions established in Section 9.7 of this method.

9.10.2 Analytical Batch Window

If initial calibration (Section 9.8.1) has been successfully performed, verify the calibration by analysis of a mid-point continuing calibration standard prior to and immediately after any samples are analyzed. An analytical batch is defined as the analysis of standards, field samples, and QC samples analyzed sequentially until all samples are analyzed, or those samples analyzed within 24 hours.

9.10.3 Continuing Calibration Acceptance Criteria

Calculate the percent difference of the response from the known continuing calibration standard concentration and the established response factor in mg/L. If the reported continuing calibration standard has a reported concentration difference greater than 25% from the known concentration, corrective action must be taken.

9.10.4 Instrument Blank Criteria

The instrument blank is essential for determining if analytical conditions are suitable for the proper analysis of samples. An unextracted solvent blank (methylene chloride) is analyzed each day to determine the area generated from normal baseline noise under the conditions prevailing in the 24-hour period. This area is generated by projecting a horizontal baseline between the retention times observed for the peak start of C_{10} and the peak start of C_{25}. This blank is integrated over the DRO area in the same manner as for the field samples, and is reported as the solvent blank. Baseline subtractions of instrument blanks is not allowed.

9.10.5 Carryover Blanks

Blanks may be run after samples suspected of being highly concentrated to prevent carryover. If the blank analysis shows contamination above the PQL, maintenance must be performed to remove the source of the carryover before any samples can be analyzed. New injector liners may be installed, or the column may be trimmed or baked out to remove the chromatographic contamination. Subsequent blanks must be analyzed until the system is shown to retain contaminant at concentrations less than the one-half the PQL.

9.10.6 Calibration Exceedances

If the DRO concentration exceeds the linear range of the method (as defined by the range of the calibration curve) in the final extract, corrective action must be taken. The sample should be diluted and the response of the major peaks should be kept in the upper half of the linear range of the calibration curve.

9.11 CHROMATOGRAPHIC INTERPRETATION

The analyst may perform a qualitative interpretation of sample chromatograms in order to determine if the sample result is attributed to natural (anthropogenic) or petroleum (petrogenic) sources. Chromatograms from known types of petroleum products may be used to compare the fuel patterns to those found in samples. Field notes and sample examination may also be used to identify potential origins of analytes in the chromatograms.

9.12 CALCULATIONS

9.12.1 Soil Concentration Calculation

External Sample Calculation:

Soil samples:

$$Cs = \frac{Cex * (Vt) * D}{(Ws)}$$

Where:

*****	=	times
Cs	=	Concentration of DRO or RRO in mg/kg in soil (dry weight)
Cex	=	Concentration in final extract
Vt	=	Volume of final extract in mL
D	=	Dilution factor, if dilution was performed on the sample prior to analysis. If no dilution was made, then D = 1, dimensionless
Ws	=	Dry weight of sample extracted in grams

9.12.2 Data Reduction Software

A software program from Agilent (Chemstation-Enviroquant) will be used to determine the concentration of the sample extract relative to Sections 9.12 of this method, based on the instrument calibration.

(Intentionally blank)

10.0 QUALITY CONTROL

10.1 CURVE VERIFICATION STANDARD (CVS)

- The CVS is not extracted.
- The CVS is analyzed once after the initial calibration standards to verify calibration curve.
- The CVS recovery limit is 75-125% of true value.

10.2 CONTINUING CALIBRATION SAMPLES

- The continuing calibration standard is not extracted.
- The continuing calibration standard is analyzed at the start and end of an analytical batch, and for every 20 samples in that batch.
- The continuing calibration standard recovery requirement is 75-125% of true value.

10.3 BLANKS

- The instrument blank is analyzed prior to any samples and after calibration standards to demonstrate that the system is free from contamination.
- The method blank must be extracted and analyzed with each extraction batch.
- If additional cleanup steps are performed on field samples, the same steps must be applied to the method blank.
- **Acceptance Criteria**: Results for the method blank must be less than or equal to the reporting limit concentration.
- BLANK SUBTRACTION IS NOT ALLOWED. Blanks are reported by value.
- Other blanks may be analyzed as necessary following the recommendations of Chapter 2, Section 9 of the *UST Procedures Manual*.

10.4 LABORATORY FORTIFIED BLANKS (LFB)

- LFB is extracted using the same method procedure as the associated samples.
- Two LFBs are analyzed with each extraction batch.
- Acceptance Criteria: The LFB recovery requirement for AK102-DRO is 75-125% of true value. The LFB recovery requirement for AK103-RRO is 60-120%. The acceptance criterion is 20% RPD for both methods.
- If additional cleanup steps are performed on field samples, the same steps must be applied to the LFB samples.
- If any LFB recovery fails to meet method criteria, appropriate corrective action must be taken. See Section 10.6 Corrective Actions.

10.5 SURROGATES

10.5.1 Surrogate Concentration

The surrogate should be spiked at a level to produce a recommended extract concentration of 1.66 µg/mL.

10.5.2 Surrogate Acceptance Criteria

Surrogate recoveries must be 60-120% for LCS (continuing calibration standard, CVS, method blank, LFB), and 50-150 % for field samples (all other samples).

10.5.3 Surrogate Recovery Failure-Corrective Action

If any surrogate recovery fails to meet method criteria, corrective action must be taken if there is no reasonable explanation for the failed recovery. Some soil types such at peat and tundra often bias recoveries low. See Section 10.6 Corrective Actions.

10.5.4 Sample Qualifiers (Flags)

If field samples show poor surrogate recovery that is not attributable to laboratory error, DRO results must be flagged.

10.6 CORRECTIVE ACTIONS

The actions listed below are recommended and may not apply to a particular failure.

- If the CVS fails to meet acceptance criteria, recheck all calculations used to prepare the standards. If the CVS fails again, prepare new ICAL and CVS standards from neat standards.
- If the instrument fails to meet continuing calibration criteria, all samples analyzed since the last acceptable continuing calibration standard must be reanalyzed.
- If method blank acceptance criteria are not met, identify and correct the source of contamination and re-prepare and reanalyze the associated samples.
- If the LFB(s) acceptance limits are not met, reanalyze the LFB to confirm the original result is reliable. If the results are still outside control limits, the associated samples must be re-extracted and reanalyzed. If the LFB is above the upper control limit, and the associated samples are all below the PQL, the deviation should be described in a non-conformance memo.

- If surrogate recoveries are outside the established limits, verify calculations, dilutions, and standard solutions. Also, verify that instrument performance is acceptable. High recoveries may be due to co-eluting matrix interference, and the chromatogram should be examined for evidence of this. Low recoveries may be due to adsorption by the sample matrix (clay, peat, or organic material in the sample). Recalculate the results and/or reanalyze the extract if the checks reveal a problem. If the surrogate recovery is outside of established limits due to well-documented matrix effects, the results must be flagged.

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11.0 METHOD PERFORMANCE

11.1 METHOD DETECTION LIMIT

The MDL for soil is calculated according to Title 40 Code of Federal Regulations, Part 136 (40 CFR136), Appendix B (1994). The MDL is estimated to be 60 mg/kg (external standard calibration, Ottawa sand) for DRO and 89 mg/kg for RRO. MDL studies will be performed and MDLs will be updated prior to any sample analyses.

11.2 METHOD ACCEPTANCE CRITERIA FOR AK102

The method acceptance criteria for laboratory control and field samples analyzed by Method AK102 are presented in Table 1.

Table 1 Method AK102 Acceptance Criteria for Quality Control

	Control Limits	
Soils (mg/kg)	**% Recovery**	**Relative % Difference**
Laboratory-Fortified Blanks	75-125	20
Continuing Calibration	75-125	
Calibration Verification	75-125	
Surrogate Recovery:		
Laboratory Fortified Blanks**	60-120	
Field Sample	50-150	

Notes:

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% = percent

mg/kg = milligrams per kilogram

11.3 METHOD ACCEPTANCE CRITERIA FOR AK103

The method acceptance criteria for laboratory control and field samples analyzed by Method AK103 are presented in Table 2.

Table 2 Method AK103 Acceptance Criteria for Quality Control

	Control Limits	
Soils (mg/kg)	**% Recovery**	**Relative % Difference**
Laboratory Fortified Blanks	60-120	20
Continuing Calibration	75-125	
Calibration Verification	75-125	
Surrogate Recovery:		
Laboratory Fortified Blanks**	60-120	
Field Sample	50-150	

**Laboratory Fortified Blank is any laboratory prepared sample used for quality control, except for calibration standards. Field criteria from voluntary contribution of method performance information from approved laboratories, and method performance at SCL.

% = percent

mg/kg = milligrams per kilogram

12.0 REFERENCES

Alaska Department of Environmental Conservation (2002), *Underground Storage Tank Procedures Manual*. 18 AAC 75 (Appendix D).

U.S. Environmental Protection Agency. *SW 846-Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Solid Waste Method 8000B, Determinative Chromatographic Separations*. Revision 2, 1996. Washington, D.C.

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TABLES

ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
ANSI	American National Standards Institute
ECD	electron capture detectors
EPA	U.S. Environmental Protection Agency
GC	gas chromatograph (or gas chromatogram)
LCS	laboratory control sample
LFB	laboratory-fortified blank
MDL	method detection limit
mg/kg	milligrams per kilogram
mL	milliliter
MSDS	Material Safety Data Sheet
NOM	natural organic matter
PCBs	polychlorinated biphenyls
PE	performance evaluation
PIDs	photoionization detectors
PPE	personal protective equipment
ppm	parts per million
QC	quality control
RF	response factor
RSD	relative standard deviation
SOP	Standard Operating Procedure
TCMX	tetrachlorometaxylene
TSDF	treatment storage disposal facility
VOA	volatile organic analysis

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1.0 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the procedures for determining the concentration of polychlorinated biphenyls (PCBs) as Aroclors® using the methodology developed by U.S. Environmental Protection Agency (EPA) Region 1 and described in the *Standard Operating Procedure PCB Field Testing for Soil and Sediment Samples* (EPA 2002).

1.1 PURPOSE OF METHOD

This method may be used to determine the concentrations of PCBs as Aroclors in extracts from soil and solids using open-tubular, capillary columns with electron capture detectors (ECD). The Aroclors listed below have been determined by this method, using a single-column analysis system. This method also may be applied to other matrices, such as oils and wipe samples, if appropriate sample extraction procedures are employed.

Table 1 Aroclor® Classes

Aroclor Class	CAS Registry No.[a]
Aroclor 1016	12674-11-2
Aroclor 1221	11104-28-2
Aroclor 1232	11141-16-5
Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5

Notes:
[a]Chemical Abstract Service Registry No.

1.2 AROCLOR QUANTITATION

The seven classes of Aroclors listed in Table 1 are those that are commonly specified in EPA regulations. The quantitation of PCBs as Aroclors is appropriate for meeting standard State and EPA cleanup criteria.

1.3 AROCLOR IDENTIFICATION

Compound identification based on single-column analysis is appropriate when Aroclor patterns of known standards (fingerprints) can be compared to a sample chromatogram. Certified standards of the differing Aroclors are used to produce chromatograms, which can be compared to sample chromatograms to identify the Aroclor mixture so it can be properly quantitated. Software which incorporates chromatogram overlay tools or other means may also be used to compare chromatograms of unknown mixtures against standards. The overlay tool is especially useful in determining if weathering of the Aroclor has occurred.

1.4 AROCLOR MIXTURES

Aroclors are multi-component mixtures. When samples contain more than one Aroclor, a higher level of analytical expertise is required to attain acceptable levels of qualitative and quantitative analysis. The same is true of Aroclors that have been subjected to environmental degradation ("weathering") or degradation by treatment technologies. Such weathered multi-component mixtures may have significant differences in peak patterns compared to those of Aroclor standards.

2.0 SUMMARY OF METHOD

2.1 EXTRACTION

Approximately 10 grams of soil (wet weight) is weighed in a tared sample boat on a 2-place, top-loading balance for extraction and analysis. The sample weight is recorded on a spreadsheet. Approximately 10 grams of the same sample is weighed in a tared aluminum drying pan for percent moisture determination. The extraction sample is allowed to air dry before being placed in a VOA vial. Once dried, the sample is transferred to a 40 milliliter (mL) volatile organic analysis (VOA) vial then 1 mL of 2 milligrams per liter (mg/L) of surrogate is added to the sample using a gas-tight syringe. Twenty mL of a 1:1 hexane acetone mixture is then added to the VOA vial and sealed with a Teflon® cap. The contents of the vial are agitated for 1 minute using a vortex mixer or vigorous shaking by hand. Four mL of deionized water is added to the vial to facilitate the separation of hexane from acetone in the vial. The vial contents are briefly vortexed or hand mixed and allowed to settle. Separation and settling may be assisted by placing the vial in a centrifuge and spinning the vial(s) for 30 seconds. The hexane and all analytes of interest are contained in the top-floating layer in the vial. If the sample extract shows signs of petroleum contamination, sulfuric acid cleanup may be performed to remove interferents. Approximately 3 mL of the hexane layer is transferred to two 2mL crimp top vials. The sample extract is now ready for analysis.

2.2 ALTERNATE EXTRACTION METHODS

Solid samples may be extracted with hexane-acetone (1:1) using Method 3545A (2007a) (pressurized fluid extraction) or Method 3550C (2007b) (ultrasonic extraction), or other appropriate technique or solvents. Extraction methods are presented in Section 10.1.

2.3 EXTRACT CLEANUP

Extracts for PCB analysis may be subjected to a sulfuric acid cleanup (Method 3665) designed specifically for these analytes. This cleanup technique will remove (destroy) many single component organochlorine or organophosphorus pesticides, as well as petroleum. Therefore, this method is not applicable to the analysis of organochlorinated compounds, such as pesticides.

2.4 SAMPLE INJECTION

After cleanup, the extract is analyzed by injecting a 2-microliter (µL) aliquot into a gas chromatograph (GC), equipped with a wide-bore fused-silica capillary column and an electron capture detector (ECD).

2.5 SAMPLE QUANTITATION

Sample quantitation involves two distinct steps. First the Aroclor chromatographic pattern has to be qualitatively identified against a known standard (fingerprinting). Second, the five major quantitative peaks must be integrated using consistent integration technique in order to properly quantitate the concentration of Aroclor in the extract. Each peak is quantified separately, and the determined concentrations of each of the 5 peaks are added to determine to total PCB concentration in the extract. The soil concentration is calculated using the soil dry weight, final volume of the extract (hexane layer), and any dilutions performed on the final extract. Sample results are reported in milligrams per kilogram (mg/kg) on a dry weight basis.

3.0 DEFINITIONS

The following sections provide definitions that may be relevant to this procedure, but may not include all terms used in this method.

3.1 POLYCHLORINATED BIPHENYLS (PCBS)

PCBs are a class of chlorinated organic compounds with 1 to 10 chlorine atoms attached to the biphenyl rings. There are 209 possible compounds (congeners) of PCBs. Each congener contains varying levels of chlorine ions attached to the carbon atoms of 2 conjoined phenyl rings. The manufacturing of the PCBs produced 7 main classes of PCBs, known as Aroclors. The 7 main classes of Aroclors are listed in Table 1 in Section 1.1.

3.2 INTEGRATION

Integration is the determination of the area of a peak or peaks in a chromatogram. Integration determines the base or bottom of the peak, and it separates the integrated peak from other peaks. Software generally performs the integration automatically; however, the analyst may be required to manually integrate the peak. The peak integration must be consistent with the integration performed on the initial and continuing calibration standards. Proper integration is required for accurate quantitation.

3.2.1 Quantitation

Quantitation is the determination of standard and sample concentrations based on the instrument response to known standard concentrations. Quantitation is based on the ratio of response (area) to concentration, and the ratio is known as the calibration or response factor.

3.2.2 Extraction

Extraction is the transfer of analytes from the matrix (soil) into solvent (extract) for the determination of analyte concentrations in the matrix.

3.2.3 Elution

Elution is the transmittal of separated analytes from the GC column to the detector.

3.2.4 Combined Calibration Standard

A stock standard mixture of Aroclor 1016 and Aroclor 1260 is diluted in hexane to produce the initial and continuing calibration standards. Multiple concentration standards are used for the initial calibration and the standard concentrations vary from the practical quantitation limit (PQL) of 0.1 to 10 mg/L, which is the upper dynamic range of the initial calibration. A 1.0 mg/L standard is used as the continuing calibration standard.

3.2.5 Continuing Calibration Standard (CCS)

A mid-range working standard diluted from the Stock Standard Solution, used to verify that the analytical system is responding in a manner comparable to that at the time of initial calibration. The continuing calibration standard is analyzed at the beginning of an analytical sequence, and at minimum, after every 20 samples to ensure that reported sample concentrations are accurate as determined by the initial calibration.

3.2.6 Calibration Verification Standard (CVS)

The CVS is a quality control (QC) standard, prepared as outlined in Section 8.6 of this method, but with an Aroclor mixture from a source other than that used to prepare the Initial Calibration, i.e., a second source from a different vendor. It is used by the laboratory to verify the accuracy of calibration and standards. Acceptance criteria are +/- 20% of the initial calibration response factor.

3.2.7 Surrogate Mixture

Tetrachlorometaxylene (TCMX) and decachlorobiphenyl are used as the surrogates for this method. The surrogate mixture contains equal concentrations of the surrogates, and it is spiked into all extracted samples before the extraction begins. The surrogate mixture is also included in the initial calibration standard as varying concentrations. Decachlorobiphenyl is the primary surrogate used to evaluate the extraction efficiency. Tetrachlorometaxylene is the secondary surrogate standard and may be used to evaluate the extraction efficiency when decachlorobiphenyl is subject to interference, as described in Section 4.2.

3.2.8 Standard Soil

Baked Ottawa sand is used in QC samples (method blank and laboratory-fortified blanks) to represent the soil matrix. Quality control samples are extracted and analyzed using the same procedures as field samples.

3.2.9 Method Blank

Method blank, also known as a preparation blank, demonstrates that the apparatus and reagents used to verify that the handling, extraction, and analysis of field samples are valid, and that the reported concentrations in field samples were not biased due to contamination introduced in the extraction and analysis process.

3.2.10 Instrument Blank

Instrument blank demonstrates that the instrument is free from contamination. The instrument blank is not extracted and consists of hexane.

3.2.11 Solvent Blank

A solvent blank demonstrates that the solvent (in this case hexane) used in the method is free from contamination. It may also serve as an instrument blank.

3.2.12 Laboratory-Fortified Blank (LFB)

A method blank sample consisting of Ottawa sand is spiked with a known quantity of prepared standard that is the same as that used to make the Initial and Continuing Calibration Standards (see Section 3.2.4 and 3.2.5 of this method). Two LFBs are extracted with every extraction batch. The spike recoveries are used to evaluate method control for accuracy and precision (see Table 1 in Section 1.1 of this method). The LFB is synonymous with a laboratory control sample (LCS).

3.2.13 Method Detection Limit (MDL)

The MDL is the minimal concentration of a compound that can be measured and reported with 99% confidence that the value is greater than zero, determined from analysis of a sample in a given matrix containing the analyte(s). (See, Appendix B, for the method of determining MDL). The method detection limit is determined prior to the analysis of any field samples.

3.2.14 Practical Quantitation Limit (PQL)

The PQL is defined as the concentration in the sample extract that can be accurately determined, and has a reproducible result. The PQL is generally between 2 and 5 times the MDL.

3.2.15 Extraction Batch

An extraction batch is a set of field and QC samples extracted using the same consistent procedure throughout the batch. A sample batch consists of an extraction blank, two LFBs, and up to 20 field samples extracted in less than a 24 hour period.

4.0 INTERFERENCES

4.1 SOLVENTS, REAGENTS, GLASSWARE

Solvents, reagents, glassware, and other sample-processing hardware may yield artifacts and/or interferences to sample analysis. All of these materials must be demonstrated to be free from interferences under the conditions of the analysis by analyzing method blanks. Specific selection of reagents and solvents may be necessary. Refer to each method to be used for specific guidance on QC procedures, and to Section 6.4.1 for general guidance on the cleaning of glassware.

4.2 DECACHLOROBIPHENYL

Decachlorobiphenyl is used as a surrogate, but it may also be present as an analyte of interest when the PCB analyte is Aroclor 1268. Aroclor 1268 is not a major class of PCBs, and it was rarely used in practice. In this instance, dechlorobiphenyl is a target analyte, but the chromatographic result should not be used to determine surrogate recovery nor for quantitation of the Aroclor. Instead, TCMX should be used to measure recovery efficiency as a surrogate, and another major chromatographic peak should be used to quantitate the Aroclor against known calibration standards.

4.3 INTERFERENCES FROM PHTHALATES

Interferences by phthalate esters introduced during sample preparation can pose a major problem in PCB determinations. Interferences from phthalate esters can best be minimized by avoiding contact with any plastic materials and checking all solvents and reagents for phthalate contamination.

Common flexible plastics contain varying amounts of phthalate esters, which are easily extracted or leached from such materials during laboratory operations.

Exhaustive cleanup of solvents, reagents, and glassware may be required to eliminate background phthalate ester contamination.

These materials can be removed prior to analysis using EPA Method 3665 (sulfuric acid cleanup).

Cross-contamination of clean glassware can routinely occur when plastics are handled during extraction steps, especially when solvent-wetted surfaces are handled. Glassware must be scrupulously cleaned.

4.4 SULFUR (S_8)

Sulfur (S_8) is readily extracted from soil samples and may cause chromatographic interferences in the determination of PCBs. Sulfur contamination should be expected with sediment samples. Sulfur can be removed through the use of EPA Method 3665.

4.5 PETROLEUM

Petroleum may be extracted from samples as a non-target analyte. Petroleum interferes with the quantitation of PCBs when it co-elutes with the PCBs. Petroleum can be removed from samples following a sulfuric acid cleanup (EPA Method 3665) of the extract.

4.6 OTHER INTERFERENCES

Interferences extracted from the samples will vary considerably from matrix to matrix and sample to sample. While general cleanup techniques are referenced or provided as part of this method, unique samples may require additional cleanup approaches to achieve desired degrees of discrimination and quantitation. Sources of interference in this method can be grouped into three broad categories, as follows:

- Contaminated solvents, reagents, or sample processing hardware.
- Contaminated GC carrier gas, parts, column surfaces, or detector surfaces.
- Compounds extracted from the sample matrix to which the detector will respond, such as single-component chlorinated pesticides, including the DDT analogs (DDT, DDE, and DDD) may cause interference of some of the Aroclor peaks.

5.0 SAFETY

This method does not address all safety issues associated with its use. The laboratory is responsible for maintaining a safe work environment, and a current awareness file of OSHA regulations regarding the safe handling of the chemicals listed in this method. A reference file of Material Safety Data Sheets (MSDSs) will be maintained and will be available to all personnel involved in these analyses.

5.1 SAFETY REQUIREMENTS

5.1.1 Personal Protective Equipment (PPE)

Eye protection that satisfies ANSI Z87.1 specifications (splash-proof and shatter-proof eye protection), laboratory coat, and nitrile gloves must be worn while handling samples, standards, solvents, and reagents. Disposable gloves that have been removed are discarded as nonhazardous waste. Non-disposable gloves must be cleaned immediately.

5.1.2 High Temperature Surfaces

The GC contains zones that have elevated temperatures. The analyst needs to be aware of the locations in those zones, and must cool them to room temperature prior to working on them. Solid reagents, such as silica gel, Ottawa Sand, and diatomaceous earth, are baked in a muffle furnace at high temperatures (450°C). Care must be taken when placing solid reagents in the muffle furnace and removing them after heating. It is required that commercial-grade oven mitts and tongs are used for the muffle furnace. The soil-drying oven is used to remove water from soil samples in order to determine the percent moisture in samples. Oven mitts must be used when placing or removing samples from the oven.

5.1.3 Electrical Hazards

There are areas of high voltage in the GC. Depending on the work to be performed, either turn off the power to the instrument, or unplug the GC from the power source. It should be noted that the back of the GC has capacitors that store energy even if the GC is unplugged. Avoid contacting the capacitor. If working in the capacitor area, it is required that the analyst wears a grounding strap.

5.1.4 Radiation

The ECD contains radioactive nickel (^{63}Ni) that requires leak testing every six months. The detector can be maintained without risk to the operator as long as the source is left in its sealed vessel. Do not open up the source, it is in violation of licensing agreements with Agilent Technologies and the Nuclear Regulatory Commission. If a source leak is suspected, do not use the detector. Perform a wipe test to evaluate the potential leak and contact Agilent immediately for further instructions. A leaking source cannot be transported by air, unless it is in a container made specifically for shipping radioactive items. Proper documentation and manifesting is required. A non-leaking detector can be flown on aircraft as hazardous material in excepted quantities. The contained radiation of a single detector is 15 millicuries.

5.1.5 Solvent Handling

Solvents used for sample extraction may be flammable and/or hazardous. Personnel must minimize their exposure to solvent fumes and avoid contact with skin or clothing. Refer to each MSDS to properly identify hazards associated with each type of solvent. Eye protection is required when handling solvents. Solvents must be handled under a fume hood whenever they are transferred. Residual solvent may remain in soil after extraction, and the soil must be stored under a fume hood or in a proper container after extraction. Signs of solvent exposure include dizziness, coughing, lightheadedness, and headaches. Over exposure to hexane may cause irritation to the skin and eyes. Hexane and acetone are flammable and must be handled with care under a fume hood. Sulfuric acid is a corrosive material, and will produce chemical burns when exposed to the skin. Sulfuric acid must be handled under a fume hood. Sulfuric acid vapors are an irritant and may cause problems with the respiratory tract and mucous membranes. Organic vapor monitors (PIDs) and/or chemical badges may be worn to ensure exposure levels are minimized.

5.1.6 Target Analytes

Some target analytes have been tentatively classified as known or suspected human or mammalian carcinogens. Standard materials and stock standard solutions of these compounds and field samples should be handled with suitable protection to the skin, eyes, etc.

6.0 EQUIPMENT AND SUPPLIES

Glassware, reagents, supplies, equipment, and settings other than those listed in this procedure may be employed provided that method performance is appropriate and not impacted by the use of items not listed in this method.

6.1 GAS CHROMATOGRAPH

An analytical system complete with GC suitable for split-splitless injection and all necessary accessories, including auto-injectors, syringes, analytical columns, gases, ECDs, and a data system.

6.2 GC COLUMNS

The single-column approach will be utilized and involves a single analysis to determine if PCBs are present. The chromatographic pattern will confirm the identity of the compound. The single-column approach may employ narrow-bore (0.25 or 0.32-mm ID) or wide-bore (0.53-mm ID) columns. The GC may employ dual columns mounted in a single GC, but with each column connected to a separate injector and a separate detector.

The columns listed in this section may be used at the discretion of the analyst performing the method. The listing of these columns in this method is not intended to exclude the use of other columns that are available.

- 30-m DB-5 30-m x 0.53-mm ID fused-silica capillary column chemically bonded with SE-54 (DB-5, SPB-5, RTx-5, or equivalent), 1.0-µm film thickness.
- 30-m DB-608 30-m x 0.53-mm ID fused-silica capillary column chemically bonded with 35 percent phenyl methylpolysiloxane (DB-608, SPB-608, RTx-35, or equivalent), 0.5-µm or 0.83-µm film thickness.
- 30-m DB-1701 30-m x 0.53-mm ID fused-silica capillary column chemically bonded with 14% cyanopropylmethylpolysiloxane (DB-1701, or equivalent), 1.0-µm film thickness.

6.3 ANALYTICAL BALANCES

- An analytical balance capable of weighing to 0.0001 gram balance is used for the preparation of standards.
- A 2-place, top-loading balance capable of weighing to 0.01 gram is used for the determination of sample weights for extraction and percent moisture determinations.

- Calibration weights will accompany the balances, and the balance calibration and accuracy are checked daily prior to sample or standard weighing.

6.4 GLASSWARE

- 4-oz amber glass wide-mouth jars with Teflon-lined screw caps
- 40-mL VOA vials with Teflon-lined screw caps are used as extraction vessels
- Two mL glass vials with Teflon-lined crimp caps (autosampler vials)
- Transfer pipettes
- Graded pipettes are pipettes with volumes etched on the glass of such quality to accurately measure the volume contained in the pipette
- Glass Beakers: 250-mL
- Glass funnels
- 10-mL, 25-mL, and 50-mL volumetric glass used for the preparation of standards.

6.4.1 Glassware Cleaning

Clean all glassware as soon as possible after use by rinsing with the last solvent used. This should be followed by detergent washing (Alconox®) with hot water, and rinsed with tap water and/or organic-free reagent water. Glassware should be covered with aluminum foil and stored in a clean environment between uses.

6.5 EXTRACTION EQUIPMENT

- Vortex Shaker
- Heat Systems Model W400 Ultrasonic Extractor with ½” horn or Misonix XL 2020 with dual horn.
- Thermo CL2 centrifuge or a Whirlybird® hand-crank centrifuge.

6.6 OTHER EQUIPMENT

- GOW-MAC® Model 21-250 helium leak detector. The leak detector is used to verify system integrity by checking all fittings and orifices for leaks that could affect system performance.
- Glass wool

7.0 REAGENTS AND STANDARDS

Reagent-grade or pesticide-grade chemicals are used in all preparations and extractions. Other grades may be used, provided the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination. Reagents should be stored in glass to prevent the leaching of contaminants from plastic containers.

NIST-certified standards will be used for the identification and quantitation of target analytes.

7.1 SOLVENTS

Solvents used in the extraction and cleanup procedures include *n*-hexane, acetone, sulfuric acid, and water. All solvents must be exchanged to *n*-hexane prior to analysis. All solvents are pesticide grade in quality or equivalent, and each lot of solvent must be determined to be free of phthalates. A manufacturer's certificate of analysis is sufficient determination, unless factors or interferences indicate otherwise.

Hexane is used for the preparation of all standards, surrogates and spiking solutions. All solvent lots must be reagent- or pesticide-grade in quality, or equivalent, and should be determined to be free of phthalates.

7.2 ORGANIC-FREE REAGENT WATER

All references to water in this method refer to organic-free reagent water

7.3 STANDARD SOLUTIONS

The following sections describe the preparation of stock, intermediate, and working standards for the compounds of interest. This discussion is provided as an example, and other approaches and concentrations of the target compounds may be used, as appropriate for the intended application. See EPA Method SW8000B for additional information on the preparation of calibration standards.

7.4 STOCK STANDARD SOLUTIONS

Stock standard solutions (1,000 µg/mL) of certified PCB standards in acetone are purchased from vendors such as Restek or AccuStandard. Certificates of analysis are maintained and stored on site in order to ensure the accuracy of prepared standards. Lot numbers and each standard preparation are recorded in the Standards Log Book.

NOTE: Standard solutions (stock, composite, calibration, and surrogate) are stored at less than 6°C in Teflon-sealed glass containers in the dark once they are removed from flame-sealed vials. When a lot of standards are prepared, aliquots of that lot are stored in individual small vials. All stock and working standard solutions must be replaced after six months, or sooner if routine QC checks indicate a problem.

7.5 CALIBRATION STANDARDS FOR AROCLORS

7.5.1 Initial Calibration Standard Mixtures

A standard containing a mixture of Aroclor 1016 and Aroclor 1260 will include many of the peaks represented in the other five Aroclor mixtures. As a result, a multi-point initial calibration employing a mixture of Aroclors 1016 and 1260 are used to demonstrate the linearity of the detector response without the necessity of performing multi-point initial calibrations for each of the seven Aroclors. In addition, such a mixture can be used as a standard to demonstrate that a sample does not contain peaks that represent any one of the Aroclors. This standard can also be used to determine the concentrations of either Aroclor 1016 or Aroclor 1260, should they be present in a sample. If other Aroclors are identified, a five-point calibration with passing ICV is required.

A minimum of five calibration standards containing equal concentrations of both Aroclor 1016 and Aroclor 1260 are prepared by diluting a stock standard with hexane. The concentrations should correspond to the expected range of concentrations found in real samples, and must be within the linear range of the detector. Initial calibration standards are prepared in volumetric glassware at concentrations of 0.1, 0.5, 1.0, 10 and 20 mg/L from a 1000 mg/L stock standard solution. Other concentrations may be used as long as they demonstrate response and linearity consistent with other standards, and are within the linear dynamic range of the detector.

7.5.2 Single PCB Standards

Single standards of each of the other five Aroclors listed in Table 1 are required to aid the analyst in pattern recognition. Assuming that the Aroclor 1016/1260 standards described in Section 7.5.1 have been used to demonstrate the linearity of the detector, these single standards of the remaining five Aroclors listed in Table 1 also may be used to determine the calibration factor for each Aroclor when a linear calibration model is chosen. A standard for each of the other Aroclors is prepared at a concentration of 1.0 mg/L. The concentrations should generally correspond to the mid-point of the linear range of the detector, but lower concentrations may be employed at the discretion of the analyst based on project requirements.

7.5.3 Surrogate Standards

The extraction efficiency of the method is monitored using surrogates. Surrogate standards (TCMX and decachlorobiphenyl) are added to all samples, method blanks, laboratory-fortified blanks, and calibration standards.

7.5.4 Other Standards

Other standards (e.g., other Aroclors) and other calibration approaches (e.g., non-linear calibration for individual Aroclors) may be employed to meet project needs. When the nature of the PCB contamination is already known, standards of those particular Aroclors will be used to prepare initial and continuing calibration standards.

(Intentionally blank)

8.0 QUALITY CONTROL

The QC acceptance criteria for various aspects of this method are described in this section. Quality control limits are outlined in Table 2 and described in detail in the following sections.

Table 2 Quality Control Criteria

QC Item	Frequency	Acceptance Criteria	Corrective Action(s)
Initial Calibration	Before analysis of samples	<20% RPD or a linear regression correlation coefficient (r^2) value greater than 0.995	Check standard integrity and perform additional initial calibrations as necessary.
Continuing Calibration	Before introduction of samples, after every 20 samples, and at the end of an analytical batch	<20% RPD of the known standard concentration	Inject another standard, clean the injector port. Perform initial calibration.
Instrument Blank	Before introduction of samples, after every 20 samples, and at the end of an analytical batch	Reported concentrations less than ½ the practical quantitation limit	Repeat blank injection, clean injection port, and replace septa and liner.
Extraction Blank	One extraction blank is extracted and analyzed with each extraction batch.	Reported concentrations less than ½ the practical quantitation limit	Repeat blank injection, clean injection port, and replace septa and liner. If the blank concentration is less than 10 times the lowest concentration of any field samples, data must be qualified (flagged) or the entire sample batch must be re-extracted.
Laboratory-Fortified Blank (LFB)	Two LFBs are extracted and analyzed with each extraction batch.	Control limits are 60 to 130% of known spiked concentrations. The RPD between 2 LFBs from the same extraction batch must not exceed20%.	Repeat injection, if re-injection fails to meet acceptance criteria, all samples in the extraction batch must be re-extracted.

Table 2 Quality Control Criteria (continued)

QC Item	Frequency	Acceptance Criteria	Corrective Action(s)
Surrogates	Surrogates are included in all continuing calibration standards, method blanks, LFBs and field samples.	continuing calibration standard acceptance criteria are +/- 20% RPD of the known concentration. Method blanks and LFB acceptance criteria are 40-140% for TCMX and 60-130% for DCB.	Determine the cause of the failure. Failure to meet recovery criteria in method blanks and LFBs indicate that extraction or analysis problems exist. Failure of surrogate recoveries in field samples may indicate matrix interference if recoveries are acceptable in extraction blanks and LFBs.

Notes:

CCS = continuing calibration standard
QC = quality control
RPD = relative percent difference
RSD = relative standard deviation

8.1 Sample Collection

The collection of analytical field samples is described in the Sample Analysis Plan, which is a separate document. The Sample Analysis Plan translates project objectives and specifications into procedures used in the collection of samples. Samples must be collected using clean sampling equipment, and new clean nitrile gloves must be worn. Sample gloves should be changed prior to the beginning of any collection activities and between samples.

8.2 Initial Calibration

The initial calibration is performed by analyzing standards at known variable concentrations over the expected concentration range of samples, or within the linear dynamic range of the detector. The area (response) of quantitative peaks is determined, and then the area is divided by the known concentration to develop individual response factors. The response factors may be incorporated into a calibration function, such as an average response factor or a linear regression. An average response factor incorporates the individual response factors into an average of the response factors. The average response must have a relative standard deviation (RSD) of less than 20% to be acceptable. A linear regression calibration curve uses the least squares method to produce a straight line that does not pass through the origin, when the regression calibration technique is used. The linear regression must have a correlation coefficient (r^2) greater than 0.995 to be acceptable. The software (Agilent ChemStation and

Enviroquant) performs the calculations necessary to determine the average RSD and correlation coefficient (r^2).

8.3 CONTINUING CALIBRATION

A continuing calibration standard is analyzed as a calibration check, after each group of 20 samples in the analysis sequence. Thus, injections of method blank and LFB extracts and other non-standards are counted in the total. Solvent blanks, injected as a check on cross-contamination, are also not counted in the total. The response factors for the continuing calibration must be within ±20 percent of the initial calibration to meet acceptance criteria. When the continuing calibration is outside of acceptance criteria, the laboratory will stop analyses and take corrective action.

8.4 LABORATORY FORTIFIED BLANK (LFB)

The LFB concentration of PCBs as Aroclor 1260 is spiked at sufficient volume to have the concentration at 1.0 mg/L in the blank sample. Other concentrations may be used, as appropriate for the intended application. The LFB is also known as the LCS. Two LFBs are extracted with each extraction batch.

8.5 METHOD BLANK

Initially, before processing any samples, the analyst should demonstrate that all parts of the equipment in contact with the sample and reagents are interference-free. This is accomplished through the analysis of a method blank. As a continuing check, each time samples are extracted, cleaned up, and analyzed, and when there is a change in reagents, a method blank is prepared and analyzed for the compounds of interest as a safeguard against chronic laboratory contamination. If a peak is observed within the RTW of any analyte that would prevent the determination of that analyte, identify the source and eliminate it, before processing the samples, if possible. The blanks should be carried through all stages of sample preparation and analysis. When new reagents or chemicals are received, the laboratory must monitor the preparation and/or analysis blanks associated with samples for any signs of contamination. A single method blank is extracted with each extraction batch.

8.6 SAMPLE QUALITY CONTROL FOR PREPARATION AND ANALYSIS

The laboratory must also have procedures for documenting the effect of the matrix on method performance (precision, accuracy, method sensitivity). This includes the analysis of QC samples, including a method blank and LFBs in each analytical batch and the addition of surrogates to each field sample QC sample when surrogates are used. Any method blanks, matrix spike samples, or replicate samples, should be subjected to the same analytical procedures (Section 11.0) as those used on actual samples.

8.7 SURROGATE RECOVERIES

The laboratory will evaluate surrogate recovery data from individual samples versus the surrogate control limits listed in Table 2.

8.8 INITIAL DEMONSTRATION OF PROFICIENCY (PERFORMANCE EVALUATION [PE] SAMPLE)

Each analyst must demonstrate initial proficiency with each sample preparation and determinative method combination it utilizes, by generating data of acceptable accuracy and precision for target analytes in a clean matrix. The laboratory must also repeat the demonstration of proficiency whenever new staff members are trained, or significant changes in instrumentation are made. PE samples are provided by manufacturers at concentrations unknown to the laboratory or analyst. Once the PE sample concentration is determined, the results are sent back to the manufacturer for confirmation. If the confirmation is within the manufacturer’s criteria, a certificate of performance is issued by the manufacturer. If the confirmation result is outside of acceptance criteria, the cause(s) must be corrected before a new PE sample is requested. The analysis and determination of each PE sample, whether in or out of acceptance criteria, must be documented and maintained by the laboratory.

9.0 METHOD PROCEDURES

The following procedures have been demonstrated to be applicable for soil screening by the Office of Environmental Measurement and Evaluation (EPA Region 1). The method is also described in *Standard Operating Procedures for PCB Field Testing For Soil and Sediment Samples* (EPA, 2002).

9.1 SAMPLE EXTRACTION

Soil Samples are extracted by weighing approximately 10 grams (wet weight) of sample in a weigh boat. The sample is allowed to air dry for up to 12 hours to evaporate excess soil moisture.. The weighed sample is transferred to a 40-mL VOA vial, then surrogates are introduced to the sample. Twenty (20) mL of 1:1 hexane-acetone solvent is added to the sample and agitated with a vortex mixer for 90 seconds. 4 mL of organic-free water is added to separate the hexane from the acetone and the sample is again agitated on the vortex shaker for 30 seconds. The extraction vial is then centrifuged for 30 seconds or more to facilitate the separation of the hexane from the soil and acetone-water layer. The hexane layer is the top layer, and it is removed and transferred with a disposable Pasteur pipette to two 2 mL autosampler vials for analysis.

EPA Method 3550B, ultrasonic extraction, may be used to handle large sample loads, difficult matrices, or, in the event of mechanical breakdown, poor recoveries. A sample batch will only be extracted using one method.

The use of hexane-acetone solvents generally reduces the amount of interferences, and improves signal-to-noise ratio.

9.1.1 Extract Cleanup

Cleanup procedures may not be necessary for a relatively clean sample matrix, but most extracts from environmental and waste samples may require additional preparation to remove interferences before analysis. A modified Method 3665A will be used for PCB sample cleanup when sample extracts exhibit likely non-target interference due to the presence of POL or natural organic matter (NOM). The hexane layer is removed from the top of the sample extract after water has been added to facilitate the separation of the hexane and acetone. Target analytes preferentially partition into the hexane layer. The hexane layer is removed and transferred to a clean 40-mL VOA vial using transfer pipettes. Five mL of 1:1 sulfuric-acid-water is then applied to sample extract, mixed on a vortex shaker, and allowed to settle before injection on the GC.

9.1.2 Method Applicability to Other Matrices

The extraction techniques for solids may be applicable to wipe samples and other sample matrices not addressed in Section 10.1. The analysis of oil samples may need special sample preparation procedures that are not described here.

9.1.3 Demonstration of Extraction Method Proficiency and Detection Limits

Reference materials, field-contaminated samples, and spiked samples will be used to verify the applicability of the selected extraction techniques. Samples will be spiked with the compounds of interest and surrogates in order to determine the percent recovery and the limit of detection for each extraction method.

A combination of Aroclor 1016 and Aroclor 1260 will be spiked at concentrations at or below the PQL to determine the detection limit. The PQL has been empirically determined to be 0.1 mg/kg in soil samples.

9.2 GC CONDITIONS

9.2.1 Single-Column Analysis

This capillary GC/ECD method allows the analyst the option of using 0.25-mm or 0.32-mm ID capillary columns (narrow-bore), or 0.53-mm ID capillary columns (wide-bore). Due to the likely presence of non-target interference, 0.53-mm ID columns will be used for this analysis. The GC is configured with dual injectors, dual columns, and dual detectors for simultaneous analysis of two independent samples.

9.2.2 GC Temperature Programs and Flow Rates

Table 3 lists the GC operating conditions for the analysis of PCBs as Aroclors for single-column analysis, using wide-bore capillary columns. The GC conditions in these tables are the GC temperature program and flow rates necessary to separate the analytes of interest.

Once established, the same operating conditions must be used for the analysis of samples and standards. Retention times and calibrations will be verified on a daily basis at the beginning of each analytical sequence and retention times will be verified by monitoring subsequent continuing calibration standards.

Note: Once established, the same operating conditions must be used for both calibrations and sample analyses**.**

Table 3 Instrument Conditions

Parameter	Settings
Injector Port Temperature	240°C
Detector Temperature	325°C
Temperature Program	100°C for 1 minute 10°C/min to 280°C 20°C /min to 300°C
Columns 1 and 2	30 m x 0.53 mm ID, 0.5 µm coating
Injection Volume	2 µL
Carrier Gas	Helium at 10 mL per minute.
Make-up Gas	5% Methane in Argon (P5) at 2.5 mL per minute

Notes:

°C	=	degrees Celsius	ID	=	identification
µL	=	micrograms per liter	mL	=	milliliter
µm	=	micrometers	mm	=	millimeter

9.3 INSTRUMENT CALIBRATION

9.3.1 Initial Calibration

Prepare calibration standards using the procedures in Section 7.5. PCBs will be determined and quantitated as Aroclors using an external standard calibration.

Note: Because of the sensitivity of the electron capture detector, always clean the injection port and column prior to performing the initial calibration.

To establish the calibration factor, estimate the linear range starting at the PQL, which is the lowest concentration that can be accurately quantitated using the established GC analysis conditions. The upper dynamic range of the calibration is dependent on the detector and operating conditions. Upper calibration standards should demonstrate adequate sensitivity as evaluated using the response factor (RF) for each individual standard. The RF is equal to: RF=Peak Area in the Standard/Total Mass of the Standard Injected (in nanograms).

The initial calibration consists of two parts, described below.

9.3.1.1 <u>Establishment of Linear Dynamic Range</u>

As noted in Section 7.5, a standard containing a mixture of Aroclor 1016 and Aroclor 1260 will include many of the peaks represented in the other five Aroclor mixtures. Thus, such a standard may be used to demonstrate the linearity of the detector and to demonstrate that a sample does not contain peaks that represent any one of the Aroclors. This standard can also be used to determine the concentrations of either Aroclor 1016 or Aroclor 1260, should they be present in a sample. Therefore, an initial multi-point calibration is performed using the mixture of Aroclors 1016 and 1260.

9.3.2 Selection of Quantitative Peaks

Sample and standard concentrations will be determined using 5 quantitation peaks for each Aroclor. The peaks must be characteristic of the Aroclor in question. Selected quantitation peaks should be at least 25% of the height of the largest Aroclor peak. The 5 quantitative peaks are selected at the discretion of the analyst, and should demonstrate adequate separation from non-quantitative peaks. When practical, the quantitative peaks should have slopes returning to baseline and not co-elute or shoulder with other peaks. For each Aroclor, the set of quantitation 5 peaks should include at least one peak that is unique to that Aroclor. If the analyst is using the Aroclor 1016/1260 mixture, none of the individual congeners should be found in both of these Aroclors.

Inject 2 µL of each calibration standard and record the peak area and retention time of each characteristic Aroclor peak to be used for quantitation. Whether using automated or manual integration technique, the peak baseline must be integrated in the same manner as the initial and continuing calibration standards, in order to accurately determine analyte quantities in the sample extract. When five peaks are used for determining sample concentrations, each peak will be assigned a concentration at $1/5^{th}$ the total concentration in the standard. The concentration in the sample extract is determined by totaling the concentrations of the five peaks. When field sample peaks do not demonstrate the same characteristics as the standards due to interferences, a peak may be excluded from the quantitation at the discretion of the analyst. The concentration is determined by totaling the concentration of the other four peaks and multiplying the sum by 1.25 in order to normalize the sample concentration. Exclusion of quantitated peaks should only be performed by an experienced analyst after confirmation that the Aroclor has been properly identified, and that no other classes of Aroclors are present in the sample. (See Section 4.0 for description of interferences).

9.3.2.1 Calibration Factors

For a five-point calibration, ten sets of calibration factors will be generated for each standard of the Aroclor 1016/1260 mixture, with each set consisting of the calibration factors for each of the five (or more) peaks chosen for this mixture. For example, there will be at least 50 separate calibration factors in the multi-point calibration.

9.3.2.2 Establishing the Calibration Function

If a linear calibration model is used, the response factors or calibration factors from the initial calibration are used to evaluate the linearity of the initial calibration. This involves the calculation of the mean response or calibration factor, the standard deviation, and the RSD for each Aroclor peak. When the Aroclor 1016/1260 mixture is used to demonstrate the detector response, the linear calibration models must be applied to the other five Aroclors for which only single standards are analyzed. If multi-point calibration is performed for other Aroclors (such as Aroclor 1254), use the same criteria to evaluate calibration factors from those standards to evaluate linearity. An RSD of less than or equal to 20% is considered an acceptable demonstration of linearity.

Refer to EPA Method 8000B for the specifics of the evaluation of the linearity of the calibration and guidance on performing non-linear calibrations. In general, non-linear calibrations will also consider each characteristic Aroclor peak separately.

9.3.2.3 <u>Qualitative Identification of Other Aroclors</u>

Standards of the other five Aroclors are necessary for pattern recognition. When employing the traditional model of a linear calibration, these standards are also used to determine a single-point calibration factor for each Aroclor, assuming that the Aroclor 1016/1260 mixture in Section 7.5.1 has been used to describe the detector response. The standards for these five Aroclors should be analyzed before the analysis of any samples, and may be analyzed before or after the analysis of the five 1016/1260 standards in Section 7.5.2. These Aroclors must be reinjected if the GC operating conditions are modified, or new columns are installed. If new columns are installed with the same characteristics as the one that is replaced, and no other operating conditions have changed, the analyst may use discretion in determining if the 5 Aroclor standards need to be reinjected. Criteria for the determination include similar retention times and chromatographic patterns nearly identical to those previously established for the qualitative determination of the classes of Aroclor standards.

9.3.2.4 <u>Initial Calibration of Other Aroclor Classes</u>

In situations where other Aroclors of interest are present at a site, the analyst may employ a multi-point initial calibration of the Aroclors of interest (e.g., five standards of Aroclor 1254 if this Aroclor is of concern and linear calibration is employed) and not use the 1016/1260 calibration mixture.

9.4 RETENTION TIME WINDOWS

Absolute retention times are generally used for compound identification. When absolute retention times are used, RTWs are crucial to the identification of target compounds, and should be established by one of the approaches described in EPA Method 8000B.

Retention time windows are established to compensate for minor shifts in absolute retention times as a result of sample loadings and normal chromatographic variability. The width of the RTW should be carefully established to minimize the occurrence of both false positive and false negative results. Tight RTWs may result in false negatives and/or may cause unnecessary reanalysis of samples when surrogates or spiked compounds are erroneously not identified. Overly wide RTWs may result in false positive results that cannot be confirmed upon further analysis. Analysts should reference EPA Method 8000B for the details of establishing RTWs. Other approaches to compound identification may be employed, provided that the analyst can demonstrate and document that the approaches are appropriate for the intended application. A sum of the area of all peaks (congeners) in any class of Aroclors in not recommended due to the relative inaccuracy of the integration.

When conducting Aroclor analysis, it is important to determine that common single-component pesticides, such as DDT, DDD, and DDE, do not elute at the same retention times as the target congeners. There may be substantial DDT interference with the last major Aroclor 1254 peak in some soil and sediment samples.

9.5 GAS CHROMATOGRAPHIC ANALYSIS OF SAMPLE EXTRACTS

9.5.1 Operating Conditions for Field Samples

The same GC operating conditions used for the initial calibration must be employed for the analysis of all samples and continuing calibration standards.

9.5.2 Continuing Calibration Verification

Verify calibration at least once each 12-hour shift or every 20 samples, by injecting calibration verification standards prior to conducting any sample analyses. A calibration standard must also be injected at intervals of not less than once every 20 samples and at the end of the analysis sequence. For Aroclor analyses, the calibration verification standard will be a mixture of Aroclor 1016 and Aroclor 1260. The calibration verification process does not *require* analysis of the other Aroclor standards used for pattern recognition unless that Aroclor is present in a field sample.

9.5.2.1 Continuing Calibration Verification Criteria

The calibration factor for each analyte calculated from the CVS should not exceed a difference of more than ±20 percent when compared to the mean calibration factor from the initial calibration curve. If a calibration approach other than the RSD method has been employed for the initial calibration (e.g., a linear model not through the origin, a non-linear calibration model, etc.), consult Method 8000B for the specifics of calibration verification. % Difference = ((known concentration of standard-standard analytical result/ known concentration) * 100. RF × 100

9.5.2.2 Continuing Calibration Verification Failure

If the calibration does not meet the ±20% limit on the basis of each compound, check the instrument operating conditions, and if necessary, restore them to the original settings, and inject another aliquot of the calibration verification standard. If the response for the analyte is still not within ±20%, then a new initial calibration must be prepared. See Section 8.0 for a discussion on the effects of a failing calibration verification standard on sample results.

9.5.3 Qualitative Identification of Aroclors

Qualitative identifications of target analytes are made by examination of the sample chromatograms and comparison of target analytes to known standards injected on the GC under the same analytical conditions.

9.5.4 Quantitative Determination of Aroclor Concentrations

Quantitative results are determined for each identified analyte using the procedures described in Section 9.3 for the external calibration procedure (Method 8000B). If the responses in the sample chromatogram exceed the calibration range of the system, dilute the extract and reanalyze.

9.5.5 Sample Bracketing with Continuing Calibration Standards

Each sample analysis employing external standard calibration must be bracketed with an acceptable initial calibration, calibration verification standard(s) after every 20 field samples, or calibration standards interspersed within the samples. The results from these bracketing standards must meet the calibration verification criteria in Section 9.3. Multi-level standards are used in the initial calibration to ensure that detector response remains stable for all analytes over the calibration range.

When a calibration verification standard fails to meet the QC criteria, all samples that were injected after the last standard that met the QC criteria must be evaluated to prevent misquantitation and possible false negative results, and reinjection of the sample extracts is required. More frequent analyses of standards will minimize the number of sample extracts that would have to be reinjected if the QC limits are violated for the standard analysis. However, if the standard analyzed after a group of samples exhibits a response for an analyte that is above the acceptance limit, i.e., >20% of true value, and the analyte was not detected in the specific samples analyzed during the analytical shift, then the extracts for those samples do not need to be reanalyzed, because the verification standard has demonstrated that the analyte would have been detected if it were present. In contrast, if an analyte above the QC limits was detected in a sample extract, then reinjection is necessary to ensure accurate quantitation. If an analyte was not detected in the sample and the standard response is more than 20% below the initial calibration response, then reinjection is necessary. The purpose of this reinjection is to ensure that the analyte could be detected, if present, despite the change in the detector response, e.g., to protect against a false negative result.

Sample injections may continue for as long as the CVS and other standards interspersed with the samples meet instrument QC requirements. It is *recommended* that standards be analyzed after every 10 samples (*required* after every 20 samples and at the end of a set per EPA Method 8082) to minimize the number of samples that must be re-injected when the standards fail the QC limits. The sequence ends when the set of samples has been injected, after 24 hours of continuous injections, or when qualitative or quantitative QC criteria are exceeded.

9.5.6 Retention Time Stability

Use the calibration standards analyzed during the sequence to evaluate retention time stability. If any of the standards fall outside their daily RTWs, the system is out of control. Determine the cause of the problem and correct it. Likely causes of retention time shifts are loss of system integrity due to a leaking gas system. Check regulator pressures at the cylinders and flow controls on the GC. If they are the same as the conditions used to initially determine the RTWs, replace the injector septa and/or check for leaks in the system with a helium leak detector.

9.5.7 Analytical Interferences

If compound identification or quantitation is precluded due to interferences (e.g., broad, rounded peaks or ill-defined baselines are present), corrective action is warranted. Cleanup of the extract, column trimming, or replacement of the capillary column or detector may be necessary. The analyst may begin by rerunning the sample on another column to determine if the problem results from analytical hardware or the sample matrix. Refer to Section 9.1.1 for sample cleanup procedures.

9.6 QUALITATIVE IDENTIFICATION

The identification of PCBs as Aroclors using this method with an electron capture detector is based on agreement between the retention times of peaks in the sample chromatogram with the RTWs established through the analysis of standards of the target analytes. See Section 9.4 for information on the establishment of retention time windows. Tentative identification of an Aroclor occurs when peaks from a sample extract fall within the established RTWs for a particular Aroclor.

The results of a single column/single injection analysis may be confirmed, if necessary, on a second, dissimilar, GC column. In order to be used for confirmation, RTWs must have been established for the second GC column. In addition, the analyst must demonstrate the sensitivity of the second-column analysis. This demonstration must include the analysis of a standard of the target analyte at a concentration at least as low as the concentration estimated from the primary analysis. That standard may be the individual Aroclor or the Aroclor 1016/1260 mixture.

When samples are analyzed from a source known to contain specific Aroclors, the results from a single-column analysis may be confirmed on the basis of a clearly recognizable Aroclor pattern. This approach should not be attempted for samples that appear to contain mixtures of Aroclors. In order to employ this approach, the analyst must document:

- The peaks that were evaluated when comparing the sample chromatogram and the Aroclor standard.
- The absence of major peaks representing any other Aroclor.
- The source-specific information indicating that Aroclors are anticipated in the sample (e.g., historical data, generator knowledge, etc.).

Note: This information should either be provided to the data user or maintained by the laboratory.

9.6.1 Confirmation

Tentative identification of an analyte occurs when a peak from a sample extract falls within the daily RTW established by injection of a known standard. An experienced analyst must perform the confirmation.

9.7 QUANTITATION OF PCBS AS AROCLORS

The quantitation of PCB residues as Aroclors is accomplished by comparison of the sample chromatogram to that of the most similar Aroclor standard. A choice must be made as to which Aroclor is most similar to that of the residue and whether that standard is truly representative of the PCBs in the sample.

Use the individual Aroclor standards (not the 1016/1260 mixtures) to determine the pattern of peaks on Aroclors 1221, 1232, 1242, 1248, and 1254. The patterns for Aroclors 1016 and 1260 will be evident in the mixed calibration standards.

Once the Aroclor pattern has been identified, compare the response's 5 major peaks in the single-point calibration standard for that Aroclor with the peaks observed in the sample extract. The amount of Aroclor is calculated using the individual calibration factor for each of the 5 characteristic peaks chosen in Section 9.3 and the calibration model (linear or non-linear) established from the multi-point calibration of the 1016/1260 mixture. Non-linear calibration may result in different models for each selected peak, i.e. more than one type of calibration may be used for fitting the differing peaks but only one type of calibration per peak. A concentration is determined using each of the characteristic peaks and the individual calibration factor calculated for that peak in Section 9.2. Then, these 5 concentrations are totaled to determine the concentration of that Aroclor.

Weathering of PCBs in the environment and changes resulting from chemical or natural weathering processes, may alter the PCBs to the point that the pattern of a specific Aroclor is no longer recognizable.

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10.0 GC MAINTENANCE

The analytical system must be inspected and maintained on a daily basis to ensure accurate and determinative identification and quantitation of analytical samples.

10.1 METAL INJECTOR BODY

Turn off the oven, cool the detectors and injectors to room temperature, and remove the analytical columns once the oven has cooled. Remove the glass injection port insert. Inspect the injection port and remove any noticeable foreign material.

Place a beaker beneath the injector port inside the oven. Using a wash bottle, rinse the entire inside of the injector port with acetone and then hexane while catching the rinseate in the beaker.

Deactivated glass injection port liners should be replaced after every 3 days, or as indicated by instrument conditions. Replace the injector liner, reassemble the injector, replace the injector septa, and re-install the columns. Test all fittings with a leak detector to ensure a gas-tight system.

10.2 COLUMN RINSING

Rinse the column with several column volumes of an appropriate solvent. Both polar and nonpolar solvents are recommended. Depending on the nature of the sample residues expected, the first rinse might be water, followed by methanol and acetone. Fill the column with the appropriate solvent and allow it to stand flooded overnight to allow materials within the stationary phase to migrate into the solvent. Afterwards, flush the column with fresh hexane, drain the column, and dry it at room temperature with a stream of ultrapure nitrogen or helium.

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11.0 DATA ANALYSIS AND CALCULATIONS

The determination of sample concentrations is essential to project goals and quality assurance objectives. Whenever possible, spreadsheets with inserted formulas will be utilized to perform routine calculations, including determination of percent solids, sample extract concentrations, and sample concentrations. Sample extract concentrations are determined with Agilent Chemstation/Enviroquant software.

11.1 DETERMINATION OF PERCENT SOLIDS

The determination of the percent solids is performed using a spreadsheet with the following procedures and calculations:

1. Zero the 2 place balance.
2. Weigh the empty aluminum pan and record the weight.
3. Tare the balance with the aluminum pan on the balance.
4. Add approximately 10 grams of sample that is representative of the sample. Be sure to remove any rocks or twigs that may be present. Record the weight.
5. Place the panned sample in the drying oven, which is set at 104°C, for a minimum of 4 hours or until the sample is dry.
6. Remove the dry weight sample and allow to cool to room temperature.
7. Record the weight of the dried sample and pan.
8. Calculate the percent (%) solids.

Note: % Solids= (dry weight + pan weight)-pan weight)/ wet weight)*100

11.2 DETERMINATION OF SAMPLE CONCENTRATIONS

The concentration in the sample extract is calculated with the data system in Enviroquant and is based on the current calibration. The analyst must ensure that the data system is using the current calibration factors to calculate the concentration of analytes in the extract. The calculation for determining the soil sample concentration is performed on an Excel spreadsheet using the following formula.

Soil concentration= (Concentration of the sample extract (µg/L)/1000 µg/g) X (Volume of the sample extract (10mL of hexane)/dry weight of sample (g)) X dilution factor (1 or more). The result will be in µg/g, which equates to mg/kg (ppm).

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12.0 METHOD PERFORMANCE

Performance data and related information are provided in EPA SW-846 Solid Waste Methods only as examples and guidance. The data do not represent required performance goals for users of the methods. Instead, performance criteria should be developed on a project-specific basis, and the laboratory should establish in-house QC performance criteria for the application of this method. These performance data are not intended to be and must not be used as absolute QC acceptance criteria for purposes of laboratory accreditation.

The accuracy and precision obtainable with this method depend on the sample matrix, sample preparation technique, optional cleanup techniques, and calibration procedures used.

12.1 METHOD DETECTION LIMIT STUDY (MDL)

An MDL study is performed for with the same Aroclor mixture using in the ICAL and spiking solutions, but at a lower concentration. At minimum, the MDL spike should be at or below the PQL. The MDL samples go through the same extraction procedure as field and QC samples. Ten samples are extracted in the same batch along with a method blank. Sample concentrations are quantified and the standard deviation is calculated for all of the MDL samples. The standard deviation is then multiplied by the student T value to determine the MDL.

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13.0 POLLUTION PREVENTION

Pollution prevention encompasses any technique that reduces or eliminates the quantity and/or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. The EPA has established a preferred hierarchy of environmental management techniques that places pollution prevention as the management option of first choice. Whenever feasible, laboratory personnel should use pollution prevention techniques to address their waste generation. When wastes cannot be feasibly reduced at the source, the Agency recommends recycling as the next best option.

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14.0 WASTE MANAGEMENT

Laboratory waste management practices will be conducted consistently with all applicable federal, state and local rules and regulations. The laboratory will use best practices to protect the air, water, and land, by minimizing and controlling all releases from hoods and bench operations, complying with all permits and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management, consult the *Waste Management Plan*, located inside the Bristol Work Plan, which is a separate document. Waste streams will be segregated and stored in categories, such as chlorinated and non-chlorinated solvents, acids and solid waste. Used solvents and acids will be stored in labeled bung top drums. Extracted and unextracted soil and solid reagents, such as sodium sulfate or diatomaceous earth, will be incorporated into the contaminated soil waste stream, which will be disposed of at the appropriate permitted treatment storage disposal facility (TSDF).

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15.0 REFERENCES

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WIPE SAMPLING AND DOUBLE WASH/RINSE CLEANUP

AS RECOMMENDED BY

THE ENVIRONMENTAL PROTECTION AGENCY PCB SPILL CLEANUP POLICY

June 23, 1987

Revised and Clarified on April 18, 1991

Written By:

John H. Smith, Ph.D.
Chief, PCB Disposal Section
Chemical Regulation Branch
United States Environmental Protection Agency
Washington, D.C.

APPENDIX E

Spill Prevention, Control, and Countermeasures Plan

ENGINEER'S CERTIFICATION

I hereby certify that I or my agent has personally examined this facility and attest that this Spill Prevention, Control, and Countermeasures (SPCC) Plan has been prepared in accordance with good engineering practices, including consideration of applicable industry standards, and with the requirements of the SPCC Rule (Title 40 Code of Federal Regulations [CFR Part 112]). I further attest that this plan establishes procedures for testing and inspections and that this plan is adequate for this facility.

This certification will expire if there is a change in the facility design, construction, operation, or maintenance that could materially affect the potential for discharge of oil into or upon navigable waters or adjoining shorelines. Recertification of this plan is not required for non-technical changes to the plan, such as changes to names and phone numbers.

Kyle L. Petersen, P.E.
Registration No.: Alaska CE-11250

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REVIEW PAGE

In accordance with Title 40 Code of Federal Regulations Part 112.5(b) (40 CFR 112.5[b]), a review and evaluation of this Spill Prevention, Control, and Countermeasures (SPCC) Plan is conducted at least once every 5 years if the temporary fuel storage area is still in use. As a result of this review and evaluation, Bristol Environmental Remediation Services, LLC (Bristol) will amend the SPCC Plan within 6 months of the review to include more effective prevention and control technology if (1) such technology will significantly reduce the likelihood of a spill event from the facility and (2) such technology has been field-proven at the time of review. Any technical amendment to the SPCC Plan will be certified by a Professional Engineer within 6 months after a change in the facility design, construction, operation, or maintenance occurs that materially affects the facility's potential for the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines. A Certification of the Applicability of the Substantial Harm Criteria Checklist is included as Attachment 1.

Review	Signature

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MANAGEMENT APPROVAL

Bristol Environmental Remediation Services, LLC (Bristol), is committed to the prevention of discharges of oil to navigable waters and the environment and maintains the highest standards for spill prevention, control, and countermeasures through regular review, updating, and implementation of this Spill Prevention, Control, and Countermeasures Plan for the temporary fuel storage area constructed to support Bristol's Hazardous, Toxic, and Radioactive Waste (HTRW) Remedial Actions at Northeast Cape, St. Lawrence Island, Alaska.

Molly Welker
Bristol Project Manager

Signature: Molly W

Date: July 19, 2012

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

°	degree/degrees
′	minute/minutes
ADEC	Alaska Department of Environmental Conservation
Bristol	Bristol Environmental Remediation Services, LLC
CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
HTRW	hazardous, toxic, and radioactive waste
ISO	International Standards Organization
MOC	Main Operations Complex
PPE	personal protective equipment
SPC	spill containment and control
SPCC	Spill Prevention, Control, and Countermeasures
TDC	Transportation and Disposal Coordinator
USACE	US Army Corps of Engineers

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1.0 FACILITY OWNER AND OPERATOR

1.1 FACILITY OWNER ADDRESS AND TELEPHONE

Bristol Environmental Remediation Services, LLC (Bristol)
111 West 16th Avenue, Third Floor
Anchorage, Alaska 99501
Contact: Molly Welker
Business Phone: 907-563-0013
Cell Phone: 907-244-7784
Home Phone: 907-522-1805

1.2 LAND OWNER ADDRESS AND TELEPHONE

Sivuqaq Incorporated – Village Native Corporation
P.O. Box 101
Gambell, Alaska 99742
Phone: 907-985-5826
Fax: 907-985-5426
Email: sivuqaq@gci.net

Kukulget Incorporated – Village Native Corporation
PO Box 150
Savoonga, Alaska 99769
Phone: 907-984-6613

1.3 DESIGNATED PERSON RESPONSIBLE FOR SPILL PREVENTION

Chuck Croley, Bristol Site Superintendent
Bristol Environmental Remediation Services, LLC
111 West 16th Avenue, Third Floor
Anchorage, Alaska 99501
Business Phone: 907-563-0013
Cell Phone: 907-242-7402

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2.0 FACILITY AND EMERGENCY CONTACTS

NAME / AGENCY GOVERNMENT REPORTING	PHONE
National Response Center	1-800-424-8802
Alaska Department of Environmental Conservation (ADEC) Fairbanks Office	907-451-2121
ADEC – After Hours	1-800-478-9300
U.S. Coast Guard	907-581-3466 907-391-2733 (24 Hr)
SPILL RESPONSE ORGANIZATIONS	
Alaska Chadux Corporation	907-348-2365 (24 Hr)
SPILL PREVENTION MANAGER	
Chuck Croley – Bristol Site Superintendent/Spill Prevention Manager	1-206-973-0239 907-242-7402 (Cell)
PROJECT MANAGER	
Molly Welker, Bristol Project Manager	907-563-0013 (Office) 907-244-7784 (Cell) 907-522-1805 (Home)
Carey Cossaboom, USACE Project Manager	907-753-2689 (Office)
EMERGENCY CONTACTS	
Base Camp (Also for Medical Emergencies)	1-206-973-0239
Alaska State Troopers (Anchorage)	907-269-5511
Alaska State Troopers (Nome)	907-443-2441
Norton Sound Health Corporation Medevac	907-443-3311
Providence Hospital (Anchorage)	907-562-2211
Alaska Regional Hospital (Anchorage)	907-264-1222
Alaska Native Medical Center (Anchorage)	907-563-2662
Alaska Native Medical Center (Emergency)	907-729-1729

Notes:
Bristol = Bristol Environmental Remediation Services, LLC
USACE = US Army Corps of Engineers

Reporting requirements will follow ADEC spill reporting guidelines (see Section 8.6). The National Response Center (single-source contact for all federal agencies) should be notified first, followed by the ADEC. In an emergency, or if a spill has entered or threatens to approach water, the U.S. Coast Guard should be notified immediately. The U.S. Environmental Protection Agency (EPA) notification is required for a single spill discharged to navigable water that is greater than 1,000 gallons, or two spills discharged to navigable water within any 12-month period that are greater than 42 gallons each. Alaska Chadux Corporation can be contacted for spill response and cleanup operations.

3.0 FACILITY LOCATION AND SETTING

3.1 Fuel Facility Location

The temporary fuel facility is located on the Northeast Cape on St. Lawrence Island (Figure 1). The site is located at 63 degrees (°) 20 minutes (′) north latitude, by 168° 59′ west longitude, in Township 25 South, Range 54 West, Kateel River Meridian. The temporary fuel storage facilities will be used to support the USACE project for hazardous, toxic, and radioactive waste (HTRW) Remedial Actions. The fuel facility will be used for heavy equipment, personnel support vehicles/equipment, and construction camp generators.

3.2 Site History

Refer to the 2012 Work Plan, Section 2 (Bristol, 2012), for site history and details.

In June 2011, Bristol mobilized eight 5,500-gallon ISO tanks (steel containers within International Standards Organization [ISO] standard frames) containing diesel and two 5,500-gallon ISO tanks containing unleaded gasoline (filled to 4,500 gallons each). The ISO tanks were overwintered at the site at the temporary fuel storage facility.

At the completion of the project, the ISO tanks will be loaded on a flatbed truck with a crane or a forklift, returned to the beach, and loaded aboard the barge for demobilization to Anchorage, Alaska. The completion date of the project is undetermined and will depend on the quantity of contaminated soil that remains.

3.3 Drainage Pathway and Distance to Navigable Waters

The main temporary fuel storage facility is about 8,000 feet southwest of Kitnagak Bay on a gravel pad immediately southeast of the Former Main Operations Complex (MOC) area (Figure 2). The topography slopes gently northeast from the main fuel storage location to Kitnagak Bay. The Suqitughneq River is located approximately 2,000 feet from the temporary facility. A distinct drainage pathway to the Suqitughneq River exists approximately 750 feet northwest of the area of the main temporary fuel storage facility. Figure 3 shows the drainages in the vicinity of the temporary fuel storage facility. The Certification of the Applicability of the Substantial Harm Criteria Checklist is included as Attachment 1.

4.0 FACILITY DESCRIPTION

4.1 FUEL FACILITY LAYOUT

4.1.1 General Description

The layout for the main temporary fuel storage facility is shown in Figure 4. The main temporary fuel storage facility will be constructed on a gravel pad immediately southeast of the former MOC area.

4.1.2 Fuel Storage

The nine 5,500-gallon ISO tanks at the temporary fuel storage facility have a maximum fuel storage capacity of 44,000 gallons (maximum stored capacity will be no greater than 36,000 gallons). The ISO tanks are single-walled, stainless-steel material with a shell thickness of 0.24 inches.

Eight ISO tanks will store diesel fuel, and two will store gasoline. Table 1 identifies the fuel tanks and assigns a tank identification number for the purpose of Spill Prevention Control and Countermeasures (SPCC).

Table 1 Fuel Storage Tanks

Tank ID	Tank Capacity (Gallons)	Contents	Maximum Quantity Stored Per Tank (Gallons)	Maximum Quantity Stored (Gallons)	Tank Description
1 through 8	5,500 (ea)	Diesel No. 2	4,500 (82% Capacity)	36,000 (82% Capacity)	Single-walled, ISO tanks with stainless-steel spill boxes on top fittings
9	5,500 (ea)	Unleaded Gasoline	4,500 (82% Capacity)	9,000 82% Capacity)	Single-walled, ISO tanks with stainless-steel spill boxes on top fittings

Notes:
% = percent
ea = each
ISO = International Standards Organization

4.1.3 Containment

At the main temporary fuel storage facility, the ISO tanks will be placed in a common secondary containment area. This containment area is constructed on a laydown area immediately southeast of the MOC area. Figure 4 shows a cross section and dimensions of the containment berm and ISO tanks.

Granular fill from the borrow pit was transported to the location and spread to level and expand the area. Because the fill is somewhat angular and sharp, a minimum one-fourth inch-thick geotextile was laid over the rock and then covered with Typar® liner, and finally a 20-mil Hypalon™ liner was placed as the impervious containment surface. Berms were created with soil transported from the borrow pit. The Hypalon liner was laid over the berms and secured with sand bags.

The containment berm is approximately 45 feet long by 45 feet wide. The berm height is approximately 2 feet. The maximum expected rain event for 1 day is estimated to be 2.36 inches. Using these dimensions, the 1-day maximum storm precipitation volume was calculated to be 3,000 gallons. The capacity of the containment area using these dimensions and accounting for displacement from the tanks and fueling flat will be approximately 13,000 gallons.

4.1.4 Fuel Delivery to St. Lawrence Island

Each 5,500-gallon ISO tank was originally fueled in Anchorage, Alaska, before the tanks were loaded and mobilized to St. Lawrence Island. At St. Lawrence Island, the ISO tanks were offloaded onto a flatbed truck and transported to the fuel containment area at the MOC. No refueling or transfer of contents between ISO tanks will take place on the island. Refueling may occur by removing the necessary ISO tanks from the containment area and transporting them via landing craft to Nome, Alaska. Following refueling operations in Nome, the ISO tanks will be returned to St. Lawrence Island and replaced in the containment area. ISO tanks will be transported between Cargo Beach and the fuel containment area via flatbed truck.

4.2 OPERATING PROCEDURES

Fuel from the main temporary fuel storage location will be transferred into the 900-gallon-capacity oiler truck. Fuel will be transferred to the oiler truck by a 3-inch pump and hose equipped with dry-break connectors and Camlock fittings. The truck will be parked inside the containment berm on a 20-foot-long by 8-foot-wide flatbed truck. The ISO tanks **will not** be connected to one another using a manifold system. The oiler truck will be used to transport and dispense fuel to the camp generators and to individual pieces of equipment Bristol will operate on the island.

Diesel and unleaded gasoline will be dispensed to equipment storage tanks and to individual vehicles using a conventional 1-inch-diameter hose and fuel nozzle. An electrically powered fuel transfer pump will be placed inside the containment berm. For vehicles, spill pans will be placed beneath the fill port during refueling.

The following procedures will be adhered to during all fueling operations to or from the fuel tanks:

- Parking brakes will be on. The vehicle will be blocked. The engine will be off unless required to operate the fuel transfer pump.
- The delivery hose and all valves and piping will be checked for visible leaks, cracks, or damage.
- Valves will be checked to ensure that they are in the proposer position.
- A drip pan will be placed underneath nozzle connections and under hose connections, if required.
- Fuel levels of the target tank will be checked to determine how much product the fuel tank can hold. The target amount is not to exceed 90 percent of the tank capacity.
- During the transfer, flow will be restricted to a reduced rate until it is certain that the product is flowing correctly. Once the pump is running, the operator must

remain ready for emergency shutdowns until all fluid has been transferred. The transfer rate is again reduced when the 90 percent level is approached. All personnel must be notified when the transfer operation is nearing completion.

- Once fueling is complete, valving will be closed so that fuel can no longer be transferred from the tank. Any fuel remaining in the piping or transfer hose will be collected and returned to the appropriate tank.
- All valves on the truck will then be closed. The hose, valves, and surrounding ground will be checked for leaks.
- If leaks are found, absorbent pads will be used to capture any fuel prior to personnel unblocking the tires and leaving the area.

4.3 Facility Inspection and Maintenance

4.3.1 Facility Inspection

A formal fuel facility inspection is to be performed every week and logged on the form provided as Attachment 2, Fuel Facility Inspection Checklist. All inspections must be signed by the inspector, reviewed and initialed by the designated person, and filed in the SPCC files. These records will be kept for a minimum of 3 years. Staff familiar with fuel facility operations will perform regular walkthroughs of the facility.

If any spills are found during the inspections, ADEC spill identification and notification procedures must be followed (Attachments 3 and 4). Areas of inspection are listed below:

- **General Housekeeping**. It is essential that the facility be kept clean and free of unnecessary items. Only items directly related to the operation of the facility and the storage of fuels should be in the containment areas. Personnel will perform formal monthly and informal regular checks of the facility for cleanliness and make corrections immediately. Any serious problems will be recorded and filed.
- **Safety Equipment.** A check will be made to ensure the availability of all fire extinguishers, safety signs, and other safety equipment. Any discrepancies will be recorded and corrected immediately.
- **Signs.** A check will be made to ensure that all required signs are in place. The following signs are required:
  - Tank signs – tank content indicated on the tanks
  - Hazard placards

  - Tank identification numbers
  - "No Smoking" signs in storage, secondary containment, and fuel dispensing areas
  - ADEC Discharge Notification and Reporting Placard (Attachment 3)
  - Signs warning drivers of tank proximity
- **Security.** A check will be made for any notable security issues. Security concerns will be addressed as soon as possible.
- **Tanks.** A check will be made for chipped or worn paint, drip marks and leaks, discoloration of tanks, corrosion, and cracks. Particular attention will be paid to "weeping" or "wet" staining on the tank near the ground, which may signify internal leaking.
- **Tank Supports and Foundations.** These will be checked to see if the tanks are stable and level to ensure the foundations and supports are not weakening. Particular attention will be focused on cracks and gaps between the tank and foundation.
- **Pumps and Hoses.** Pumps, valves, and connections will be checked for leaks and drips. All spills will be cleaned up immediately, and maintenance will be scheduled as required. All hoses will be inspected for cracks, leaks, or other signs of weakening and replaced as soon as possible. A check will be made to ensure that hoses are kept on hose reels or in a protected manner when not in use.

4.3.2 Spill Response Equipment Inventory and Inspection

All spill response equipment will be inspected weekly and after any event during which any of the equipment is used. This inspection will entail a complete inventory and an operational check of emergency response and support equipment (such as pumps). All deficiencies will be corrected as soon as possible, any new equipment added to the list, and the updated list filed in the SPCC files.

4.4 TRAINING

4.4.1 Initial SPCC Training

Any person who is to operate fuel storage and delivery equipment will receive training when initially hired or when assigned duties that involve fuel handling or storage. Initial training will include operation, maintenance, and SPCC functions. As a minimum, all personnel must read the SPCC Plan and document that they have read and understood it. Training will be documented on the form provided in Attachment 5, Spill Response Team Training, Drill, and Exercise Log. This record will be maintained in the SPCC files for at least 3 years.

4.4.2 Spill and Safety Briefings

Spill and safety briefings will be provided to all new personnel upon employment and regularly to all available personnel who operate and/or maintain fuel and/or equipment. The briefings will include any changes or problems with the equipment or facility, any new procedures, or any other information that could help prevent accidents and spills. The subjects covered at the briefings and attendance will be documented on the form provided in Attachment 6, Record of Attendance for Spill Response and Safety Meetings. In lieu of a meeting, a written briefing may be issued. The form contained in Attachment 6 will be attached to the written briefing. Personnel will be required to sign the form once they have read the briefing and understood what it says. The signed forms will be maintained in the SPCC records.

4.5 Fuel Facility Record Keeping

Records of all activities pertaining to the fuel facility will be maintained on file by Bristol in the SPCC documents for this project for a period of at least 3 years. These records include but are not limited to:

- Copies of inspections
- Operator inspections
- Government inspections
- Maintenance records
- Records of major maintenance and construction
- Pressure testing of tanks

- Visual integrity inspections
- Fuel inventory records
- Training documents
- Training records
- Exercise and safety briefing logs
- Equipment operating procedures
- Training manuals
- Oil spill records
- Notification reports
- After-action reports
- SPCC Plan
- SPCC correspondence

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5.0 SPILL HISTORY

The main temporary fuel storage facility is newly constructed and provides support necessary for Bristol’s 2012 site activities. No spills have occurred at this location from operation of the temporary facility. Personnel will regularly inspect the facility for indications of spilled fuel (including stains, odors, and stressed vegetation).

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6.0 POTENTIAL SPILLS AND CONTROL MEASURES

Table 2 presents potential spill predictions, volumes, and rates for this project.

Table 2 Potential Spill Predictions, Volumes, and Rates

Source	Type of Failure	Tank Volume (Gallons)	Maximum Spill Volume (Gallons)	Direction of Flow	Containment	Ratio (Cont./Vol.)
ISO Tank	Rupture, leakage	5,500	5,000	Into surrounding soil	Secondary containment with impermeable liner	1,200% (main); >110% (auxiliary)
Oiler Truck Loading	Rupture, piping failure, valve failure	900	810	Into surrounding soil	By boom and absorbent pads	100% if boom is placed in time
Transfer Hose/ Pump	Pipe/hose rupture	9	8 (estimated maximum)	Into surrounding soil	By boom and absorbent pads	100% if boom is placed in time

Notes:

%	=	percent	ISO	=	International Standards Organization
Cont.	=	containment	Vol.	=	volume

6.1 TANK FAILURE

A puncture or rupture of tanks is unlikely because of the berm surrounding the tanks. If a valve is broken by violent contact, the complete drainage of any tank is possible. A complete spill from a tank would be contained within the containment berm. Fuel spilled outside the tank, within the containment berm, could be pumped into tanker trucks, or into 55-gallon drums. Recovered fuel would be stored in 55-gallon drums or other containers until they could be disposed of properly.

During mobilization and demobilization efforts, it will be necessary to move the tanks, using heavy equipment, between the barge landing area and the fuel storage containment area. The possibility for a spill exists if the tank is punctured or a valve is broken due to the mishandling of containers. Spills occurring during transportation of the tanks would likely be released to the environment.

Initial recovery could be performed with heavy equipment, shovels, absorbent pads, drums and other containers, and a portable pump, if needed. A spill traveling toward the river would require the placement of a boom to contain the flow. Long-term treatment and storage of contaminated soil would be required.

6.2 Broken Hose Connection

6.2.1 Transfers from Fuel Truck

Generators and vehicles will be filled by the fuel truck hose. The maximum capacity of the truck pump is estimated at approximately 900 gallons. Spill containment (spill buckets) will be provided for hose connections. If a hose connection or the pumping system were to break during fueling operations, the spill would likely be onto the surrounding soil. The spill would likely be noticed immediately, and the operator would most likely stop pump operations within 1 minute. The estimated maximum amount of spilled fuel from such an event would not be more than 200 gallons. Some or the majority of such a spill would likely be cleaned up before it could affect navigable waters. Absorbent pads, pumps, booms, and other means would be used to recover the fuel. Contaminated water, soil, or fuel could be pumped into 55-gallon drums for future disposal.

The chance of a hose break is considered to be low. If a hose is ruptured during fueling operations, the amount of fuel spilled will depend on how quickly the operator shuts off the pump. In most cases, the operator will shut off the pump immediately. An estimated 200 gallons of fuel could be spilled in this scenario. However, the exact location of a hose break cannot be known until the break occurs, so it must be assumed that any spill could travel to the shoreline. Absorbent pads, booms, emergency soil berms, portable fuel pumps, and other manual methods may be required to stop the flow and recover the fuel. Some long-term treatment of the soil would be expected.

6.3 OVERSPILLS

An overspill of the generators or vehicles while fueling is possible if the tanks and/or fuel truck are not carefully monitored during fueling operations. Flow control for the generator tank is achieved through constant monitoring of the tank level. Because none of the tanks have automatic shutoff capabilities, an overspill during fueling is possible, even when fueling is closely monitored. In the event of an overspill, the operator will stop pumping immediately. Absorbent pads, pumps, and oil/water separators would normally be used to recover this fuel. Soil berms, booms, and other means of containment and recovery would be required in the event that fuel overflowed from the primary containment. In this case, immediate spill response would be needed to ensure that fuel did not enter the river.

Fuel levels will be carefully monitored at all times during fuel transfers. Poor monitoring could result in a severe spill. An emphasis should be placed on the need for continual training, awareness, and education.

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7.0 EVALUATION OF COUNTERMEASURES

This section evaluates compliance of the temporary fuel storage tanks with spill prevention regulatory requirements. Paragraph titles reflect specific areas of concern outlined in Title 40, Code of Federal Regulations, Part 112 (40 CFR 112), and other related documents. Each area of concern is rated as SATISFACTORY, NOT APPLICABLE, or UNKNOWN. The rating in this case was derived from observations of prevailing conditions made during previous temporary fuel storage operations. Any limitations are so noted and discussed in the body of this SPCC Plan.

7.1 INSPECTIONS, TESTS, AND RECORDS, 40 CFR 112.7(e)

(SATISFACTORY) Under the requirements of this SPCC Plan, employees inspect the fuel facility regularly during their normal work functions and weekly during the fuel facility inspection. The inspections are logged using the Fuel Facility Inspection Checklist provided as Attachment 2. The completed forms will be signed by the fuel systems manager and kept on file for 3 years.

7.2 PERSONNEL, TRAINING, AND DISCHARGE PREVENTION PROCEDURES, 40 CFR 112.7(f)

7.2.1 Personnel Instructions, 40 CFR 112.7(f)(1)

7.2.1.1 Annual Training

(SATISFACTORY) Because the fuel storage facilities are temporary, new workers involved with fuel handling will attend an initial training session that will meet the requirements of the annual training.

7.2.1.2 Annual Exercises

(SATISFACTORY) Because the fuel storage facilities are temporary, annual exercise requirements will be met by accomplishing an initial “tabletop” spill scenario on site, at the beginning of each project season. All employees who operate fuel facility equipment will attend the tabletop exercise in operations and spill prevention. Training, exercise, and inventory procedures will be established under this SPCC Plan and all associated records maintained in the SPCC Records. A reporting placard is included with this SPCC Plan and should be prominently displayed at the fuel facility. A Spill Response Team Training, Drill, and Exercise Log is provided as Attachment 5.

7.2.1.3 Weekly Spill Response and Safety Meetings

(SATISFACTORY) Each week, employees will be provided a spill response and safety briefing. This briefing will be in a verbal or written format, such as applicable current news articles, and will be tailored to this fuel facility. The briefing will be documented on the Record of Attendance for Spill Response and Safety Meetings attendance record, provided as Attachment 6, and will be maintained in the project file.

7.2.2 Designated Person Accountable for Spill Prevention, 40 CFR 112.7(f)(2)

(SATISFACTORY) The Site Superintendent is Chuck Croley. He is assigned as the Spill Prevention Manager and is the designated person accountable for spill prevention at the fuel facility.

7.2.3 Spill Prevention Briefings, 40 CFR 112.7(f)(3)

(SATISFACTORY) Spill prevention briefings will be given monthly. Sign-in sheets (Attachment 6) will be maintained with the other SPCC records, and kept on file for three years in the SPCC records.

7.3 Site Security, 40 CFR 112.7(g)

7.3.1 Fencing, 40 CFR 112.7(g)(1)

(NOT APPLICABLE) The fuel storage facility is located at a remote site that will be occupied only by contractors and agency representatives. The nearest village, Savoonga, is located approximately 60 miles west of the project site. The remote nature of the site will provide adequate security for the fuel facility.

7.3.2 Flow Valves Locked, 40 CFR 112.7(g)(2)

(SATISFACTORY) When construction operations have been completed, all valves on all ISO tanks will be locked. Individual ISO tank openings will be secured with wire tag seals, unless being used.

7.3.3 Starter Controls Locked, 40 CFR 112.7(g)(3)

(SATISFACTORY) Fuel will be transferred by electric- or gasoline-powered transfer pumps that will be connected and operated only when fuel transfer is taking place.

7.3.4 Loading/Unloading Connections Securely Capped, 40 CFR 112.7(g)(4)

(SATISFACTORY) There are no pipeline loading/unloading connections. Individual ISO tank openings will be secured with wire tag seals, unless being used.

7.3.5 Lighting Adequate to Detect Spills, 40 CFR 112.7(g)(5)

(SATISFACTORY) Fuel transfer and weekly fuel facility inspections will take place during daylight hours only. Daylight will be prevalent given the seasonal operation (summer) and northern latitude of the site.

7.3.6 Facility Loading/Unloading Rack, 40 CFR 112.7(h)

(NOT APPLICABLE) The facility does not have a loading rack.

7.4 Brittle Fracture, 40 CFR 112.7(i)

(NOT APPLICABLE) There are no field-constructed tanks at the facility.

7.5 Drainage Control, 40 CFR 112.8(b)

7.5.1 Drainage from Diked Storage Areas, 40 CFR 112.8(b)(1)

(SATISFACTORY) Water that accumulates in the containment dike of the temporary fuel storage facility will be pumped directly onto the ground if there is no evidence of petroleum sheen. If petroleum sheen is evident, the water will be treated with a water-scrubbing system before being discharged to the ground. Water treatment, if necessary, will employ the use of a water-scrubbing system utilizing absorbent materials for the removal of petroleum hydrocarbons from water.

7.5.2 Valves Used on Diked Storage Areas, 40 CFR 112.8(b)(2)

(NOT APPLICABLE) There are no valves on the diked storage area.

7.5.3 Facility Drainage Systems and Equipment, 40 CFR 112.8 (b)(3), (4), and (5)

(NOT APPLICABLE) There are no drainage systems at the diked containment area. No treatment units or slop tanks for contaminated water treatment will exist at the main temporary fuel storage facility.

7.6 BULK STORAGE CONTAINERS/SECONDARY CONTAINMENT, 40 CFR 112.8(c)

7.6.1 Tank Compatibility with Its Contents, 40 CFR 112.8(c)(1)

(SATISFACTORY) All ISO tanks are constructed of stainless steel, welded in accordance with American Petroleum Institute standards, and are compatible with the contents they hold.

7.6.2 Diked Area Construction and Containment Volume for Storage Tanks, 40 CFR 112.8(c)(2)

(SATISFACTORY) The main temporary fuel storage facility will have bermed and lined secondary containment capable of containing a minimum capacity of the largest tank volume, plus anticipated storm water.

7.6.3 Drainage of Uncontaminated Rainwater, 40 CFR 112.8(c)(3)

(SATISFACTORY) Rainwater that accumulates in the containment dike of the temporary fuel storage facility will be pumped directly onto the ground if there is no evidence of petroleum sheen. If petroleum sheen is evident, the water will be treated before being discharged to the ground.

7.6.4 Corrosion Protection of Buried Metallic Storage Tanks, 40 CFR 112.8(c)(4)

(NOT APPLICABLE) There are no buried metallic storage tanks.

7.6.5 Corrosion Protection of Partially Buried Metallic Tanks, 40 CFR 112.8(c)(5)

(NOT APPLICABLE) There are no partially buried metallic tanks.

7.6.6 Aboveground Tank Periodic Integrity Testing, 40 CFR 112.8(c)(6)

(SATISFACTORY) Because the tanks are shop-built containers with a capacity of 5,500 gallons each, equivalent integrity testing is provided in the form of visual inspections for the storage tanks, and barriers are provided between the tanks and the ground (diked containment area).

7.6.7 Control of Leakage Through Internal Heating Coils, 40 CFR 112.8(c)(7)

(NOT APPLICABLE) None of the tanks at the facility have internal heating coils.

7.6.8 Tank Installation Fail-Safe Engineered, 40 CFR 112.8(c)(8)

(SATISFACTORY) Tanks are located within a diked containment. A complete tank failure is unlikely. Any spills would be contained within the dike.

7.6.9 Disposal Facilities for Effluent Discharge, 40 CFR 112.8(c)(9)

(NOT APPLICABLE) The fuel facility is not equipped with an effluent discharge system.

7.6.10 Visible Leak Corrections, 40 CFR 112.8(c)(10)

(SATISFACTORY) Visible leaks are reported to the Site Superintendent and fixed immediately. Spilled fuel is cleaned up immediately with absorbent pads or other applicable spill response equipment. Soiled pads and other similar spill control equipment would be kept in an overpack drum until they could be removed from the island or burned in an approved manner.

7.6.11 Portable Oil Storage Tanks, 40 CFR 112.8(c)(11)

(SATISFACTORY) All portable tanks at the temporary fuel storage facility will be in secondary containment structures with sufficient freeboard to contain the capacity of the largest tank in the dike and expected maximum rainfall.

7.7 Facility Transfer Operations, 40 CFR 112.8(d)

7.7.1 Buried Piping Installation Protection and Examination, 40 CFR 112.8(d)(1)

(NOT APPLICABLE) No buried piping installations are present.

7.7.2 Not-in-Service and Standby Service Terminal Connections, 40 CFR 112.8(d)(2)

(NOT APPLICABLE) There are no not-in-service or standby service terminal connections at this facility.

7.7.3 Pipe Supports Design, 40 CFR 112.8(d)(3)

(NOT APPLICABLE) The facility does not have a piping system.

7.7.4 Aboveground Valve and Pipeline Examination, 40 CFR 112.8(d)(4)

(SATISFACTORY) Aboveground valves will be examined during the weekly inspections. These inspections will be documented using the Fuel Facility Inspection Checklist (Attachment 2) and will be kept in the Site Superintendent’s spill response files for at least 3 years. Bristol personnel will also observe valves periodically during each workday and will be instructed to report any problems to the Site Superintendent. There are no aboveground pipelines.

7.7.5 Protection from Vehicles, 40 CFR 112.8(d)(5)

(SATISFACTORY) The ISO tanks will be kept inside a bermed containment area, with a distance of 11 feet between the outside berm and the tanks. Speed limits in the vicinity of the ISO tanks will be 10 miles per hour and will be discussed at safety meetings and posted.

7.8 Spill Control Equipment

(SATISFACTORY) Sufficient spill equipment is available to contain a catastrophic spill of one of the 5,500-gallon ISO tanks inside the lined and bermed facilities. Sufficient spill equipment is also available to contain a spill associated with fuel transfer from the main temporary fuel storage facility to the oiler truck. Table 3 presents spill control equipment at Bristol's project site.

Table 3 Spill Control Equipment

Quantity	Material	Location	Inspection Remarks
5	55-gallon drums	Various	New and complete
1	95-gallon overpack drum	Various	New and complete
20	3-inch by 12-foot SOCs	Various	New and complete
12	3-inch by 4-foot SOCs	Various	New and complete
32	18-inch by 18-inch absorbent pillows	Various	New and complete
2,200	18-inch by 18-inch absorbent pads	Various	New and complete
800	12-inch by 12-inch absorbent wipes	Various	New and complete
25	Disposal bags	Various	New and complete
2	Rolls of 3-foot by 120-foot absorbent pad	Various	New and complete
1	750 feet of containment boom	Various	New and complete

Field first-aid kits and fire extinguishers will be available in all field vehicles. A fuel transfer pump, personal protective equipment (PPE), and 55-gallon drums will be available for spill cleanups. Heavy equipment, shovels, and other miscellaneous tools will also be available.

(Intentionally blank)

8.0 SPILLS

This section addresses procedures designed to prevent spills and provides contingency measures for mitigation of any spills that occur during the performance of this project. The procedures discussed in this section cover control of detected spills.

8.1 GENERAL PROVISIONS

All employees will be properly trained and supervised in protocols for hazardous waste operations and emergency spill response. Proper equipment, procedures, and safeguards will be used when handling waste materials. To minimize the frequency of spills, personnel will be instructed during daily safety briefings on the proper methods for transferring and handling hazardous materials.

8.2 LIKELY SPILL SCENARIOS

Activities that could result in a spill include fueling activities associated with equipment use. A release of hazardous materials to the land could occur during equipment fueling or transfer operations, such as from hose rupture or overfilling.

8.3 SPILL RESPONSE EQUIPMENT

To minimize the impact of spilled material by quick response, Bristol will maintain emergency spill response kits on site. Each kit will contain absorbent materials (oil sorbent pads and booms) and PPE (safety glasses or goggles, chemical-resistant gloves, Tyvek® suits, boot covers, etc.). Personnel on site will be familiar with the contents and use of the kits. In addition, each vehicle on site will carry oil-sorbent pads.

Spill response materials will also be maintained at the fueling station and inside vehicles. These materials include universal and oil-only sorbent materials, and PPE. The vehicles will have spill kits containing oil-sorbent pads and a spill containment and control (SPC) Attack Pac™. The SPC Attack Pac contains materials to absorb up to 7 gallons of liquid spills. Personnel working at the fueling station will be familiar with the type of hazardous materials stored there and will be instructed in appropriate spill response procedures.

8.4 Spill Response Procedures

Bristol will contain any spill and stop all work in areas of release if there is any reason to believe the spill represents a safety concern. The following procedures will apply in the event of a spill:

- Protect project personnel and notify the Site Superintendent.
- Identify the contaminant spilled, the source of release, volume of release, and any associated contaminated media (such as soil).
- Take necessary personal precautions, isolate or segregate contaminated material from human contact (using temporary berms, absorbents, and shutoff valves, as necessary).
- Take immediate measures, using properly protected personnel, to control the discharge at its source and contain the release.
- Keep combustibles and ignition sources away from spilled materials.
- Take additional actions and request outside assistance, as required.

These procedures for response to spills and releases will be reviewed weekly as part of the health and safety meetings. The following sections further outline typical spill resources Bristol will employ in the event of the release of a contaminant.

8.4.1 Release to Water

In the event of a contaminant release to water:

- Contain and absorb the spill using absorbent booms, roll absorbent, or other appropriate mechanisms.
- Eliminate and contain the spill source.
- Place absorbent between the spill source and its most direct pathway(s) to surface water access, as close to the source as possible.
- Locate and establish spill absorbent downgradient where product may collect.
- Place absorbent in other downgradient areas likely to collect spilled product.

- Change collected absorbent as necessary and store in U.S. Department of Transportation-approved containers.

8.5 SPILL REPORTING PROCEDURES

In the event of a spill, Bristol will take all emergency measures necessary, including notifying appropriate personnel and containing the spill. The Transportation and Disposal Coordinator (TDC) will serve as Bristol's on-site representative for spill and release reporting. The TDC will receive training for these procedures and will be familiar with all aspects of implementation. The following chain of communication will be used in case of a spill:

- Site personnel will first contact Bristol's Site Superintendent.
- Bristol's Site Superintendent will contact the appropriate agencies.
- All spills will be reported using the Oil Discharge Notification Form (Attachment 4).

8.6 NOTIFICATIONS

Upon discovery of a spill, the appropriate parties listed below will be notified. The Oil Discharge Notification Form (Attachment 4) will be used to document all releases. Immediate notifications should not be delayed by lack of any information required on the Oil Discharge Notification Form. The ADEC notification and reporting requirements are provided as Attachment 3.

8.6.1 Discharge to Water

For any discharge to water, immediately notify (verbally):

- National Response Center (800-424-8802)
- U.S. Coast Guard (907-391-2733)
- ADEC, Fairbanks District Office (907-451-2121)
- EPA (if single spill greater than 1,000 gallons, or two spills discharged to navigable water within any 12-month period that are greater than 42 gallons each) (800-424-4372)

8.6.2 Discharge to Land

For any discharges to land of greater than 55 gallons, immediately notify (verbally):

- National Response Center (800-424-8802)
- U.S. Coast Guard (907-391-2733)
- ADEC, Fairbanks District Office (907-451-2121)
- EPA (if single spill greater than 1,000 gallons, or two spills discharged to navigable water within any 12-month period that are greater than 42 gallons each) (800-424-4372)

For any discharges to land less than 55 gallons, notify:

- Within 48 hours (written): ADEC, Fairbanks District Office (fax 907-451-2188) – releases exceeding 10 gallons, but less than 55 gallons, outside of secondary containment.
- Monthly (written): ADEC Fairbanks District Office (fax 907-451-2188) – less than 10 gallons. Interim reports will be submitted when the total of separate releases of less than 10 gallons accumulates to exceed 10 gallons.

8.7 CONTAINMENT PROCEDURES

In the event of a spill, the following containment procedures will be followed:

- Establish an exclusion zone to control access to the site. Smoking and open flames are banned within the exclusion zone.
- Prevent release of additional product by using the following procedures, as appropriate:
  - Close valves.
  - Set upright the container releasing the product.
  - Plug punctures with wooden pegs, sticks, rags, or absorbent pads.
  - Move the container into a lined containment area.
- Contain the released product by using the following procedures, as appropriate:
  - Construct earthen berms downgradient of the product.
  - Apply granular sorbent or absorbent pads and booms.
  - Collect free product with barrel pumps, buckets, skimmers, or other physical means.

- Clean up the spill by using the following procedures:
  - Recover free product.
  - Excavate affected soils and place them in containment cells.
  - Gather contaminated spill response materials and place them in sealable drums for disposal.
- Provide follow-up notification to appropriate parties listed in Section 8.6.

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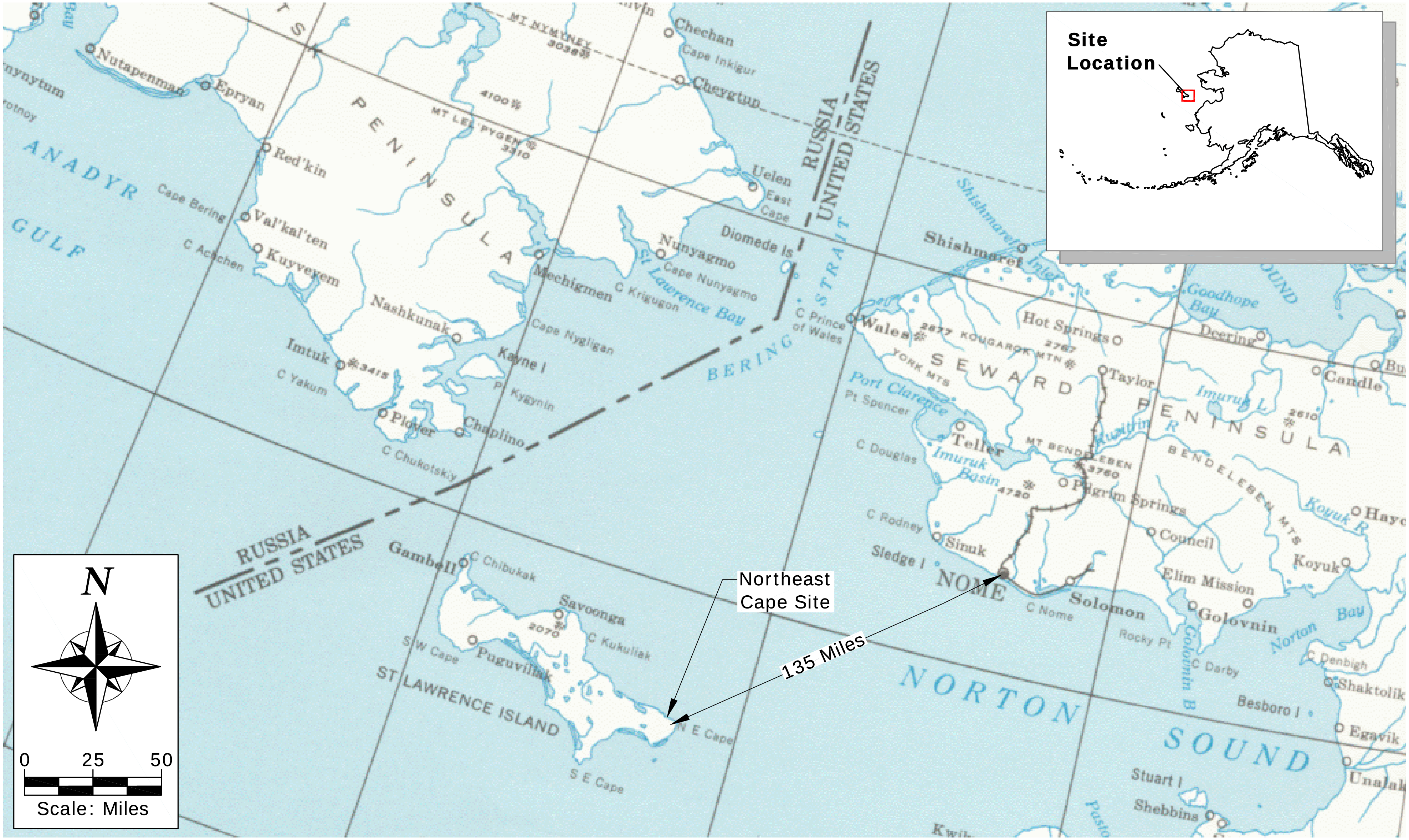
9.0 REFERENCES

Bristol Environmental Remediation Services, LLC. 2012. *Northeast Cape HTRW Remedial Actions Work Plan*. May.

(Intentionally blank)

FIGURES

Drawing: O:\JOBS\410026 NE CAPE HTRW\ACAD-ENVIRO\FIGURES-MAR10\DWG\410026-FIG1-MAR10.DWG - Layout: 410026-FIG1-MAR10
User: MGARCIA Mar 10, 2010 - 4:05pm Xrefs: - Images: NECAPE.JPG

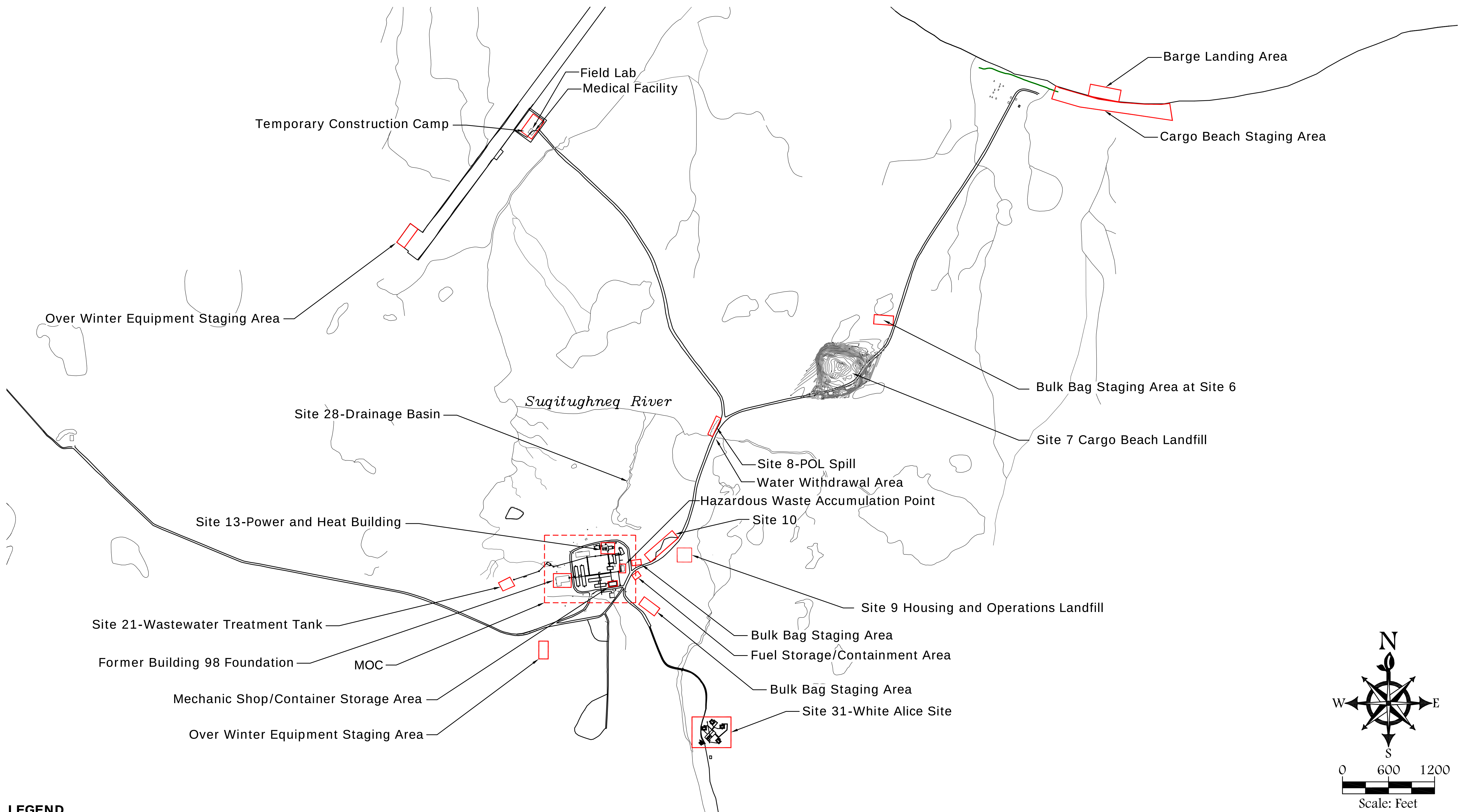


Source: USGS National Atlas Sheet Number 42-43

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

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

DATUM:	NA
PROJECTION:	NA
PROJECT NO.	410026
DATE	03/08/10
DWN.	MTG
SCALE	SHOWN
APPRVD.	MW



LEGEND

HTRW	Hazardous, Toxic, and Radioactive Waste
MOC	Main Operations Complex
POL	Petroleum, Oil, and Lubricants

NOTE

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

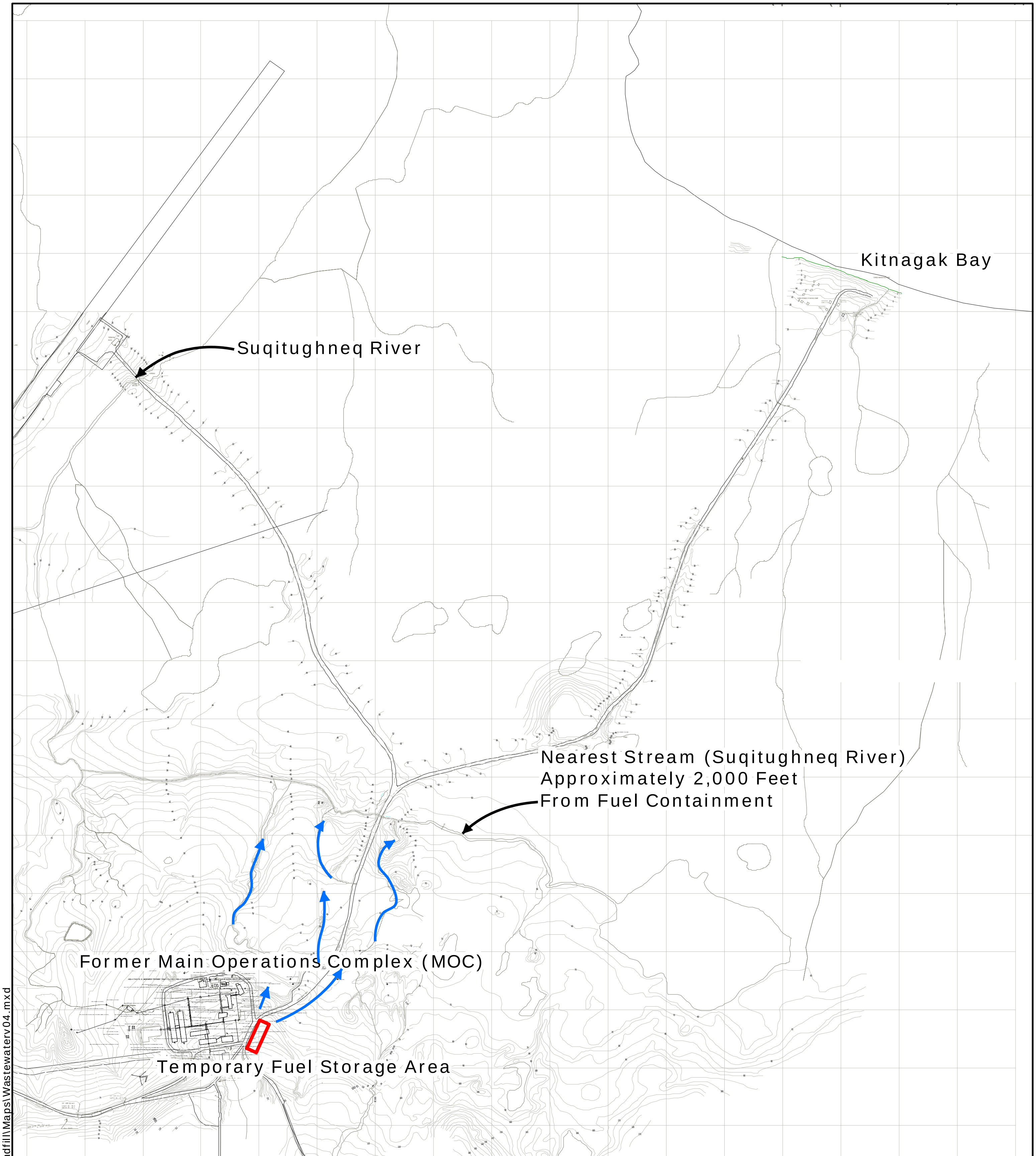
FIGURE 2
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
TEMPORARY FUEL CONTAINMENT LOCATION

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

DATUM: NAD 83
PROJECTION: STATE PLANE AK 9
Project No. 34110008

DATE 05/01/12
DWN. NAP
SCALE SHOWN
APPRVD. MW

Drawing: O:\JOBS\34120057 2012 NE CAPE\ACAD-ENVIRO\FIGURES-MAR12\FIGURES-SPCC\FIGURE-2.DWG - Layout: 34110008-FIG2-MAY12
User: NPEACOCK May 02, 2012 - 12:15pm Xrefs: - Images:



N
W E
S

Note: Not to Scale.
Blue lines indicate
surface water flow.

Figure 3
Northeast Cape, St. Lawrence Island, Alaska
Rivers and Drainage in Vicinity of
Fuel Storage Area

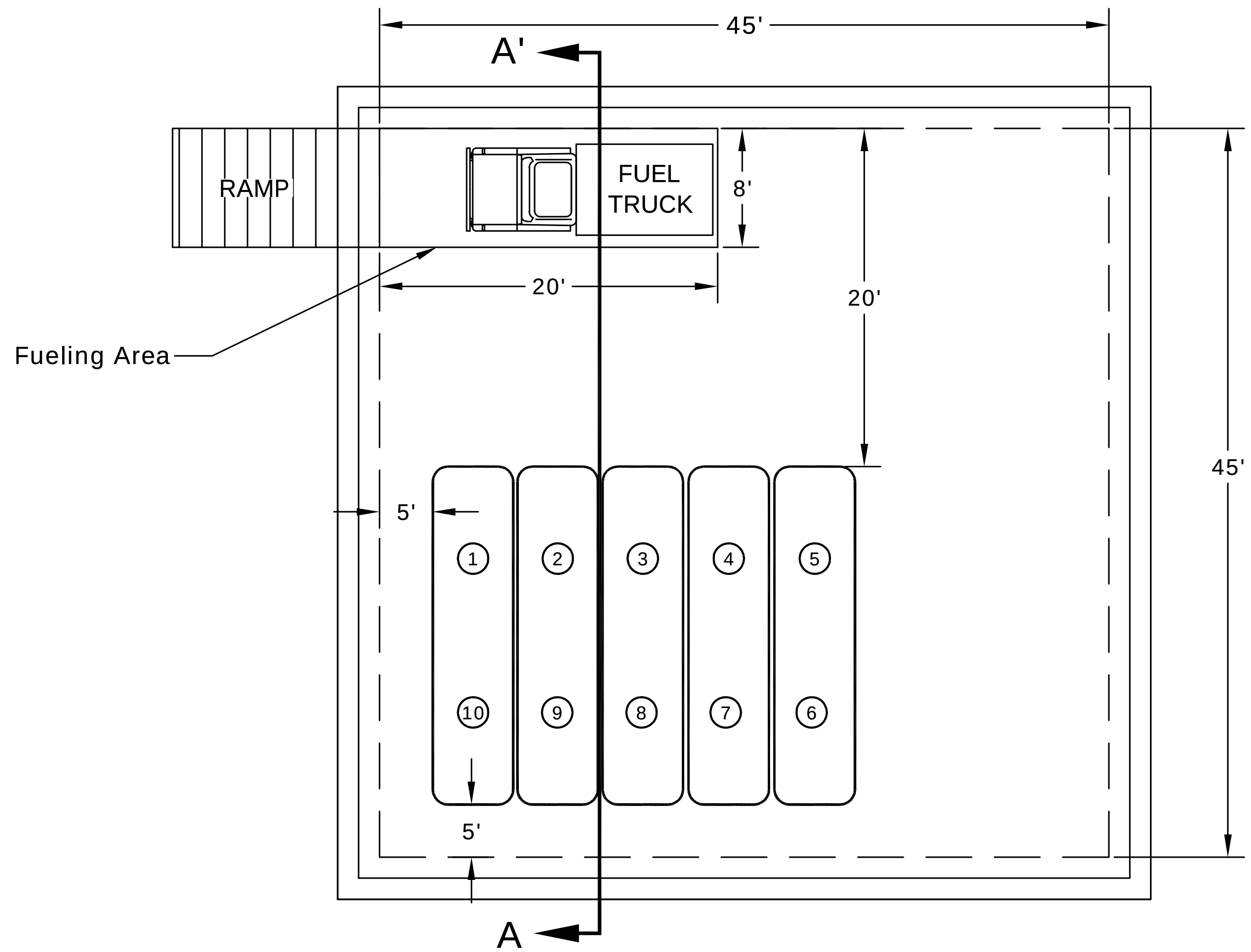
Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 49028

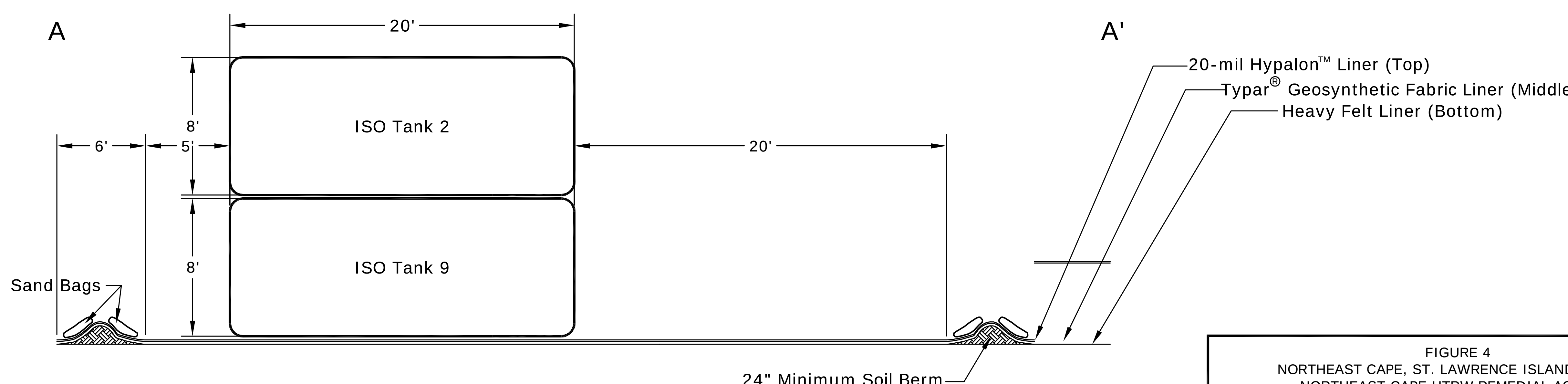
DATUM: N/A	DATE 03-04-10	SHEET
PROJECTION: N/A	DWN. BERS-RJ	1
	SCALE NTS	of
	APPRVD. BERS-MW	1

File: G:\Jobs\49028 NE Cape Landfill\Maps\Wastewaterv04.mxd

Main Temporary Fuel Storage Area

TANK #	CAPACITY (GALLONS)	CONTENTS
1	5,500	DIESEL
2	5,500	DIESEL
3	5,500	DIESEL
4	5,500	DIESEL
5	5,500	DIESEL
6	5,500	DIESEL
7	5,500	DIESEL
8	5,500	DIESEL
9	5,500	GASOLINE
10	5,500	GASOLINE





Typical Fuel Storage Area Cross Section A-A'

FIGURE 4
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NORTHEAST CAPE HTRW REMEDIAL ACTIONS
TEMPORARY FUEL STORAGE AREA DETAIL

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

DATUM:	NA	DATE	01/31/11
PROJECTION:	NA	DWN.	MTG
PROJECT NO.	34110008	SCALE	SHOWN
		APPRVD.	MW

ATTACHMENT 1

Certification of the Applicability of the
Substantial Harm Criteria Checklist

CERTIFICATION OF THE APPLICABILITY OF THE SUBSTANTIAL HARM CRITERIA CHECKLIST

Does the facility transfer oil over water to or from vessels and does the facility have a total oil storage capacity greater than or equal to 42,000 gallons?

Yes ☐ No ☐

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons and, within any storage area, does the facility lack secondary containment that is sufficiently large to contain the capacity of the largest aboveground oil storage tank, plus sufficient freeboard to allow for precipitation?

Yes ☐ No ☐

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons, and is the facility located such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?

Yes ☐ No ☐

Does the facility have a total oil storage capacity greater than or equal to1 million gallons, and is the facility located such that a discharge from the facility would shut down a public drinking water intake?

Yes ☐ No ☐

Does the facility have a total oil storage capacity greater than or equal to 1 million gallons, and has the facility experienced a reportable oil spill in an amount greater than or equal to 10,000 gallons within the last 5 years?

Yes ☐ No ☐

ATTACHMENT 2

Fuel Facility Inspection Checklist

FUEL FACILITY INSPECTION CHECKLIST

ITEM	TANK # OR LOCATION	DATE	INSPECTORS SIGNATURE

FUEL TANK INSPECTION CHECKLIST (Continued)			
ITEM	**TANK # OR LOCATION**	**DATE**	**INSPECTORS SIGNATURE**

Tanks

- Drip marks and leaks
- Discoloration of tanks
- Corrosion
- Leaks
- Cracks

Tank Support Foundation

- Settling
- Cracks
- Gaps between tank & foundation
- Gaps, breaks between liner & wall

Piping

- Drip marks and leaks
- Discoloration of soil under TF piping
- Corrosion
- Seepage from valves & seals
- Bowing of pipe

Fuel Pumps

- Pumps are operational
- Drip marks and leaks
- Discoloration of soil under pumps
- Corrosion
- Seepage from valves & seals
- Fire Extinguisher is available and operational
- Appropriate locks are in place

Secondary Containment Area (if applicable)

- Water in containment area
- Debris
- Wall erosion
- Floor settling
- Puddles containing spilled or leaked material
- Discoloration of soil/sand inside the containment area
- Hardened areas of soil/sand inside the containment area
- Vegetation starting to grow inside containment area

Fuel Trucks

- Both trucks are operational
- Pump equipment is operational
- Hoses are in good order
- Drip marks and leaks in truck parking area
- Corrosion
- Seepage from valves and seals
- Extinguishers are on trucks and operational
- Safety equipment is on trucks
- Spill equipment is on trucks

Other

- Electricity and Security lighting are operational
- Security locks are properly placed
- Appropriate Operational, Safety, and Emergency Action checklists are available

ATTACHMENT 3

ADEC Discharge Notification and
Reporting Requirements Placard

REPORT ALL

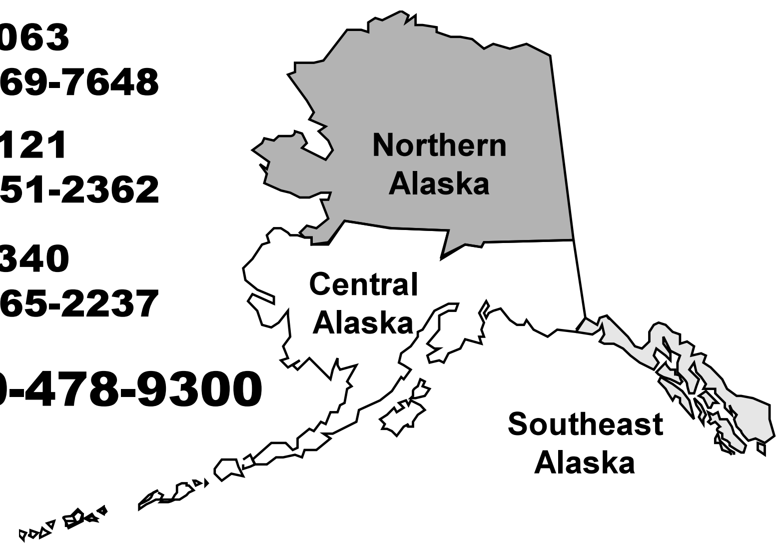
OIL AND HAZARDOUS SUBSTANCE SPILLS

ALASKA LAW REQUIRES REPORTING OF ALL SPILLS

During normal business hours

contact the nearest DEC Area Response Team office:

Central Area Response Team:	**Anchorage**	**269-3063** **fax: 269-7648**
Northern Area Response Team:	**Fairbanks**	**451-2121** **fax: 451-2362**
Southeast Area Response Team:	**Juneau**	**465-5340** **fax: 465-2237**



Outside normal business hours, call: 1-800-478-9300

Alaska Department of Environmental Conservation

Division of Spill Prevention and Response

rev. 4/2002

Alaska Department of Environmental Conservation

Discharge Notification and Reporting Requirements

AS 46.03.755 and 18 AAC 75 Article 3

Notification of a discharge must be made to the **nearest** Area Response Team during working hours:

Anchorage:	**269-3063**	**Fairbanks:**	**451-2121**	**Juneau:**	**465-5340**
	269-7648 (FAX)		**451-2362 (FAX)**		**465-2237 (FAX)**

OR

to the 24-Hour Emergency Reporting Number during non-working hours: **1-800-478-9300**

Notification Requirements

Hazardous Substance Discharges

Any release of a hazardous substance must be reported as soon as the person has knowledge of the discharge.

Oil Discharges

TO WATER

- Any release of oil to water must be reported as soon as the person has knowledge of the discharge.

TO LAND

- Any release of oil in ***excess of 55 gallons*** must be reported as soon as the person has knowledge of the discharge.
- Any release of oil in ***excess of 10 gallons but less than 55 gallons*** must be reported within 48 hours after the person has knowledge of the discharge.
- A person in charge of a facility or operation shall maintain, and provide to the Department on a monthly basis, a written record of any discharge of oil ***from 1 to 10 gallons***.

TO IMPERMEABLE SECONDARY CONTAINMENT AREAS

- Any release of oil ***in excess of 55 gallons*** must be reported within 48 hours after the person has knowledge of the discharge.

Special Requirements for Regulated Underground Storage Tank (UST) Facilities*

If your **release detection system** indicates a possible discharge, or if you notice **unusual operating conditions** that might indicate a release, you must notify the Storage Tank Program at the nearest DEC Office **within 7 days**:

Anchorage:	(907) 269-7504	Fairbanks:	(907) 451-2360
Juneau:	(907) 465-5200	Soldotna:	(907) 262-5210

*Regulated UST facilities are defined at 18 AAC 78.005 and do not include heating oil tanks.

ATTACHMENT 4

Oil Discharge Notification Form

OIL DISCHARGE NOTIFICATION FORM

STATE NOTIFICATION

When a spill occurs, the following information should be reported according to the Alaska Department of Environmental Conservation (ADEC).

Anchorage: 269-7500 **Fairbanks: 451-2121** **Juneau: 465-5340**

Or the 24-Hour Emergency Reporting Number during non-working hours: ***1-800-478-9300***

FEDERAL NOTIFICATION

National Response Center: 1-800-424-8802
Note: It is not necessary to wait for all information before calling The National Response Center.

COLLECT AS MUCH OF THE FOLLOWING INFORMATION AS YOU CAN:

	A. REPORTING PARTY	B. RESPONSIBLE PARTY (if different)
NAME	______________________	______________________
PHONE	______________________	______________________
COMPANY	______________________	______________________
POSITION	______________________	______________________
ADDRESS	______________________	______________________
	______________________	______________________

C. ORGANIZATION TYPE

PRIVATE		**PUBLIC UTILITY**	**GOVERNMENT**	
Citizen	____________	____________	Local	____________
Business	____________		State	____________
			Federal	____________

Were Materials Discharged? YES _____ NO _____
Calling for Responsible Party? YES _____ NO _____

D. INCIDENT DESCRIPTION

Source and/or Cause ______________________________
Start of Spill Date/Time ______________________________
Discharged Material ______________________________
Discharge Quantity & Unit ______________________________
Quantity in Water ______________________________
Discharge Location ______________________________
Nearest City and Distance From it ______________________________
Storage Tank Container Type Aboveground _____ Underground ____ Unknown ____

OIL DISCHARGE NOTIFICATION FORM (Continued)
Page 2

E. FACILITY CAPACITY

Tank Capacity ____________________ Other Tanks Potentially Affected ____________________________________

F. GEOGRAPHIC OR PHYSICAL LOCATION

Latitude deg min N, Longitude deg min W

____

G. RESPONSE ACTION

Actions Taken to Correct or Mitigate Discharge:

____
____
____

H. IMPACT

Number of Injuries ____________________________ Number of Fatalities ______________________________

Were there Evacuations? YES ☐ NO ☐ UNK ☐ Number ____________________

Was There any Damage? YES ☐ NO ☐ UNK ☐ Dollars ____________________

I. DISPERSANTS

Were appropriate procedures or approvals used or obtained prior to any dispersant use, if applicable?

YES ☐ NO ☐

J. ADDITIONAL INFORMATION

Any Other Information

____
____
____
____
____
____
____
____
____
____

K. CALLER NOTIFICATIONS

AGENCY	DATE	TIME	CONTACT NAME
U.S. Coast Guard			
EPA			
ADEC			

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

OIL & HAZARDOUS SUBSTANCES SPILL NOTIFICATION

ADEC SPILL #	**ADEC FILE #**	**ADEC LC**	
PERSON REPORTING	**PHONE NUMBER**	**REPORTED HOW?** Troopers phone fax	
DATE/ TIME OF SPILL	**DATE/TIME DISCOVERED**	**DATE/TIME REPORTED**	
LOCATION/ADDRESS	**LAT.** / **LONG.**	****SUBSTANCE TYPE** A) CR EHS HS NC PW UNK B) CR EHS HS NC PW UNK	****PRODUCT** A) B)
QUANTITY SPILLED ☐ gallons ☐ pounds	**QUANTITY CONTAINED** ☐ gallons ☐ pounds	**QUANTITY RECOVERED** ☐ gallons ☐ pounds	**QUANTITY DISPOSED** ☐ gallons ☐ pounds

POTENTIAL RESPONSIBLE PARTY C-Plan Holder? YES ☐ NO ☐	****FACILITY TYPE**
****SOURCE OF SPILL**	☐ 400 GT Vessel?
****CAUSE OF SPILL (List Primary Cause first)**	☐ Accident ☐ Human Factors ☐ Structural/Mechanical ☐ Other

****CLEANUP ACTIONS**

****DISPOSAL METHODS AND LOCATION**

RESOURCES AFFECTED/THREATENED (Water sources, wildlife, wells. etc.)	AIR	LAND	MARINE	FRESH	SURF. AREA AFFECTED	SURF. TYPE
	☐	☐	☐	☐		

COMMENTS:

DEC USE ONLY

SPILL NAME, IF ANY	**NAMES OF DEC STAFF RESPONDING**	**C-PLAN MGR NOTIFIED** YES ☐ NO ☐ ____________
DEC RESPONSE ☐ phone follow-up ☐ field visit ☐ took report	**CASELOAD CODE** ☐ First and Final ☐ Open/No LC ☐ LC assigned	**CLEANUP CLOSURE ACTION** ☐ NFA ☐ Monitoring ☐ Transferred to CS or STP

STATUS OF CASE (circle) OPEN CLOSED DATE CASE CLOSED ________________

COMMENTS:

REPORT PREPARED BY	**DATE**

revised April 19, 2002

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION

OIL & HAZARDOUS SUBSTANCES SPILL NOTIFICATION

**** Please see reference sheet when completing these columns.**

****Substance Type**
CR = Crude Oil
EHS = Extremely Hazardous Substance
HS = Hazardous Substance
NC = Non Crude Oil
PW = Process Water
UNK = Unknown

****Product**
See cheat sheet for questions on product

****Source**
Include both the “Facility Type” and the “Source” from cheat sheet

****Cause**
Include Category and Cause

****Cleanup Actions**
See cheat sheet for choices

****Disposal Methods and Location**
See cheat sheet for choices

State of Alaska
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

OIL & HAZARDOUS MATERIALS INCIDENT FINAL REPORT

The following written report is required by State regulations 18 AAC 75.300(e), following departmental notification of a discharge of oil and hazardous materials. The report is due within 15 days after the cleanup is completed, or if no cleanup occurs, within 15 days after the discharge. Forward the report to the nearest DEC office of the department. The report must contain, as applicable:

1. Date and time of the discharge:

2. Location of the discharge:

3. Name of the site, facility or operation:

4. Name, mailing address, and telephone number of:

A. Person or persons causing or responsible for the discharge:

B. Owner and operator of the site, facility or operation:

5. Type and amount of each oil or hazardous substance discharged:

6. Cause of the discharge:

7. Description of any environmental damage caused by the discharge or containment, to the extent the damage can be identified:

8. Description of cleanup actions taken:
9. Estimated amount of: (A) oil or hazardous substance cleaned up: (B) oily or hazardous waste generated:
10. Date, location, and method of ultimate disposal of the oil, hazardous substance and any contaminated materials, including cleanup materials:
11. Description of actions being taken to prevent recurrence of the discharge:
12. Other information the department requires to fully assess the cause and impact of the discharge (receipts for disposal if available):

Signature	**Printed name**
Date	**Title**

MAIL OR FAX TO the Closest A.D.E.C. Office below

Anchorage
Phone: 269-3063
Fax: 269-7648
555 Cordova Street
Anchorage, AK 99501

Fairbanks
Phone: 451-2121
Fax: 451-2362
610 University Ave.
Fairbanks, AK 99709-3643

Juneau
Phone: 465-5340
Fax: 465-2237
410 Willoughby Ave., Suite 309
Juneau, AK 99801-1795

DEC USE ONLY	
ADEC Project Manager:	ADEC Spill #:

ATTACHMENT 5

Spill Response Team Training, Drill,
and Exercise Log

TRAINING, DRILL, AND EXERCISE LOG

X = COMPLETED B = BASIC R = REFRESHER T = ON THE JOB TRAINING

Name	**Annual SPCC Training**	**Fuel Truck Operator Training**	**Other**

ATTACHMENT 6

Record of Attendance for
Spill Response and Safety Meetings

RECORD OF ATTENDANCE FOR SPILL RESPONSE AND SAFETY MEETINGS

Spill Response Meeting ___ Date _____________

Safety Meeting ___ Date _____________

Record	Required Action	Implementation
ATTENDEES:	**SIGNATURE**	**COMMENTS**

APPENDIX F

Permits and Quarry Agreement

Bristol

ENVIRONMENTAL
REMEDIATION SERVICES, LLC

111 W. 16th Avenue, Third Floor
Anchorage, AK 99501
phone (907) 563-0013
fax (907) 563-6713
www.bristol-companies.com

FAX TRANSMITTAL

Total number of sheets (including cover): 8

Date: 21 June 2012

Time: 3:45 pm

To: Morris Toolie Jr

From: Molly Welker

Fax No.: 907-984-6185

Regarding: NE Cape Quarry Agreement

Phone No.: 907–984-6414

Project No. 34120057

Project Name: 2012 NE Cape HTRW Project

MATERIAL SUPPLY AND
QUARRY OPERATING AGREEMENT

Kukulget Inc., whose address is P.O. Box 160 Savoonga, Alaska 99769, and Sivuqaq Inc., whose address is P.O. Box 101 Gambell, Alaska 99742, Alaska Native Corporations created pursuant to the Alaska Native Claims Settlement Act, herein referred to as "Owners," and Bristol Environmental Remediation Services LLC, whose address is 111 W. 16th Avenue, Third Floor, Anchorage, Alaska 99501, herein referred to as "Contractor" agree to the extraction of material and the operation of the quarry and such other rights as are designated in this contract, subject to the following provisions:

1. DESCRIPTION - LOCATION, MATERIAL, AND PRICE:

1.1. Quarry Description. The material source area covered by this agreement is the borrow site south of the Main Operations Complex at Northeast Cape, St. Lawrence Island, Alaska shown on the attached figure.

1.2. Royalty. The royalty price for all types of material removed from the Quarry during the Term of this Agreement is:

Material Type	Unit Price
All Material	$10.00 (per cubic yard)

Quantities to be determined by truck count.

2. EXCLUSIVE RIGHTS AND DUTIES:

Owner hereby grants to Contractor and Contractor accepts from Owner, the exclusive right to manage and operate the Quarry for the Term of this Agreement (defined in ¶3). Management and operation of the Quarry shall include, without limitation, the following:

A. The exclusive right to manage the extraction and removal of Materials from the Quarry;

B. The exclusive right, to secure access to the Quarry to avoid an attractive nuisance and deter unauthorized extraction of Materials therefrom, up to and including, fencing the perimeter and/or access to the Quarry;

C. The duty to perform all reclamation identified in the Letter of Intent (section 5).

3. TERM:

The term of this Agreement ("term") shall commence on June 15, 2012 and expire on December 31, 2012.

4. PAYMENTS AND DEPOSITS:

Within 30 days after the cessation of work for winter, or completion or termination, Contractor in any year in which the Contractor extracts or transports material from the Quarry, Contractor shall pay payments as described in Paragraph 1.2.

5. LETTER OF INTENT/ANNUAL RECLAMATION STATEMENT:

By June 15, 2012 and prior to commencing any operations in any Quarry subject to this Agreement, the Contractor shall file a "Letter of Intent" (Letter) with the State of Alaska Department of Natural Resources, Division of Land (Division of Land) as required by State law. The contractor shall also file an "Annual Reclamation Statement" (Statement) with the Division of Land as required by State law. The Statement shall be filed before December 31 of any calendar year during which Quarry operations were carried out under this Agreement. The Contractor shall provide copies of the Letter and the Statement(s) to the Owners.

6. RECLAMATION PLAN:

Contractor shall comply with the requirements of the Letter (section 5) regarding reclamation. The Contractor shall document reclamation activities per the Statement (section 5).

7. CONFLICT WITH CONTRACT.

In the event that any provision of this Material Supply Contract and Quarry Operating Agreement shall conflict with Contractor's Contract W911KB-12-C-0003 with the Corp of Engineers for the Northeast Cape HTRW Remedial Actions, St. Lawrence Island, Alaska, contract W911KB-12-C-0003 shall control and this Agreement shall be considered amended to bring it into conformity with W911KB-12-C-0003.

8. INSPECTION OF QUARRY:

Prior to commencing any operations at the Quarry, authorized representatives of Contractor and Owners may inspect the Quarry to determine whether and to what extent prior mining operations have resulted in visual environmental contamination that requires remediation. Contractor shall have no obligation to perform remediation of contamination discovered at this inspection; provided, however, that from the date of such inspection Contractor shall be liable for all hazardous materials deposited at the Quarry as a result of Contractor's operations during the term hereof, or any extension . Failure by the parties to do so shall not affect the enforceability of this Agreement, provided Contractor prepares and transmits its environmental findings to Owners, at its address set forth in ¶17, below in writing, before beginning Operations.

9. BOOKS AND RECORDS OF ACCOUNT:

Contractor shall maintain accurate and complete records, log books and books of account documenting: (a) the volume of gravel extracted from the Quarry seasonally and submitted to Owners; (b) the amounts due and payable by Contractor and; the amounts actually paid by Contractor to Owners pursuant to this Agreement.

Materials from the Quarry shall be measured by truckloads. Each truck load will contain between 18.75 and 25 cubic yards depending on the truck type (e.g., 30 or 40 ton rock truck). Truck count and truck type shall be performed and recorded by the operator loading haul units at the quarry site. The operator will provide the truck count to the Contractor's Site Superintendent or his designee on a daily basis. The Site Superintendent will provide a summary of the truck count to Owner within five business days of receiving a request from the Owner.

10. OPERATING REQUIREMENTS:

10.1. Standards of Operations. Contractor shall excavate and remove Material from the Quarry in compliance with all laws, regulations, ordinances, orders and its contract with the Corps W911KB-06-D-0007. Contractor shall conduct and maintain its Operations in a commercially reasonable, workman like and clean manner, and shall take all necessary precautions to prevent or suppress fires and to prevent erosion, contamination or destruction of the land and adjacent wetlands and waters. The Contractor agrees to carry out its quarry operations only in areas previously disturbed by others at the Quarry site.

10.2. Supervision. Contractor shall maintain adequate supervision at all times when Operations are in progress to ensure compliance with the provisions of this contract and all applicable federal, state, and local laws and regulations.

10.3. Agents. The provisions of this Contract apply with equal force upon any agent, employee, or contractor designated by Contractor to perform any of the Operations under this contract. Contractor is liable for the noncompliance caused by any such agent, employee, or contractor.

10.4. Grave Sites or Archaeological Sites. No grave or archaeological site shall be in any way disturbed, removed, or damaged. Upon encountering any grave or archaeological site, Contractor shall immediately cease work in the area of the site and shall immediately notify Owners.

11. COMPLIANCE WITH APPLICABLE LAWS:

Contractor shall comply with all local, State and federal laws, statutes, ordinances, rules, regulations, decrees, injunctions, orders and codes applicable to the operation or management of the Quarry, including without limitation, mining reclamation, mining safety and health (i.e., "MSHA") and occupational safety and health (i.e., "OSHA"). These laws and regulations are, by this reference, made a part of this Contract.

12. REQUIRED PERMITS:

Contractor shall obtain and maintain, at its expense and throughout the Term, all licenses, permits, approvals, consents and certificates from local, state and federal authorities which may be necessary or appropriate for its management and operation of the Quarry.

13. ASSIGNMENT:

This contract may be assigned or transferred pursuant to 30 days advance notice to Owners.

14. PERMITS:

Any permits necessary for Operations under this Contract must be obtained by Contractor before commencing those Operations.

15. WARRANTIES:

This sale is made without any warranties, express or implied, as to quantity, quality, merchantability, profitability, or fitness for a particular use of the Material to be extracted from the Quarry under contract. Contractor specifically waives any claims that may arise resulting from the use of the Material.

16. NOTICES:

All notices and other documents required or authorized under this Contract must be in writing and are deemed delivered upon receipt provided that the same are sent certified mail, postage paid, to the party to which the same is mailed the following address or such other address as such party may by written notice provide:

To the Owner: Kukulget Inc.
P. O. Box 160
Savoonga, AK 99769

Sivuqaq Inc.
P.O. Box 101
Gambell, AK 99742

with a copy to Jerald Reichlin, Attorney at Law.

To the Contractor:
Bristol Environmental Remediation Services, LLC
Attn: Molly Welker
111 W. 16th. Avenue, Third Floor
Anchorage, Alaska 99501

17. INTEGRATION AND MODIFICATION:

This Contract, including all laws and documents that by reference are incorporated in it or made a part of it, contains the entire agreement between the parties. This Contract may not be modified or amended except by a document signed by both parties to this contract. Any amendment or modification which is not in writing, signed by both parties, is null and void and of no legal effect.

18. SEVERABILITY OF CLAUSES OF CONTRACT:

If any provision of this Contract is adjudged to be invalid, that judgment does not affect the validity of any other provision of this Contract, nor does it constitute any cause or action in favor of either party as against the other.

19. CONSTRUCTION:

Words in the singular number include the plural, and words in the plural number include the singular.

20. HEADINGS:

The headings of the numbered paragraphs in this Contract shall not be considered in construing any provisions of this Contract.

21. "EXTRACTED," "EXTRACTION":

In this Contract, use of the terms "Extracted" and "Extraction" encompasses the severance or removal, as well as extraction, by Contractor of any Material covered by this Contract.

22. WAIVERS:

No agent, representative, or employee of Owners has authority to waive any provision of this Contract unless expressly authorized to do so in writing by the Presidents of Kukulget Inc. and Sivuqaq Inc.

23. GOVERNING LAW:

This Contract shall be governed by and construed in accordance with Alaska law. Venue and jurisdiction shall lie exclusively in the Superior Court for the State of Alaska, Third Judicial District, at Anchorage, Alaska.

24. EFFECTIVE DATE:

This Contract shall be effective the 15th day of June 2012.

25. BY SIGNING THIS CONTRACT, Owner, and Contractor, agrees to be bound by its provisions as set out above.

CONTRACTOR:

By: ______________________

Its: Project Manager

OWNER:

Kukulget Inc.

By: ______________________

Its: ______________________

Sivuqaq Inc.

By: ______________________

Its: President.

Remittance Advice

Check: 404843 Paid by: Bristol Envt'l Remediation Svc
Date: 04/27/12 Paid to: Alaska Dept of Natural Resourc
Amount: 350.00

Our Account #:
Vendor Code: 1102

Inv. Date	Invoice No.	Job Number	Inv. Amount	Discount	Amount Paid	Retention	Remarks
04/20/12	CR042012SL	34120057	350.00	0.00	350.00	0.00	water permitting fee
Check Totals			350.00	0.00	350.00	0.00	

Bristol Envt'l Remediation Svc
111 W. 16th Ave
Third Floor
Anchorage, AK 99501

Wells Fargo Bank
PO Box 63020

11-24
1210

Date	Check No.
04/27/12	404843

PAY **THREE HUNDRED FIFTY AND XX / 100

$ ** 350.00

Two Signatures Required if over $10,000

TO THE ORDER OF
Alaska Dept of Natural Resourc
550 W 7th Ave
Ste 2010
Anchorage, AK 99501

DIVISION OF MINING, LAND AND WATER
WATER RESOURCES SECTION
www.dnr.state.ak.us/mlw/water/index.htm

Alaska Department of NATURAL RESOURCES

Anchorage Office 550 West 7th Avenue, Suite 1020 Anchorage, AK 99501-3562 (907) 269-8600 Fax: (907) 269-8947	Juneau Office PO Box 111020 400 Willoughby Avenue Juneau, AK 99811-1020 (907) 465-3400 Fax: (907) 586-2954	Fairbanks Office 3700 Airport Way Fairbanks, AK 99709-4699 (907) 451-2790 Fax: (907) 451-2703	***For ADNR Use Only*** ***Date/Time Stamp***
For ADNR Use Only ***TWUP #***	***For ADNR Use Only*** ***CID #***	***For ADNR Use Only*** ***Receipt Type WR***	

APPLICATION FOR TEMPORARY USE OF WATER

INSTRUCTIONS

1. Complete one application for each project including up to five water sources (incomplete applications will not be accepted).
2. Attach legible map that includes meridian, township, range, and section lines such as a USGS topographical quadrangle or subdivision plat. Indicate water withdrawal point(s), location(s) of water use, and point(s) of return flow or discharge (if applicable).
3. Attach sketch, photos, plans of water system, or project description (if applicable).
4. Attach driller's well log for drilled wells (if available).
5. Attach copy of ADNR fish habitat permit (if applicable).
6. Attach completed Coastal Project Questionnaire (if applicable - see page 4).
7. Submit non-refundable fee (see page 4).

APPLICANT INFORMATION

Project Name: NE Cape Landfill Site

Organization Name (if applicable): Bristol Environmental Remediation Services

Agent or Consultant Name (if applicable): Susan Luetters, Bristol Engineering Srvs. Corp.

Individual Name (if applicable): Molly Welker

Individual Co-applicant Name (if applicable):

Mailing Address: 111 West 16th Ave. Third Floor

City: Anchorage

State: AK

Zip Code: 99501

Daytime Phone Number: 907-563-0013

Alternate Phone Number (optional):

Fax Number (if available): 907-563-6713

E-Mail Address (optional): mwelker@bristol-companies.com

PROPERTY DESCRIPTIONS

Location of Water Use

Project Area (e.g. milepost range, place name, survey number)	Meridian	Township	Range	Section	Quarter Sections	
Northeast Cape, St. Lawrence Island	Kateel River	25S	54W		¼	¼
					¼	¼

Location of Water Source

Geographic Name of Water Body or Well Depth	Meridian	Township	Range	Section	Quarter Sections	
Suqitughneg River	Kateel River	25S	54W		¼	¼
					¼	¼
					¼	¼
					¼	¼
					¼	¼

Location of Water Return Flow or Discharge (if applicable)

Geographic Name of Water Body or Well Depth	Meridian	Township	Range	Section	Quarter Sections	
Not Applicable					¼	¼
					¼	¼

METHOD OF TAKING WATER

Pump	Pump Intake 4 Inches Pump Output 35 GPM	Hours Working 1.5 Hours/Day Length of Pipe 20 Feet (from pump to point of use)
Gravity	Pipe Diameter ______ Inches Head ______ Feet	Length of Pipe ______ Feet (take point to point of use)
Ditch	L ____ H ____ W ____ Feet	Diversion Rate ______ ☐ GPM or ☐ CFS
Reservoir	L ____ H ____ W ____ Feet	Water Storage ______ Acre-feet
Dam	L ____ H ____ W ____ Feet	Water Storage ______ Acre-feet

AMOUNT OF WATER

Purpose of Water Use	Quantity of Water			Season of Use	
	Maximum Withdrawal Rate	Total Daily Amount	Total Seasonal Amount	Date Work Will Start	Date Work Will be Completed
Dust suppression/Camp water use	3000 GPD	3000 GPD	180,000 gal	June 15, 2012	Sept. 15, 2015
	Project Totals	3000 GPD	180,000 gal	Total years needed: 1/6 (3 mo. over 4 yrs)	

PROJECT DESCRIPTION

What alternative water sources are available to your project should a portion of your requested diversion be excluded because of water shortage or public interest concerns?

There is no other viable alternative.

Are there any surface water bodies or water wells at or near your site(s) that could be affected by the proposed activity? If yes, list any ground water monitoring programs going on at or near the sites, any water shortages or water quality problems in the area, and any information about the water table, if known.

No water wells or surface water bodies are anticipated to be impacted by the proposed activity.

Briefly describe the type and size of equipment used to withdraw and transport water, including the amount of water the equipment uses or holds.

A 2000 gallon tank has been placed into the bed if an old dump truck which will serve as the tanker truck. There is a 4-inch pump associated with this that will be used to pump water into and out of the tank. Water from the tanker truck will be used for dust suppression and camp water use.

Briefly describe what changes at the project site and surrounding area will occur or are likely to occur because of construction or operation of your project (e.g. public access, streambed alteration, trenching, grading, excavation).

None are anticipated or expected.

Briefly describe land use around the water take, use, and return flow points (e.g. national park, recreational site, residential).

undeveloped

Will project be worked in phases? State reason for completion date.

No, all work started will be completed this season.

Briefly describe your entire project:

See attached project description.

(Attach extra page if needed.)

11 AAC 93.220 sets out the required information on the application and authorizes the department to consider any other information needed to process an application for a temporary use of water. This information is made a part of the state public water records and becomes public information under AS 40.25.110 and 40.25.120. Public information is open to inspection by you or any member of the public. A person who is the subject of the information may challenge its accuracy or completeness under AS 44.99.310, by giving a written description of the challenged information, the changes needed to correct it, and a name and address where the person can be reached. False statements made in an application for a benefit are punishable under AS 11.56.210.

SIGNATURE

The information presented in this application is true and correct to the best of my knowledge. I understand that no water right or priority is established per 11 AAC 93.210-220, that the water used remains subject to appropriation by others, and that a temporary water use authorization may be revoked if necessary to protect the water rights of other persons or the public interest.

Susan T Luetters — Signature

4/27/2012 — Date

Susan T. Luetters — Name (please print)

Sr. Environmental Scientist — Title (if applicable)

REFERENCES

Measurement Units

GPD = gallons per day
CFS = cubic feet per second
GPM = gallons per minute
AF = acre-feet
AFY = acre-feet per year (325,851 gallons/year)
AFD = acre-feet per day (325,851 gallons/day)
MGD = million gallons per day

Conversion Table

5,000 GPD=	30,000 GPD=	100,000 GPD=	500,000 GPD=	1,000,000 GPD=
0.01 CFS	0.05 CFS	0.2 CFS	0.8 CFS	1.5 CFS
3.47 GPM	20.83 GPM	69.4 GPM	347. 2 GPM	694.4 GPM
5.60 AFY	33.60 AFY	112.0 AFY	560.1 AFY	1120.1 AFY
0.2 AFD	0.09 AFD	0.3 AFD	1.5 AFD	3.1 AFD
0.01 MGD	0.03 MGD	0.1 MGD	0.5 MGD	1.0 MGD

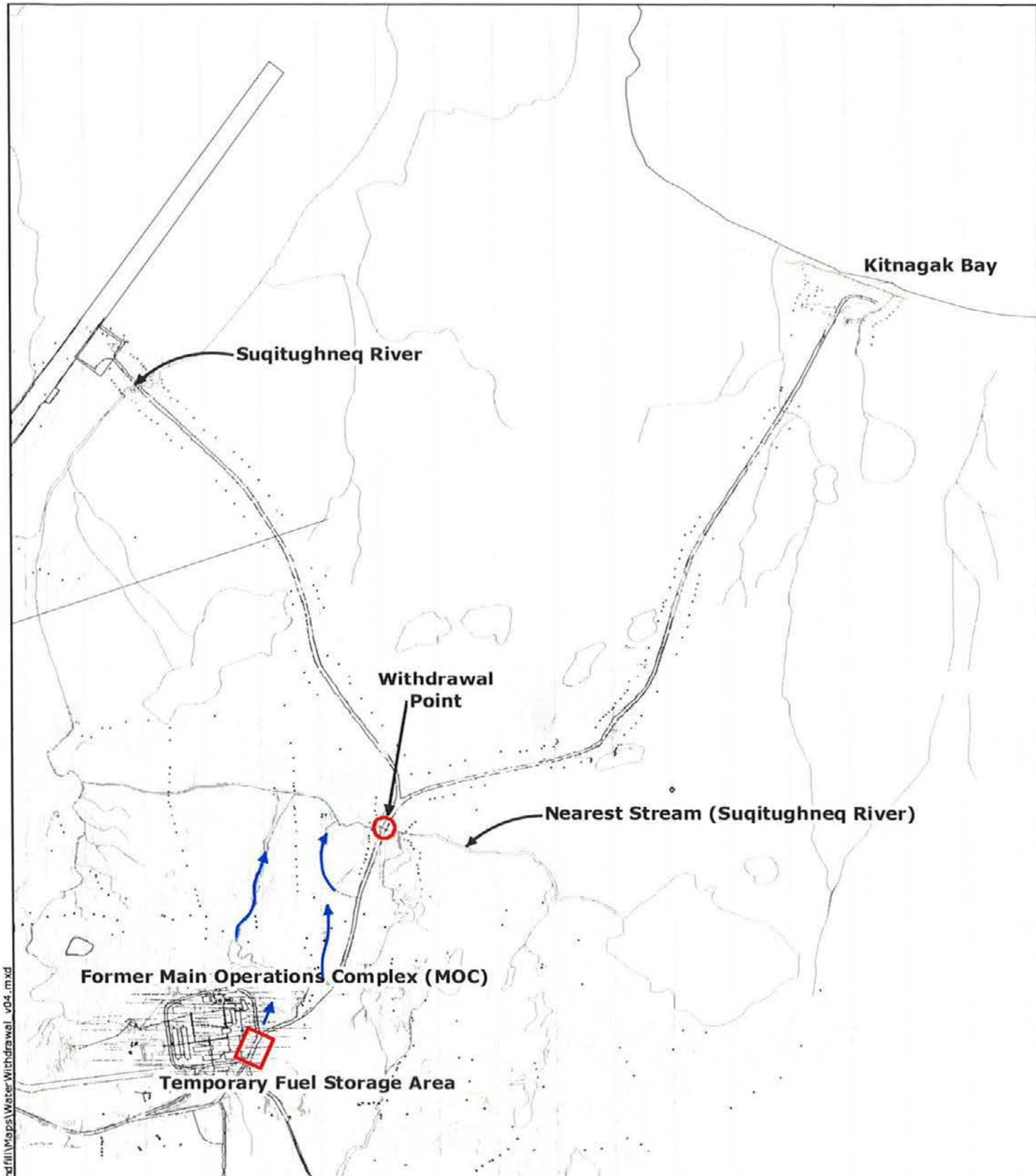
Fee required by regulation 11 AAC 05.010(a)(8)

- **$350** for all uses of water from up to five water sources

Make checks payable to "Department of Natural Resources".

Coastal Zone

If this appropriation is within the Coastal Zone, and you are planning to use more than 1,000 GPD from a surface water source or 5,000 GPD from a subsurface water source, you need to submit a completed Coastal Project Questionnaire with this application. For more information on the Coastal Zone, contact the Office of Project Management and Permitting; Anchorage 269-7470, Juneau 465-3562, www.dnr.state.ak.us/acmp/.



Note: Not to Scale.
Blue lines indicate surface water flow.

Figure 6
Northeast Cape, St. Lawrence Island, Alaska
Withdrawal Point on the Suqitughneq River

Bristol
ENVIRONMENTAL REMEDIATION SERVICES, LLC
Phone (907)563-0013 Fax (907)563-6713
Project No. 49028

DATUM: N/A	DATE	06-04-09	SHEET	1
PROJECTION: N/A	DWN.	BI-ME	of	1
	SCALE	NTS		
	APPR.	BEESC-SL		

File: G:\Jobs\49028_NE_Cape_Landfill\Maps\WaterWithdrawal_v04.mxd

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

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

Proposed Plan for 2012 HTRW Remedial Actions
Northeast Cape, St. Lawrence Island, Alaska

INTRODUCTION

The Northeast Cape (NE Cape) site is located on St. Lawrence Island, in the Bering Sea, near the territorial waters of Russia, approximately 135 air-miles southwest of Nome. The Village of Savoonga is the closest community; located 60 miles northwest of the site. The NE Cape site, at 63°19' North, 168°58' West, is 9 miles west of the northeastern cape of St. Lawrence Island. The NE Cape site originally encompassed 4,800 acres (7.5 square miles). The site is bounded by Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south (Figure 1). The site has been subject to previous phased remedial investigations and several removal actions; all of the former buildings and structures have been removed and most of the debris has been addressed. Due to the remoteness, sea ice conditions, and fall storms in the Bering Sea near the site on St. Lawrence Island, the field season is generally limited to less than 90 days.

Environmental investigations and cleanup activities at NE Cape began in the mid 1980s. Multiple remedial investigations and removal actions occurred from 1994 to 2011 and resulted in the identification of 34 separate sites of concern within the larger NE Cape complex.

This proposed plan pertains to removal of petroleum (POL) - contaminated soil at the Main Operations Complex, polychlorinated biphenyls (PCBs) - contaminated soil at Sites 13 and 31, and arsenic-contaminated soil from Site 21. The objectives of this 2012 project are to implement selected remedies for the NE Cape sites, as detailed in the Final 2009 Decision Document for the NE Cape HTRW Project.

Main Operations Complex (MOC)

The MOC at the NE Cape installation included the majority of the site infrastructure including buildings, heat and power supply, fuel storage tanks, maintenance, and housing quarters. Individual sites were grouped together to evaluate an overall response action for the known contamination. These sites are located on the northeast portion of the main complex gravel pad and include Sites 10, 11, 13, 15, 19, and 27. See Figure 2 for site locations.

All of the MOC structures have been demolished including backfill of utilidors. Tanks and piping have been removed. Contaminated concrete, PCB-contaminated soils, and fuel stained soils were also excavated and transported off-site during removal actions from 2000 to 2011. Inert concrete foundations and pads remain at the MOC.

The primary contaminant of concern in soil at the MOC is DRO. Surface and subsurface soils are contaminated with petroleum to depths exceeding 15 feet below ground surface. The fuel contamination is most heavily concentrated within a layer of peat and silt, and may have created a smear zone along the shallow groundwater interface.

Shallow groundwater is also contaminated throughout the northeast portion of the MOC, over an area of approximately 175,000 square feet. The primary contaminants of concern in groundwater are DRO, GRO, RRO, benzene, and naphthalene. The depth to groundwater across the northeast portion of the MOC varies significantly. In some areas, a perched aquifer is present, with shallow groundwater encountered between 4 and 7 feet below ground surface. A potentially confined aquifer is also present, with water encountered from 10 to 25 feet below ground surface.

Numerous remedial investigations have been conducted since 1994. The sampling results indicate soils and groundwater contain petroleum compounds at elevated levels. An in-situ chemical oxidation (ISCO) pilot test was completed at the MOC in 2009. Results indicated ISCO was not an effective means of remediating the POL-contaminated, peat rich soil present at the MOC. As a result, excavation and removal is the preferred alternative. Additional data were collected at the MOC during the 2010 field season. Specifically, ultra-violet optical screening tool (UVOST) technology was used to evaluate the extent and magnitude of petroleum-contaminated soil. In 2011 Bristol excavated over 8,000 tons of POL-contaminated soil from the MOC. In 2012 Bristol will continue to target excavating the contaminated soil located on the former building pad area and not in wetlands. Bristol estimates that over 6,500 tons of POL-contaminated soil will be excavated from the MOC in 2012.

Site 13 – Power and Heat Building

Site 13 consisted of the Heat and Electrical Power Building (Building 110). Several aboveground storage tanks (ASTs), underground storage tanks (USTs), diesel generators, and power transformers were formerly located at this site.

Soil samples collected during the 2003 demolition of the wooden utilidor corridor south of Building 110 also indicated two discrete hits of PCBs ranging from 2.4 to 16.9 mg/Kg, at depths of 4 to 5 feet below ground surface. The utilidor trenches were backfilled with clean fill.

Surface and subsurface soil samples were collected over several years to evaluate the extent of PCB contamination surrounding Building 110 and the transformer pads. During 2005, 141 tons of PCB-contaminated soils were excavated and removed from Site 13. Soil screening and laboratory confirmation samples following the 2005 removal action indicated residual PCB concentrations up to 37.1 mg/Kg at one location (excavation 13B-2). Three excavations (13C, 13D, and 13E) conducted north of Building 110 during the 2005 field season successfully removed PCB contamination to below 1 mg/Kg at these locations.

Approximately 2,420 tons of additional PCB-contaminated soil was removed from Site 13 during 2011 for a total volume removed since 2005 of 3,151 tons. Soil screening sample results indicate residual PCB-contaminated soil remains approximately 4 feet below the ground surface. A plastic liner was used to demarcate the boundary between clean backfill and potentially contaminated residual soil. Bristol is scoped to remove 2,600 tons of PCB soil from Sites 13 and 31 in 2012.

Site 21 – Wastewater Treatment Tank

Site 21 included the wastewater treatment system for the MOC. The facility was located west of the perimeter road and consisted of a concrete septic settling tank which discharged via an 8" insulated cast iron pipe to the wetland area approximately 450 feet to the west.

The septic tank compartments were cleaned and decommissioned during the 2003 removal action. The utilidor corridor from the main complex to the septic tank and the wooden utilidor outfall line were also removed in 2003. Confirmation soil samples were collected from underneath the inlet and outfall lines, adjacent to and below the lowest level of the septic tank, and from beneath the wooden utilidor corridor. The concrete sidewalls and floor of the tank were also sampled prior to demolition. All PCB sampling results from the concrete were equal to or less than 1 mg/Kg. The concrete tank was broken up and buried in place.

Soil, sediment, surface water, and shallow groundwater samples were collected at Site 21 throughout the various phases of remedial investigation. Arsenic and PCBs were identified as primary contaminants of concern during the investigations. The PCB-contaminated soil was removed at Site 21 in 2010.

Arsenic was detected at a single location (SS170) at an anomalous concentration of 170 mg/Kg in surface soil down-gradient of the septic tank outfall during the 1994 investigation. Other surface soil and subsurface soil samples collected in 1994 at Site 21 contained arsenic at levels ranging from 2.8 to 39 mg/Kg. Additional surface soil and sediment samples were collected from the surrounding tundra near the septic tank outfall in 2001 and arsenic concentrations ranged from 4.5 to 14.7 mg/Kg and were within the range of ambient levels for the NEC site. During the 2003 removal action, arsenic was detected in tundra soil samples collected from immediately beneath the demolished utilidor corridor at concentrations ranging from 11.4 to 35.2 mg/Kg. The arsenic detections are likely attributable to naturally occurring minerals in the tundra soils. There is no other known source for the detected arsenic.

Approximately 32 tons of arsenic-contaminated soil was removed from Site 21 during 2010-2011. Residual arsenic-contaminated soil (17 mg/Kg arsenic) remains above the site specific cleanup level of 11 mg/Kg. In 2012 Bristol is scoped to remove 100 tons of arsenic contaminated soil.

Site 31 – White Alice Communications Station

The White Alice Complex is located southeast and uphill from the main operations complex in a glacial valley at the base of Mt. Kangukhsam. The site included four large billboard antennas, a central main electronics building, other supporting structures, and seven ASTs.

Surface water samples were collected in 2001 and no contaminants of concern were identified.

Surface and subsurface soil samples were collected in 2001, 2003, and 2004 to evaluate the extent of petroleum hydrocarbon contamination associated with former fuel tanks and piping. Specifically, soil samples were collected from beneath fuel pipelines, fuel tanks, and tank impoundments. Samples were also collected to evaluate the extent of PCB contamination near transformer pads and a septic outfall.

The antennas, buildings, and ASTs were demolished and removed during the 2003 field season. A total of 118 tons of PCB-contaminated soil was excavated from three locations: 1) south and west of the former Main Electronics Building (Bldg 1001); 2) adjacent to a former transformer pad; and 3) at the septic tank outfall during the 2005 field season. PCB-contaminated concrete (79 tons) was removed from portions of the Building 1001 foundation. Confirmation soil samples were collected in 2005 after the removal of PCB-contaminated soil and concrete.

Confirmation soil sample results indicated PCBs remained in subsurface soil at concentrations above 1 mg/Kg (ranging from 1.53 to 7.09 mg/Kg) only adjacent to the former transformer pad. The excavations west of the former Main Electronics Building and at the septic tank outfall successfully removed all PCB contaminated soil to below 1 mg/Kg.

As a result of residual contamination present adjacent to the former transformer pad, approximately 2,058 tons of additional PCB-contaminated soil was removed from Site 31 during 2010-2011 for a total volume removed since 2005 of 2,176 tons. Residual PCB-contaminated soil remains in the subsurface. A plastic liner was used to demarcate the boundary between clean backfill soil and potentially contaminated residual soil. In 2012 Bristol is scoped to remove 2,600 tons of PCB-contaminated soil from Sites 13 and 31.

PROPOSED PLAN

Bristol plans to excavate, process, handle, and dispose off site the POL-contaminated soil to a depth of 15 feet, or 2-feet below groundwater, whichever occurs first, at the MOC. Approximately 6,700 tons of POL-contaminated soil above the site specific cleanup goal of 9,200 mg/kg DRO will be removed on the building pad (Photograph 1). During excavation, special attention will be given to separation of clean overburden. Clean overburden will be separately stockpiled from contaminated soil. Upon completion of excavation, stockpiled overburden will be used as backfill. Following backfill with stockpiled overburden, clean backfill from the local borrow source will be used (Photograph 2). Backfill will be placed to an elevation that ensures positive drainage without ponding of water and will not promote erosion.

An estimated 2,600 tons of PCB-contaminated soil from Sites 13 and 31 will be excavated, handled, and disposed off site (Photographs 3 and 4). Both of these sites are in gravel pad or very coarse grain to cobbly soils. From Site 21 an estimated 100 tons of arsenic-contaminated soil will be excavated, handled, and disposed off site (Photograph 5).

Photograph 1 – Main Operations Complex building pad area.

Photograph 2 – Working borrow area.

Photograph 3 - Site 13 area excavated in 2011.

Photograph 4 – Site 31 POL-contaminated soil excavation area.

Photograph 5 – Site 21 arsenic-contaminated soil excavation area.

Alaska Department of Environmental Conservation
Wastewater Discharge Authorization Programs

STATE OF ALASKA WASTEWATER GENERAL PERMIT

2009DB0004

Contained Water GP

This permit is issued under provisions of Alaska Statutes 46.03, the Alaska Administrative Code as amended, and other applicable State laws and regulations. This permit may be terminated, modified, or renewed under provisions of Alaska Statute and the Alaska Administrative Code. This permit supersedes State wastewater general permit 2003DB0089.

This wastewater discharge general permit is available for use by persons responsible for the discharge of contained water that meets the eligibility criteria in this permit. Contained water means water isolated from the environment in a manmade container or a lined impoundment structure.

The owners and operators of facilities covered under this general permit are authorized to discharge to the lands and waters of the State of Alaska in accordance with discharge point(s) effluent limitations, monitoring requirements, and other conditions set forth herein.

This general permit shall become effective **March 19, 2009**

This general permit and the authorization to discharge shall expire at midnight, **March 18, 2014**.

SIGNATURE ON FILE	3/19/2009
Signature	Date
Sharmon M Stambaugh	Wastewater Discharge Program Manager
Printed Name	Title

Wastewater Discharges Eligible For Coverage Under this Permit. This general permit applies to:

- contained water including, but not limited to: hydrostatic test water or chlorinated water from tanks, pipelines, swimming pools, and other containers that hold wastewater that meets state water quality standards in 18 AAC 70 and the effluent limitations in Section 1.2.2 of this permit;

Wastewater Discharges Not Covered by this Permit. This general permit does not apply to:

- Contaminated groundwater where halogenated hydrocarbons are the primary contaminant of concern;
- A discharge to waters listed by the state as impaired, where the impairment is wholly or partially caused by a pollutant contained within the proposed discharge;
- A discharge from a sewage lagoon or other treatment works subject to a different State wastewater discharge permit;
- A discharge permitted under storm water general permits;
- A discharge to groundwater under a response action, a cleanup, or a corrective action approved under 18 AAC 70.005; or
- A wastewater discharge originating from water accumulations within secondary containment areas as regulated under 18 AAC 75.075 (d), AND is intended to be discharged to a surface water.

Notice of Intent (NOI) Requirements

- An NOI under Section 1.1.1 and prior written authorization from the Department are required for one-time discharge (i.e., no more than one discharge per year) of a volume of water greater than or equal to 10,000 gallons through discharge to the land surface or to a surface water body; or
- An NOI is not required for a one-time discharge of a volume of water less than 10,000 gallons, however, all terms and conditions of this permit, including the effluent limitations in Section1.2.2, still apply.

General Provisions

A wastewater discharge authorized under this general permit is subject to the terms and conditions specified in Sections 1 and 2 of this permit. All discharges made under the authority of this permit, regardless of size, are subject to the terms and conditions contained herein. Approval to operate under this permit shall be valid for not longer than 12 months. This permit does not relieve the permittee of the responsibility of obtaining other required permits if any.

The Department will require a person to obtain an individual permit when the wastewater discharge does not meet the eligibility criteria of this general permit, contributes to pollution, has the potential to cause or causes an adverse impact on public health or water quality, or a change occurs in the availability of technology or practices for the control or abatement of pollutants contained in the discharge.

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1 OPERATIONAL REQUIREMENTS

1.1 NOTICE OF INTENT

1.1.1 An applicant wishing to conduct a discharge activity under this permit and whose total discharge volume is equal to or greater than 10,000 gallons, must submit a Notice of Intent to the Alaska Department of Environmental Conservation. The Notice of Intent form can be found at http://www.dec.state.ak.us/water/wwdp/index.htm or by sending a request to DEC.Water.WQPermit@alaska.gov. The Notice of Intent must be submitted to ADEC at least thirty (30) days prior to the start of the discharge activity at:

Alaska Department of Environmental Conservation
Division of Water
Wastewater Discharge Authorization Programs
555 Cordova Street
Anchorage, Alaska 99501
Phone (907)-269-6285
Fax (907)-269-3487
Email DEC.Water.WQPermit@alaska.gov
http://www.dec.state.ak.us/water/wwdp/index.htm

1.1.2 A Notice of Intent is **not** required for discharges of less than a total of 10,000 gallons. However the water quality standards in 18 AAC 70 and the terms and conditions in this permit still apply to all activities conducted under this permit even if submittal of a Notice of Intent is not required.

1.1.3 The Notice of Intent must be accompanied by the appropriate fee as found in 18 AAC 72.956 or any such regulations as amended. The permit fees can be found the Department's website at: www.state.ak.us\dec\water\wwdp\online permitting\fees.htm

1.1.4 An applicant must have written authorization from the Department before conducting a discharge activity under this permit which results in a total discharge of 10,000 gallons or more of contained water. The Department will, in its discretion, deny use of this permit, or attach or waive conditions appropriate for a specific discharge activity in the authorization.

1.1.5 The written authorization is effective for the period beginning on the effective date of the authorization and lasting through its expiration date. If this permit is modified or renewed during the term of the authorization, the new permit requirements apply.

1.2 TERMS AND CONDITIONS

1.2.1 The permittee is authorized to discharge wastewater as specified in this subsection.

1.2.2 Wastewater discharged shall not exceed the following limitations:

Effluent Characteristic	**Maximum Value**
Turbidity	5 NTU above background[1]
Settleable Solids	0.2 mL/L (milliliters per liter)
Total Chlorine	11 µg/L fresh water or 7.5 µg/L saltwater (micrograms per liter)
pH	Between 6.5 and 8.5 pH units or within 0.2 units (marine water), or 0.5 units (fresh water) of the receiving water pH at all times.
Total Aqueous Hydrocarbons (TAqH)	15 µg/L (micrograms per liter)
Total Aromatic Hydrocarbons (TAH)	10 µg/L (micrograms per liter)

1.2.3 The discharge shall not cause thermal or physical erosion.

1.2.4 The discharge shall not cause re-suspension of sediments upon discharge to receiving waters.

1.2.5 The discharge shall be free of (a) any additives such as antifreeze solutions, methanol, solvents, and corrosion inhibitors; (b) solid wastes and garbage; (c) toxic substances; (d) grease or oils which exceed the effluent limitations in Section 1.2.2 or produce sheen; (e) foam in other than trace amounts; or (f) other contaminants.

1.2.6 The discharge shall not cause a violation of the Alaska Water Quality Standards (18 AAC 70).

1.2.7 The discharge shall not cause adverse effects to aquatic or plant life, their reproduction or habitats.

1.2.8 The Department will, in its discretion, attach terms and conditions to the written authorization required by Section1.1.4, as appropriate.

1 Applies to discharges to the waters of the state only. Not in effect for disposals which freeze upon discharge. Shall not have more than 10% increase in turbidity when the natural condition is more than 50 NTU, not to exceed a maximum increase of 15 NTU. Shall not exceed 5 NTU over natural conditions for all lake waters.

1.2.9 This permit does not constitute a grant of water rights.

1.2.10 An applicant must contact the Department of Fish & Game, Office of Habitat Management and Permitting, http://www.habitat.adfg.alaska.gov/ , two weeks prior to any discharge, if the discharged water will enter fish-bearing waters.

1.2.11 If a toxic pollutant (including oil, grease, or solvents) concentration standard is established in accordance with 18 AAC 70 for a pollutant present in this discharge, and such standard is more stringent than the limitation in this permit, this permit is considered to be modified in accordance with the toxic pollutant concentration standard.

1.3 MONITORING

1.3.1 Test procedures used for sample analysis shall conform to methods cited in 18 AAC 70.020(c), or as such regulations may be amended. The permittee may substitute alternative methods of monitoring or analysis upon receipt of prior written approval from the Department.

1.3.2 The permittee shall use current calibrated equipment when taking field measurements, and shall use bottles and sampling procedures provided by the laboratory when taking samples for laboratory analysis.

1.3.3 Samples and measurements taken shall be representative of the volume and nature of the monitored activity.

1.3.4 For discharges equal to or greater than 10,000 gallons, the permittee shall monitor the contained water, background natural condition, or the wastewater stream of the discharge in the following manner and frequency. Monitoring results from all before discharge samples must be received and reviewed by the permittee before discharging in order to insure compliance with the conditions in Section 1.2.2.

For discharges less than 10,000 gallons, the permittee is required to conduct the Field monitoring to insure compliance with the conditions in Section 1.2.2, but is not required to conduct the TAqH or TAH Lab monitoring unless there is sheen.
In accordance with this section, the following requirements apply:

Effluent Characteristic	**Sample Location**	**Minimum Frequency**	**Sample Type**	**Sample method**
Total Flow	Effluent	Daily	Estimate or Measured	Field
Turbidity (NTU)	Effluent & Background	Before discharge and 1 per week	Grab	Field
Settleable Solids	Effluent	Before discharge and 1 per week	Grab	Field (see note 11 to 18 AAC 70.020(b))
Total Chlorine	Containment	Before discharge	Grab	Field
pH	Containment	Before discharge	Grab	Field
Total Aqueous Hydrocarbons (TAqH)	Containment	Before discharge	Grab	Lab method 602 or 624 (see note 7 to 18 AAC 70.020(b))
Total Aromatic Hydrocarbons (TAH)	Containment	Before discharge	Grab	Lab method 610 or 625 (see note 7 to 18 AAC 70.020(b))

1.3.5 If the permittee monitors any contained water, discharge, or surface water characteristic identified in this permit more frequently than required, the results of such monitoring shall be reported to the Department in the monitoring report required under Section 1.4 of this permit.

1.3.6 Additional monitoring parameters and increased monitoring frequency may be required on a case-by-case basis.

1.3.6 Specific requirements for monitoring may be waived by the Department in the authorization to discharge under this permit if the information submitted in the Notice of Intent demonstrates no reasonable potential to exceed the effluent limitations in Section 1.2.2 of this permit.

1.4 REPORTING

For a discharge equal to or greater than 10,000 gallons, monitoring results shall be recorded on a Discharge Monitoring Report (DMR) and submitted no later than the 14th day of the month following the month that each sampling occurs. Reporting shall begin when the discharge starts. Reporting shall be done on the electronic form included with the written authorization or on the form located at the website address provided below. The reports shall be emailed AND signed copies of the monitoring results and all other reports required herein shall be submitted to the Department office at the following address:

Alaska Department of Environmental Conservation
Division of Water
Compliance Section
555 Cordova Street
Anchorage, Alaska 99501
Toll free 1-877-569-4114 (outside Anchorage service area)
In Anchorage service area 907-269-4114
Fax (907) 269-4604
Email: dec-wqreporting@alaska.gov
http://www.dec.state.ak.us/water/Compliance/index.htm

A false statement knowingly made by the permittee, the operator, or other employee, including a contractor, on any such report may result in the imposition of criminal penalties as provided for under AS 46.03.790.

1.5 RECORDS RETENTION

All records and information resulting from the monitoring activities required by this permit, including all records of analyses performed, calibration and maintenance of instrumentation, and recordings from continuous monitoring instrumentation shall be retained in Alaska for three years for observation by the Department. Upon request from the Department, the permittee shall submit certified copies of such records.

1.6 CHANGE IN DISCHARGE

A discharge authorized herein shall comply with the terms and conditions of this permit. The discharge of any pollutant or toxic material more frequently than specified, or at a concentration or limit not authorized, shall constitute noncompliance with the permit. Any anticipated construction changes, flow increases, or process modifications which will result in new, different, or increased discharge of pollutants and will cause a violation of this permit's limitations are not allowed under this permit and must be reported by submission of an individual waste discharge permit application or a revision of the Notice of Intent. Physical changes to the treatment process may be subject to plan review.

1.7 ACCIDENTAL DISCHARGES

The permittee shall provide protection from accidental discharges not in compliance with the terms and conditions of this permit. Facilities to prevent such discharges shall be maintained in good working condition at all times.

1.8 NONCOMPLIANCE NOTIFICATION

1.8.1 If, for any reason, the permittee does not comply with or will be unable to comply with any term or condition specified in this permit, the permittee shall report the noncompliance to the Department within 72 hours of becoming aware of such noncompliance. This report shall be by telephone, fax, email, or in the absence of these avenues, by mail to the address information provided in Section 1.4.

1.8.2 A written follow-up report shall be sent to the Department within seven (7) days of the noncompliance event. The written report shall contain, but is not limited to:

1.8.2.1 Times and dates on which the event occurred, and if not corrected, the anticipated time the noncompliance is expected to continue;

1.8.2.2 A detailed description of the event, including quantity and type of materials causing the noncompliance;

1.8.2.3 Details of any actual or potential impact on the receiving environment or public health;

1.8.2.4 Details of actions taken or to be taken to correct the cause(s) of the event and to remedy any damage that result from the event.

1.8.2.5 A permittee may use the ADEC non-compliance notification form to provide the required information of this section. Go to the website address provided in Section 1.4 or send a request to the email address provided in Section 1.4.

1.9 RESTRICTION OF PERMIT USE

The department will require a person with a general permit authorization to obtain an individual permit if the department determines that the discharge does not meet the requirements of this permit, the discharge contributes to pollution, there is a change in technology, or the environment or public health are not protected.

1.10 TRANSFER OF OWNERSHIP

In the event of any change in control or ownership of the permitted facility, the permittee shall notify the succeeding owner or controller of the existence of this permit and the authorization by letter or by using the Change in Ownership Form. A copy of the letter or form shall be forwarded to the Department at the address listed in Section1.1. The original permittee remains responsible for permit compliance unless and until the succeeding owner or controller agrees in writing to assume such responsibility and the Department approves assignment of the permit. The Department will not unreasonably withhold such approval.

2 GENERAL REQUIREMENTS

2.1 ACCESS AND INSPECTION

The permittee shall allow the department access to the permitted facilities at reasonable times to conduct scheduled or unscheduled inspections or tests to determine compliance with this permit, the terms of the authorization to operate under this permit, State laws, and regulations.

2.2 INFORMATION ACCESS

Except where protected from disclosure by applicable state or federal law, all records and reports submitted in accordance with the terms and conditions of this permit shall be available for public inspection at the appropriate State of Alaska Department of Environmental Conservation office.

2.3 CIVIL AND CRIMINAL LIABILITY

Nothing in this permit shall relieve the permittee from any potential civil or criminal liability for noncompliance with this permit, their authorization to operate, or applicable laws and regulations.

2.4 AVAILABILITY

The permittee shall post or maintain a copy of this permit and their authorization available to the public at the discharge facility.

2.5 ADVERSE IMPACT

The permittee shall take all necessary means to minimize any adverse impacts to the receiving waters or lands resulting from noncompliance with any limitation or condition specified in this permit, including additional monitoring needed to determine the nature and impact of the non-complying activity. The permittee shall clean up and restore all areas adversely impacted by the non-complying activity.

2.6 CULTURAL OR PALEONTOLOGICAL RESOURCES

If cultural or paleontological resources are discovered as a result of this discharge activity, work which would disturb such resources is to be stopped, and the State Historic Preservation Office, Division of Parks and Outdoor Recreation, Department of Natural Resources (907) 762-2622, is to be notified immediately.

2.7 OTHER LEGAL OBLIGATIONS

This permit does not relieve the permittee from the duty to obtain any other necessary permits or approvals from the Department or other local, state, or federal agencies, and to comply with the requirements contained in any such permits. All activity conducted and all plan approvals implemented by the permittee pursuant to the terms of this permit shall comply with all applicable local, state, and federal laws and regulations.

2.8 POLLUTION PREVENTION

In order to prevent and minimize present and future pollution, when making management decisions that affect waste generation, the permittee shall consider the following order of priority options as outlined in AS 46.06.021:

- Wastewater source reduction;
- Wastewater recycling;
- Wastewater treatment; and
- Wastewater discharge to the environment.

STATE OF ALASKA

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

FISH HABITAT PERMIT
FH09-III-0103
Amendment #1

ISSUED: April 22, 2009
AMENDMENT #1 ISSUED: June 5, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Bridge Repair, Northeast Cape White Alice Site Removal Action (St. Lawrence Island); T25S, R54W, Suqitughneq River; SID AK0203-17AA

Pursuant to AS 16.05.841, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, has reviewed Ms. Susan Luetters' email request, dated June 4, 2009, to amend Fish Habitat Permit FH09-III-0103 to authorize withdrawal of up to 3,000 gallons per day of water from the Suqitughneg River (180,000 gallons per season). Water will be withdrawn with a 4-inch diameter pump at a rate of 35 gpm. Proposed season of use is July 15, 2009 to September 15, 2009.

In accordance with AS 16.05.841, Fish Habitat Permit FH09-III-0103 is hereby amended subject to the following stipulation:

(1) In fish bearing waters, pump intakes or stream diversions shall be designed to prevent intake, impingement, or entrapment of fish. Each water intake structure shall be centered in a screened enclosure. The effective screen opening may not exceed ¼ inch. To reduce fish impingement on the screened surfaces, water velocity at the screen/water interface may not exceed 0.5 feet per second when the pump is operating.

NOTE: Due the small water withdrawal rate, the simplest manner to achieve compliance with this stipulation is to perforate the lower third of a 5-gallon plastic bucket with a large number of ¼-inch holes, place some large rock in the bucket to keep it submerged, and then place the intake hose (presumably with a small rock chuck) in the bucket.

All other terms and conditions of FH09-III-0103 remain in effect.

Sincerely,

Denby S. Lloyd, Commissioner

Robt F McLean

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division
Alaska Department of Fish and Game

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

STATE OF ALASKA

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

FISH HABITAT PERMIT
FH09-III-0102

ISSUED: April 22, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Equipment Stream Crossing, Northeast Cape White Alice Site Removal Action (St. Lawrence Island), T25S, R54W, Quangeghsaq River; SID AK 0203-17AA

Pursuant to AS 16.05.841, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, has reviewed your proposal to make multiple crossings at multiple sites (four) across the Quangeghsaq River with amphibious all-terrain vehicles. Timbers or poles may need to be placed in and adjacent to the stream to create better crossing sites that prevent ATVs from getting stuck and reduce damage to vegetation. Access is needed to cut down and remove hundreds of poles from abandoned utility lines. ADF&G originally received a description of the proposed project on March 19, 2002 and a more detailed description via email on April 3, 2002. That activity was permitted under Fish Habitat Permit FG02-III-0073 which expired December 31, 2005. Additional access may be needed to conduct maintenance activities.

The Quangeghsaq River supports anadromous Dolly Varden (and possibly whitefish) and resident fish (e.g., Alaska blackfish) in the area of your proposed activity. Based upon our review of your plans, your proposed project may obstruct the efficient passage and movement of fish.

In accordance with AS 16.05.841, project approval is hereby given subject to the following stipulations:

(1) Equipment crossings shall be made from bank to bank in a direction substantially perpendicular to the direction of stream flow.

Equipment crossings shall be made only at locations with gradually sloping banks. There shall be no crossings at locations with sheer or cut banks.

Banks shall not be altered or disturbed in any way to facilitate crossings. If stream banks are inadvertently disturbed, they shall be immediately stabilized to prevent erosion.

(2) If timber/poles are placed in and adjacent to the stream to create a crossing site, they must be placed in such a way that free passage of fish is assured. In addition, all material shall be completely removed from the streambed and banks at the end of each work season. If needed, the streambed shall be recontoured to assure that "trenches" are not left that will trap fish at low-water levels.

(3) Vehicle crossings shall be limited to only what is necessary to accomplish work.

(4) No damming or diversions are permitted.

The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved plan. For any activity that significantly deviates from the approved plan, the permittee shall notify the ADF&G and obtain written approval in the form of a permit amendment before beginning the activity. Any action taken by the permittee, or an agent of the permittee, that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the ADF&G. Therefore, it is recommended that the ADF&G be consulted immediately when a deviation from the approved plan is being considered.

This letter constitutes a permit issued under the authority of AS 16.05.841. This permit must be retained on site during construction. Please be advised that this approval does not relieve you of the responsibility of securing other permits, state, federal or local.

This permit provides reasonable notice from the commissioner that failure to meet its terms and conditions constitutes violation of AS 16.05.861; no separate notice under AS 16.05.861 is required before citation for violation of AS 16.05.841 can occur.

In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which were a direct result of the failure to comply with this permit or any applicable law.

The recipient of this permit (permittee) shall indemnify, save harmless, and defend the department, its agents and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or the permittee's performance under this permit. However, this provision has no effect, if, and only if, the sole proximate cause of the injury is the department's negligence.

Sincerely,

Denby S. Lloyd, Commissioner

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

FISH HABITAT PERMIT
FH09-III-0103

ISSUED: April 22, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Bridge Repair, Northeast Cape White Alice Site Removal Action (St. Lawrence Island); T25S, R54W, Suqitughneq River; SID AK0203-17AA

Pursuant to AS 16.05.841, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, has reviewed your proposal to place riprap or conduct maintenance activities in the Suqitughneq River (on St. Lawrence Island) to protect the bridge abutments. ADF&G received your request via email on April 17, 2009. Your original request was received on March 19, 2002 with a more detailed description received via email on April 3, 2002. The original activity was permitted under Fish Habitat Permit FG02-III-0072 which expired December 31, 2005.

Your original proposed project entailed placing approximately 15 cubic yards of riprap at the base of the abutments of the bridge crossing the Suqitughneq River each work season (two work seasons are anticipated). An excavator, operating from the deck of the bridge, will place the riprap. The current proposed work will included any necessary repairs but will not exceed the original footprint and scope of work.

The Suqitughneq River supports anadromous Dolly Varden (and possibly whitefish) and resident fish (e.g., Alaska blackfish) in the area of your proposed activity. Based upon our review of your plans, your proposed project should not obstruct the efficient passage and movement of fish.

In accordance with AS 16.05.841, project approval is hereby given subject to the following stipulations:

(1) Banks shall not be altered or disturbed in any way. If stream banks are inadvertently disturbed, they shall be immediately stabilized to prevent erosion.

(2) "End-dumping" riprap is prohibited. Riprap shall be strategically placed to prevent excess rock in the streambed.

The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved plan. For any activity that significantly deviates from the approved plan, the permittee shall notify the ADF&G and obtain written approval in the form of a permit amendment before beginning the activity. Any action taken by the permittee, or an agent of the permittee, that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the ADF&G. Therefore, it is recommended that the ADF&G be consulted immediately when a deviation from the approved plan is being considered.

This letter constitutes a permit issued under the authority of AS 16.05.841. This permit must be retained on site during construction. Please be advised that this approval does not relieve you of the responsibility of securing other permits, state, federal or local.

This permit provides reasonable notice from the commissioner that failure to meet its terms and conditions constitutes violation of AS 16.05.861; no separate notice under AS 16.05.861 is required before citation for violation of AS 16.05.841 can occur.

In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which were a direct result of the failure to comply with this permit or any applicable law.

The recipient of this permit (permittee) shall indemnify, save harmless, and defend the department, its agents and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or the permittee's performance under this permit. However, this provision has no effect, if, and only if, the sole proximate cause of the injury is the department's negligence.

Sincerely,

Denby S. Lloyd, Commissioner

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division
Alaska Department of Fish and Game

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

Luetters, Susan

From: Sackinger, Robert B (DNR) <robert.sackinger@alaska.gov>
Sent: Wednesday, April 11, 2012 3:51 PM
To: Luetters, Susan
Cc: Floyd, Christopher B POA; Welker, Molly
Subject: RE: NE Cape 2012

Susan,

Dianna is now working for BLM. I have assumed her previous duties.
The letter is still valid. I will note (again) that clean up is still ongoing. You are "good to go."

Thanks,

R. Bruce Sackinger
Natural Resource Specialist III
State of Alaska, Department of Natural Resources
Division of Mining, Land & Water, Northern Regional Office
(907) 451-2720
bruce.sackinger@alaska.gov

From: Luetters, Susan [mailto:sluetters@bristol-companies.com]
Sent: Wednesday, April 11, 2012 3:29 PM
To: Sackinger, Robert B (DNR)
Cc: Floyd, Christopher B POA; Welker, Molly
Subject: FW: NE Cape 2012

Please disregard the previous email as one of the attachments was incomplete.

Susan Luetters
Senior Environmental Scientist
Bristol Engineering Services Corporation
Phone : (907) 563-0013

From: Luetters, Susan
Sent: Wednesday, April 11, 2012 3:20 PM
To: 'Leinberger, Dianna L (DNR)'
Cc: Welker, Molly; Floyd, Christopher B POA
Subject: RE: NE Cape 2012

Hi Dianna,

It is that time of year again. Bristol Environmental Remediation Services (BERS) will be heading out to North East Cape again. I have included the email string from the past couple of years, and as attachments the original Permit letter and the current year's project description. Conditions surrounding the request remain unchanged from the past three years. Are we still good to go?

f you require any additional information please call/email me.

From:	Kimberly_Klein@fws.gov
To:	Luetters, Susan
Cc:	Floyd, Christopher B POA; Welker, Molly
Subject:	RE: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island
Date:	Monday, April 23, 2012 5:01:03 PM

Susan, Christopher, and Molly,

Thank you for sending the project description and figures for the proposed 2012 cleanup
activities at the St. Lawrence Island Northeast Cape Site for potential impacts to threatened and endangered species. We reviewed and evaluated the project for new information
following the activities of 2010. Based on this information, we have determined that the project has not substantially changed from that evaluated in 2009-2011, and as such, it will not be
necessary to reinitiate consultation with the US Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act for this year's (2012) activities. The determination and concurrence statement issued May 13, 2009 will remain in effect and applicable to the cleanup activities of 2012.

This letter relates only to federally listed or proposed species, and/or designated or proposed critical habitat, under our jurisdiction. This letter does not address species under the jurisdiction of the National Marine
Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, or Bald and Golden Eagle Protection Act. Please send us and available monitoring and reporting documents or updated permits when these are available, and let us know if you have any questions or
concerns. Thank you.

Kimberly Klein
Endangered Species Biologist
USFWS/AFWFO
605 W. 4th Ave. Room G-61
Anchorage, AK 99501
(907) 271-2066

"Luetters, Susan" <sluetters@bristol-companies.com>

"Luetters, Susan" <sluetters@bristol-companies.com>

04/13/2012 05:17 PM

To<Kimberly_Klein@fws.gov>
cc"Welker, Molly" <mwelker@bristol-companies.com>, "Floyd, Christopher B POA" <Christopher.B.Floyd@usace.army.mil>
SubjectRE: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island

Luetters, Susan

From:	Dana Seagars <dana.seagars@noaa.gov>
Sent:	Wednesday, April 11, 2012 4:34 PM
To:	Luetters, Susan
Cc:	Welker, Molly; Jon Kurland
Subject:	Re: St. Lawrence Island: NE Cape Cleanup 2012

Hi Susan:
There have been no changes on the Steller sea lion front since last year, so yes, the letter is still valid.
Please adjust your contact for Assistant Administrator of Protected Resources from Kaja Brix to Jon Kurland effective immediately. Jon's email is Jon.Kurland@noaa.gov and his phone number in Juneau is 907-586-7638.
Thank you, Dana Seagars

On Wed, Apr 11, 2012 at 3:10 PM, Luetters, Susan <sluetters@bristol-companies.com> wrote:

Hi Dana,

Bristol Environmental Remediation Services (BERS) will be heading out to North East Cape again this year in June, and we are checking in with NOAA-NMFS to reaffirm our compliance with existing reg.'s as it pertains to our work getting to, and while on, the island.

The email string associated with this transmission is the correspondence between your office and ours beginning in 2010.

We would appreciate it if you would please verify that the original letter, as it stands, is still valid. For your information I have attached the current Project Description and the original 2009 correspondence between our office and yours regarding marine species of concern to NOAA-NMFS.

Thank you for your time and attention to this matter, and if you have any questions please call or email me.

Susan Luetters
Senior Environmental Scientist
Bristol Environmental Remediation Services, LLC
111 W. 16th Avenue, Third Floor
Anchorage, AK 99501-5109
Phone : (907) 563-0013
Direct : (907) 743-9316
FAX : (907) 563-6713
sluetters@bristol-companies.com
http://www.bristol-companies.com/

STATE OF ALASKA

SARAH PALIN, GOVERNOR

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

FISH HABITAT PERMIT
FH09-III-0103

ISSUED: April 22, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Bridge Repair, Northeast Cape White Alice Site Removal Action (St. Lawrence Island); T25S, R54W, Suqitughneq River; SID AK0203-17AA

Pursuant to AS 16.05.841, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, has reviewed your proposal to place riprap or conduct maintenance activities in the Suqitughneq River (on St. Lawrence Island) to protect the bridge abutments. ADF&G received your request via email on April 17, 2009. Your original request was received on March 19, 2002 with a more detailed description received via email on April 3, 2002. The original activity was permitted under Fish Habitat Permit FG02-III-0072 which expired December 31, 2005.

Your original proposed project entailed placing approximately 15 cubic yards of riprap at the base of the abutments of the bridge crossing the Suqitughneq River each work season (two work seasons are anticipated). An excavator, operating from the deck of the bridge, will place the riprap. The current proposed work will included any necessary repairs but will not exceed the original footprint and scope of work.

The Suqitughneq River supports anadromous Dolly Varden (and possibly whitefish) and resident fish (e.g., Alaska blackfish) in the area of your proposed activity. Based upon our review of your plans, your proposed project should not obstruct the efficient passage and movement of fish.

In accordance with AS 16.05.841, project approval is hereby given subject to the following stipulations:

(1) Banks shall not be altered or disturbed in any way. If stream banks are inadvertently disturbed, they shall be immediately stabilized to prevent erosion.

(2) "End-dumping" riprap is prohibited. Riprap shall be strategically placed to prevent excess rock in the streambed.

The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved plan. For any activity that significantly deviates from the approved plan, the permittee shall notify the ADF&G and obtain written approval in the form of a permit amendment before beginning the activity. Any action taken by the permittee, or an agent of the permittee, that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the ADF&G. Therefore, it is recommended that the ADF&G be consulted immediately when a deviation from the approved plan is being considered.

This letter constitutes a permit issued under the authority of AS 16.05.841. This permit must be retained on site during construction. Please be advised that this approval does not relieve you of the responsibility of securing other permits, state, federal or local.

This permit provides reasonable notice from the commissioner that failure to meet its terms and conditions constitutes violation of AS 16.05.861; no separate notice under AS 16.05.861 is required before citation for violation of AS 16.05.841 can occur.

In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which were a direct result of the failure to comply with this permit or any applicable law.

The recipient of this permit (permittee) shall indemnify, save harmless, and defend the department, its agents and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or the permittee's performance under this permit. However, this provision has no effect, if, and only if, the sole proximate cause of the injury is the department's negligence.

Sincerely,

Denby S. Lloyd, Commissioner

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division
Alaska Department of Fish and Game

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

STATE OF ALASKA

SARAH PALIN, GOVERNOR

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

1300 COLLEGE RD.
FAIRBANKS, AK 99701
PHONE: (907) 459-7289
FAX: (907) 459-7303

FISH HABITAT PERMIT
FH09-III-0102

ISSUED: April 22, 2009
EXPIRES: December 31, 2014

Ms. Molly Welker
Bristol Environmental and Engineering Services Corporation
111 W. 16th Ave., Third Floor
Anchorage, AK 99501-5109

Dear Ms. Welker:

RE: Equipment Stream Crossing, Northeast Cape White Alice Site Removal Action (St. Lawrence Island), T25S, R54W, Quangeghsaq River; SID AK 0203-17AA

Pursuant to AS 16.05.841, the Alaska Department of Fish and Game (ADF&G), Division of Habitat, has reviewed your proposal to make multiple crossings at multiple sites (four) across the Quangeghsaq River with amphibious all-terrain vehicles. Timbers or poles may need to be placed in and adjacent to the stream to create better crossing sites that prevent ATVs from getting stuck and reduce damage to vegetation. Access is needed to cut down and remove hundreds of poles from abandoned utility lines. ADF&G originally received a description of the proposed project on March 19, 2002 and a more detailed description via email on April 3, 2002. That activity was permitted under Fish Habitat Permit FG02-III-0073 which expired December 31, 2005. Additional access may be needed to conduct maintenance activities.

The Quangeghsaq River supports anadromous Dolly Varden (and possibly whitefish) and resident fish (e.g., Alaska blackfish) in the area of your proposed activity. Based upon our review of your plans, your proposed project may obstruct the efficient passage and movement of fish.

In accordance with AS 16.05.841, project approval is hereby given subject to the following stipulations:

(1) Equipment crossings shall be made from bank to bank in a direction substantially perpendicular to the direction of stream flow.

Equipment crossings shall be made only at locations with gradually sloping banks. There shall be no crossings at locations with sheer or cut banks.

Banks shall not be altered or disturbed in any way to facilitate crossings. If stream banks are inadvertently disturbed, they shall be immediately stabilized to prevent erosion.

(2) If timber/poles are placed in and adjacent to the stream to create a crossing site, they must be placed in such a way that free passage of fish is assured. In addition, all material shall be completely removed from the streambed and banks at the end of each work season. If needed, the streambed shall be recontoured to assure that "trenches" are not left that will trap fish at low-water levels.

(3) Vehicle crossings shall be limited to only what is necessary to accomplish work.

(4) No damming or diversions are permitted.

The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved plan. For any activity that significantly deviates from the approved plan, the permittee shall notify the ADF&G and obtain written approval in the form of a permit amendment before beginning the activity. Any action taken by the permittee, or an agent of the permittee, that increases the project's overall scope or that negates, alters, or minimizes the intent or effectiveness of any stipulation contained in this permit will be deemed a significant deviation from the approved plan. The final determination as to the significance of any deviation and the need for a permit amendment is the responsibility of the ADF&G. Therefore, it is recommended that the ADF&G be consulted immediately when a deviation from the approved plan is being considered.

This letter constitutes a permit issued under the authority of AS 16.05.841. This permit must be retained on site during construction. Please be advised that this approval does not relieve you of the responsibility of securing other permits, state, federal or local.

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In addition to the penalties provided by law, this permit may be terminated or revoked for failure to comply with its provisions or failure to comply with applicable statutes and regulations. The department reserves the right to require mitigation measures to correct disruption to fish and game created by the project and which were a direct result of the failure to comply with this permit or any applicable law.

The recipient of this permit (permittee) shall indemnify, save harmless, and defend the department, its agents and its employees from any and all claims, actions or liabilities for injuries or damages sustained by any person or property arising directly or indirectly from permitted activities or the permittee's performance under this permit. However, this provision has no effect, if, and only if, the sole proximate cause of the injury is the department's negligence.

Sincerely,

Denby S. Lloyd, Commissioner

Robt F McLean

BY: Robert F. "Mac" McLean, Regional Supervisor
Habitat Division

cc: Chris Milles, ADNR, Fairbanks
Ann Rappoport, USFWS, Anchorage
Jeanne Hanson, NMFS, Anchorage

RFM:mac

From:	Kimberly_Klein@fws.gov
To:	Luetters, Susan
Cc:	Floyd, Christopher B POA; Welker, Molly
Subject:	RE: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island
Date:	Monday, April 23, 2012 5:01:03 PM

Susan, Christopher, and Molly,
Thank you for sending the project description and figures for the proposed 2012 cleanup
activities at the St. Lawrence Island Northeast Cape Site for potential impacts to threatened and endangered species. We reviewed and evaluated the project for new information
following the activities of 2010. Based on this information, we have determined that the project has not substantially changed from that evaluated in 2009-2011, and as such, it will not be
necessary to reinitiate consultation with the US Fish and Wildlife Service pursuant to Section 7 of the Endangered Species Act for this year's (2012) activities. The determination and concurrence statement issued May 13, 2009 will remain in effect and applicable to the cleanup activities of 2012.

This letter relates only to federally listed or proposed species, and/or designated or proposed critical habitat, under our jurisdiction. This letter does not address species under the jurisdiction of the National Marine
Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, or Bald and Golden Eagle Protection Act. Please send us and available monitoring and reporting documents or updated permits when these are available, and let us know if you have any questions or
concerns. Thank you.

Kimberly Klein
Endangered Species Biologist
USFWS/AFWFO
605 W. 4th Ave. Room G-61
Anchorage, AK 99501
(907) 271-2066

"Luetters, Susan" <sluetters@bristol-companies.com>

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04/13/2012 05:17 PM

To <Kimberly_Klein@fws.gov>
cc "Welker, Molly" <mwelker@bristol-companies.com>, "Floyd, Christopher B POA" <Christopher.B.Floyd@usace.army.mil>
Subject RE: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island

Hi Kim,

Bristol Environmental Remediation Services (BERS) will be heading out to North East Cape again this year. We are anticipating arrival on Island in June. We just wanted to touch base with USFWS to make sure that we were all still good with USFWS. Included as attachments is the 2012 project description and the 2012 version of the questions that we have been answering for the last couple of years.

Please let me know if you require any additional information.

Susan Luetters
Senior Environmental Scientist
Bristol Environmental Remediation Services, LLC
111 W. 16th Avenue, Third Floor
Anchorage, AK 99501-5109
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From: Kimberly_Klein@fws.gov [mailto:Kimberly_Klein@fws.gov]
Sent: Wednesday, June 01, 2011 10:10 PM
To: Welker, Molly
Cc: Luetters, Susan
Subject: Re: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island

S

STATE OF ALASKA

SEAN PARNELL, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINING, LAND & WATER
Water Resources Section

550 WEST 7TH AVENUE, SUITE 1020
ANCHORAGE, ALASKA 99501-3562
PHONE: (907) 269-8600
FAX: (907) 269-8904

June 12, 2012

Bristol Environmental Remediation Services
Attn: Molly Welker
111 W. 16th Avenue, Third Floor
Anchorage, AK 99501

Subject: Temporary Water Use Authorization, TWUP A2012-63

Dear Ms. Welker:

The Water Resources Section completed the review of the Application for Temporary Use of Water from Bristol Environmental Remediation Services. Enclosed is the Temporary Water Use Authorization TWUP A2012-63, **with an expiration date of September 15, 2016,** for uses associated with the ongoing environmental remedial cleanup activities at the former Northeast Cape site on St. Lawrence Island.

Please note all of the conditions on the permit, especially conditions one (1), five (5) and thirteen (13) through twenty-four (24).

If changes to this project are proposed during its operation, please contact this office immediately to determine if further review is necessary. If you have any questions or concerns, I may be contacted at (907) 269-8588. Thank you for your cooperation with the Water Resources Section.

Sincerely,

Merry Johnson

Merry Johnson
Natural Resource Specialist III

Enclosures: Temporary Water Use Authorization – TWUP A2012-63
Administrative Service Fee Fact Sheet

Cc. Susan Luetters, Bristol Environmental & Engineering Services Corporation
(Via email: sluetters@bristol-companies.com)

ALASKA DEPARTMENT OF NATURAL RESOURCES

Division of Mining, Land, and Water

Water Resources Section

550 West 7th Avenue, Suite 1020, Anchorage, AK 99501-3562

TEMPORARY WATER USE AUTHORIZATION
TWUP A2012-63

Pursuant to AS 46.15, as amended and the rules and regulations promulgated thereunder, permission is hereby granted to Bristol Environmental Remediation Services, 111 W. 16th Avenue, Third Floor, Anchorage, Alaska 99501, and its contractors, **to withdraw up to 3,000 gallons of** water per day **(subject to a maximum of 180,000 gallons of water)** from June 15 through September 15 of each authorized year from the below-described source of water. The water will be used for camp water supply and dust suppression associated with the ongoing environmental remedial cleanup activities at the former Northeast Cape site, on Saint Lawrence Island, Alaska.

SOURCE OF WATER:

Suqitughneg River within NW¼ Section 15, Township 25 South, Range 54 West, Kateel River Meridian.

STRUCTURES TO BE CONSTRUCTED AND USED:

Screened water intake structure, four-inch pump with 35-gpm output, hose and/or pipe and other water removal and distribution equipment.

Changes in the natural state of water are to be made as stated herein and for the purposes indicated.

During the effective period of this authorization, the permittee shall comply with the following conditions:

CONDITIONS:

1. This authorization does not authorize the permittee to enter upon any lands until proper rights-of-way, easements, or permission documents from the appropriate landowner have been obtained.
2. Follow acceptable engineering standards in exercising the privilege granted herein.
3. Comply with all applicable laws, and any rules and/or regulations issued thereunder.
4. Except for claims or losses arising from negligence of the State, defend and indemnify the State against and hold it harmless from any and all claims, demands, suits, loss, liability and expense for injury to or death of persons and damages to or loss of property arising out of or connected with the exercise of the privileges covered by this authorization.
5. Notify the Water Resources Section upon change of address.

6. The permittee shall obtain and comply with other permits/approvals (state, federal, or local) that may be required prior to beginning water withdrawal pursuant to this authorization.

7. The permittee shall allow an authorized representative of the Water Resources Section to inspect, at reasonable times, any facilities, equipment, practices, or operators regulated or required under this authorization.

8. Failure to respond to a request for additional information during the term of the authorization may result in the termination of this authorization.

9. The permittee is responsible for the actions of contractors, agents, or other persons who perform work to accomplish the approved project, and shall ensure that workers are familiar with the requirements of this authorization. For any activity that significantly deviates from the approved project during its siting, construction, or operation, the permittee is required to contact the Water Resources Section and obtain approval before beginning the activity.

10. The Water Resources Section may modify this authorization to include different limitations, expand monitoring requirements, evaluate impacts, or require restoration at the site.

11. Any false statements or representations, in any application, record, report, plan, or other document filed or required to be maintained under this authorization, may result in the termination of this authorization.

12. Pursuant to 11 AAC 93.220 (f), this authorization may be suspended by the Department of Natural Resources to protect the water rights of other persons or the public interest.

13. Any water intake structure in fish bearing waters, including a screened enclosure, well-point, sump, or infiltration gallery, must be designed, operated, and maintained to prevent fish entrapment, entrainment, or injury, unless specifically exempted by the Alaska Department of Fish and Game, Habitat Division.

14. **Water intake structure must be enclosed and centered within a screened box or cylinder with a maximum screen-mesh size of 1/4 inches. To reduce fish impingement at the screen/water interface, water velocity may not exceed 0.5 feet per second when the pump is operating.**

15. **Adequate flow and water levels must remain to support indigenous aquatic life and provide for the efficient passage and movement of fish. Issuance of this authorization does not give the permittee the right to block or dam a water course.**

16. Permittee shall inspect the intake screen for damage (torn screen, crushed screen, screen separated from intake ends, etc.) after each use and prior to each deployment. Any damage observed must be repaired prior to use of the structure. The structure must always conform to the original design specifications while in use.

17. Water discharge (including runoff) shall not be discharged at a rate or location resulting in sedimentation, erosion, or other disruptions to the bed or banks of water bodies, causing water quality degradation.

18. The suction hose at the water extraction site must be clean and free from contamination at all times to prevent introduction of contamination to the water body, and should be in water of sufficient depth so that sediments are not disturbed during the water extraction process.

19. Water bodies shall not be altered to facilitate water withdrawal or disturbed in any way. If banks, shores, or beds are inadvertently disturbed, excavated, compacted, or filled by activities attributable to this project, they shall be immediately stabilized to prevent erosion and resultant sedimentation of water body which could occur both during and after operations. Any disturbed areas shall be recontoured and revegetated.

20. Pumping operations shall be conducted in such a way as to prevent any petroleum products or other hazardous substances from contaminating surface or ground water. Pumps will not be fueled or serviced within 100 feet of a pond, lake, stream, or river unless the pumps are situated within a catch basin designed to contain any spills. Vehicles will not be fueled or serviced within 100 feet of a pond, lake, stream or river. Equipment shall not be stored or serviced within 100 feet of any of the subject water bodies. In case of accidental spills, absorbent pads shall be readily available at the water collection point. All spills must be reported to the Alaska Department of Environmental Conservation and the Alaska Department of Natural Resources.

21. In-water activity will be limited to placement and removal of the intake structure only. No other in-water activities will occur.

22. There shall be no wheeled, tracked, excavating, or other machinery or equipment (with the exception of the non-motorized screened intake box) operated below the ordinary high water line.

23. The placement of water trucks and/or pumping equipment shall not unnecessarily hinder public access.

24. Per 11 AAC 05.010. (a)(8)(M), an annual administrative service fee shall be assessed on this appropriation of water.

This Temporary Water Use Authorization is issued pursuant to 11 AAC 93.220. No water right or priority is established by a temporary water use authorization issued pursuant to 11 AAC 93.220. Water so used is subject to appropriation by others (11 AAC 93.210(b)).

Pursuant to 11 AAC 93.210 (b), authorized temporary water use is subject to amendment, modification, or revocation by the Department of Natural Resources if the Department of Natural Resources determines that amendment, modification, or revocation is necessary to supply water to lawful appropriators of record or to protect the public interest.

This authorization shall expire on September 15, 2016.

Date issued: June 12, 2012

Approved: K. Platt

Title: Natural Resource Manager

From:	Kimberly_Klein@fws.gov
To:	Luetters, Susan
Cc:	Floyd, Christopher B POA; Welker, Molly
Subject:	RE: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island
Date:	Monday, April 23, 2012 5:01:03 PM

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Fisheries Service, or other legislation or responsibilities under the Fish and Wildlife Coordination Act, Clean Water Act, National Environmental Policy Act, Marine Mammal Protection Act, Migratory Bird Treaty Act, or Bald and Golden Eagle Protection Act. Please send us and available monitoring and reporting documents or updated permits when these are available, and let us know if you have any questions or
concerns. Thank you.

Kimberly Klein
Endangered Species Biologist
USFWS/AFWFO
605 W. 4th Ave. Room G-61
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"Luetters, Susan" <sluetters@bristol-companies.com>

"Luetters, Susan" <sluetters@bristol-companies.com> 04/13/2012 05:17 PM	To <Kimberly_Klein@fws.gov> cc "Welker, Molly" <mwelker@bristol-companies.com>, "Floyd, Christopher B POA" <Christopher.B.Floyd@usace.army.mil> Subject RE: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island

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Susan Luetters
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Sent: Wednesday, June 01, 2011 10:10 PM
To: Welker, Molly
Cc: Luetters, Susan
Subject: Re: 2010 and 2011 Project Information - NE Cape, St. Lawrence Island

S

APPENDIX G

Resumes and Training Certificates

ERIC BARNHILL

Environmental Scientist

Years Experience
Total: 10; Bristol: 4

Areas of Expertise

Biology

Fisheries Research

Research Development

Remedial Investigation Sampling

Groundwater Sampling

Training and Certifications

OSHA 30-hour Construction Safety and Health

HAZWOPER 40-hour Training

Hazardous Materials Transportation Refresher IATA

AK Certified Erosion and Sediment Control Lead

Wetland Training Institute Wetland Delineation Certification Program

CPR and First Aid for Adults

Defensive Driving Training

Boating Safety

Education

B.S., Biology, Eastern Washington University, 1999

Mr. Barnhill has used his environmental science capabilities for contaminated site projects since 2007. Project types include site assessments and groundwater monitoring investigations. Mr. Barnhill has an extensive background in fisheries science, including both the research and the development sides of numerous fisheries projects. Additionally, he has been responsible for developing contracts and research plans for fisheries research. His end goal has been support of continued sustainability of Alaska's fisheries resource and the areas in which they inhabit. Among his many attributes, he is proficient in public speaking.

Project Experience

- **Environmental Scientist/Lead Environmental Sampler, Northeast Cape HTRW, USACE, Alaska District, St. Lawrence, Island, Alaska (07/2011 – 10/2011).** Sampling responsibilities included coordinating sampling efforts for several sites within the project area, soil sampling, water sampling and tar sampling and packing/shipping of sampling. The project consisted of removal and containerization of POL and PCB contaminated soil and removal of tar and tar-contaminated soil.
- **Environmental Scientist, Choggiung Limited Spill, Choggiung Limited, Dillingham, Alaska (10/2010).** Sampling responsibilities included excavating soil from beneath an above ground storage tank with a fuel leak; and taking several samples from the excavation to determine possible closure. The project consisted of direction of soil excavation and collection of analytical samples.
- **Environmental Scientist, Northeast Cape HTRW, USACE, St. Lawrence, Island, Alaska (07/2010 - 09/2010).** Sampling responsibilities included coordinating sampling efforts for several sites within the project area, soil sampling and water sampling and packing/shipping of sampling. The project consisted of a landfill cap and removal of POL and PCB contaminated soil.

- **Technical Lead, Site Inspections and Removal Response Actions at Former Army Air Field, Fort Sumner, New Mexico (02/2010).** Responsibilities included functioning as liaison between Bristol and the subcontractor performing sampling duties, MIS Sampling, tank removal and soil sampling beneath tanks and assisting Contractor Quality Control Manager (CQCSM) in daily paperwork duties.
- **Environmental Scientist, Soil Sampling, FAA, Selawik, Alaska (09/2009).** Responsibilities included taking samples in frozen soil, packing and shipping of samples, and swing tying. The project consisted of collecting confirmation samples of soil from underneath an aboveground storage tank (AST) where an overfill of two gallons of diesel fuel occurred years earlier.
- **Field Environmental Scientist, Data Collection Project, Fairbanks Environmental Services, Fort Wainwright Operating Unit 3, Alaska (04/2009).** Responsibilities included collecting well information and taking groundwater parameters for DRO, GRO, VOC, EDB, PAH, iron (II), lead, and sulfate analysis using low-flow groundwater sampling techniques.
- **Environmental Scientist, Well Inventory Project, U, Fort Richardson, Alaska (05/2009 - 09/2009).** Responsibilities included researching information on well locations, physically finding wells using Trimble GPS unit, and taking well field parameters, including well casing size, depth of well, depth to water and taking GPS positions for inclusion in a GIS database. The project consisted of a team of environmental scientists locating wells on the Fort Richardson Post, and noting metrics such as well damage, water level, casing type, etc. for inclusion in a military wells database.
- **Lead Environmental Sampler, Northeast Cape In-Situ Chemical Oxidation (ISCO) Study and Intrusive Drum Removal/Landfill Cap, USACE, Alaska District (07 - 09/2009).** Sampling responsibilities included coordinating sampling efforts for several sites within the project area, soil sampling, water sampling, petroleum, oil and lubricant (POL) sampling and packing/shipping of sampling. Tasks included report writing and gathering field supplies. This project consisted of excavation of an historic landfill with removal of drums of oil, transformers and other contaminated items; also a in-situ study to determine if chemical oxidation was a viable method for remediation of a petroleum contaminated area.
- **Environmental Scientist, Former Skelly Site Assessment, EPA 1004, Winnebago, Nebraska (10/2008).** Tasks included writing the Site Health and Safety Plan, installing soil borings, monitoring wells and collecting soil and groundwater samples. The project consisted of conducting a site assessment at a potential LUST site on the Winnebago Reservation in Nebraska, following NDEQ guidelines for a Tier 1 Site Assessment.
- **Environmental Scientist, Choggiung East Creek Hatchery Post Treatment Sampling and Assessment Report, Choggiung Limited, Dillingham, Alaska (10/2008).** Duties included developing sampling grid, soil sampling, collecting field-screening headspace samples, using a photoionization detector (PID), and packing and shipping of samples. Wrote a report summarizing field activities, presenting analytical data, and providing recommendations for future site remediation. Project consisted of soil sampling for assessment of a land farm being used to remediate petroleum contaminated soil.

- **Environmental Scientist, Private Residence Heating Fuel Investigation, Dillingham, Alaska (10/2008).** Developed a sampling protocol and performed soil sampling of an excavation at a private residence in Dillingham, Alaska. Duties included developing sampling grid, soil sampling, and packing and shipping of samples.
- **Environmental Scientist, Project Support for Elmendorf Treatability Study, Parsons Infrastructure & Technology Group Inc., Elmendorf Air Force Base, Alaska (06/2008).** Provided assistance for installation of bladder pump and set up of micro purge system for groundwater sampling from monitoring wells. Calibrated YSI brand water quality meter and logging system for groundwater monitoring. Performed seep sampling using a peristaltic pump. Assisted in labeling, packing and shipping of samples.
- **Environmental Scientist, Cape Yakataga Landfill Removal Project, Phase III, FAA, Cape Yakataga, Alaska (04/2008 - 06/2008).** Collection of waste characterization and confirmation soil samples for the decommissioning of a landfill and Biocell. Manifested barge shipments of contaminated soil to a disposal facility.
- **Environmental Scientist, Annette Island Phase I Environmental Due Diligence Audit (EDDA), Federal Aviation Administration, Annette Island, Alaska (04/2008).** Project responsibilities included conducting site visits to check for environmental contamination, interviews, database searches, and preparation of report and figures. Project consisted of site assessment of a former FAA site.
- **Environmental Scientist, BERS, Private Housing Development Project, Totem Trailer Park, Anchorage Alaska (04/2008).** Performed on-site assistance for well placement for groundwater contamination study. Project consisted of well installation in a residential mobile home park to assess soil and groundwater contamination.
- **Environmental Scientist, Wetland Delineation, Alaska Natural Gas Development Authority (ANGDA), Various Locations, Alaska (06/2008 - 09/2008).** Performed wetland delineation on sections of an approximately 470-mile proposed natural gas pipeline corridor. The effort was initiated by ANGDA to prepare primary requirements for a U.S. Army Corps of Engineers (USACE) National Environmental Policy Act (NEPA) ecological evaluation. Duties included traversing through developed and undeveloped Alaska wilderness, navigation and data entry using ArcPad software on several models of Trimble GPS units, making determinations of whether areas along the route were wetlands or uplands, participating in all aspects of wetland delineation, including digging pits, identifying soil types using Munsell soil charts, and identifying local plant types. Training included wildlife health and safety, wildlife interaction, rare plant Identification, wetland procedures, and using Geographical Information Systems to prepare a Wetland Delineation Report, which included: Wetland and Waterways Report, Preliminary Project Description, Support Data (Field forms, JD Forms, Photographs) and Mapping.
- **Environmental Scientist, BCS, Beaufort Sea Project, USACE, Alaska District, North Slope, Alaska (09/2007).** Performed remedial investigation sampling at Kogru, Collinson Point, and Nuvagapak DEW Line sites. Assisted in following work plan, sampling soil, sediment and surface water samples, sample packing, and shipping. Project consisted of soil sampling of former DEW line sites.

Professional Experience

- **Staff Biologist, Bering Sea Fishermen's Association, Anchorage, Alaska (2003 - 03/2007).** Developed fisheries research project in rural western Alaska and interior Alaska. Aided in the facilitation of these fisheries projects, as well as provided on-site guidance and hands-on research. Developed and maintained strong relationships with State fish and game entities. Developed contracts and research plans for fisheries research. Conducted data collection and storage. Acted as support staff of the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative. Planned data sharing symposiums and meetings. Provided oversight for many aspects of several fisheries projects. Maintained frequent contact with state, federal, and non-governmental employees for field projects. Performed grant writing and contract development. Responsible for maintaining ongoing compliance with grant criteria. Participated in watershed council meetings, resource advisory committees, Alaska Board of Fisheries Meetings, North Pacific Fisheries Management Council meetings, and various other fisheries-related meetings. Assisted Executive Director and Program Director with fisheries issues as they arose. Performed operations in remote areas, including field camp setup and maintenance, weir installation, and project preparation, setup, and maintenance. Traveled extensively to projects across the state of Alaska.
- **Fisheries Technician II, Alaska Department of Fish and Game (2001 - 2003).** Worked on the Yukon River, Kuskokwim River, and several other Western Alaska and Interior Alaska rivers, as well as Bristol Bay. Traveled to and lived in remote areas and performed camp setup. Performed radio tagging salmonids. Used gill netting as a capture method. Performed scale taking, scale reading, tissue sampling, and otolith extraction on herring. Performed Age-Sex-Length (ASL) sampling. Performed river navigation and utilized Global Positioning System. Maintained fish wheels as a means of data collection and used data loggers. Identified salmon and resident species.
- **Lab Aide, Eastern Washington University, Cheney, Washington (1998 - 1999).** Collected walleye ASL information. Read walleye scales. Assisted in separating out juvenile preserved fish by species. Performed backpack and boat electrofishing and collected samples from an electrofishing boat. Assisted in collecting individual and population statistics.

ALEX BASKOUS, M.D., M.P.H.
OCCUPATIONAL MEDICINE
BOARD CERTIFIED IN OCCUPATIONAL MEDICINE
BY THE AMERICAN BOARD OF PREVENTAVIE MEDICINE
2841 DEBARR ROAD – SUITE 24

TELEPHONE: (907) 279-4953
FAX: (907) 334-9667
EMAIL: DRALEXBASKOUS@GMAIL.COM

PHYSICIAN'S WRITTEN OPINION

PURSUANT TO 29 CFR 1910.120(f) MEDICAL SURVEILLANCE:

NAME Eric Barnhill SS#__________

DATE OF EXAM 8/15/12

✓ A. NO MEDICAL CONDITIONS WERE DETECTED WHICH WOULD PLACE THE EMPLOYEE AT INCREASED RISK OF IMPAIRMENT OF THE EMPLOYEE'S HEALTH FROM WORK IN HAZARDOUS WASTE OPERATIONS OR EMERGENCY RESPONSE, OR RESPIRATOR USE.

THE FOLLOWING MEDICAL CONDITIONS ARE OCCUPATIONALLY PERTINENET:

____

____

____

✓ B. NO LIMITATIONS UPON THE EMPLOYEE'S ASSIGNED WORK.

THE FOLLOWING LIMITATIONS ARE RECOMMENDED:

____

____

✓ C. THE EMPLOYEE HAS BEEN INFROMED BY ME OF THE RESULTS OF THE EXAMINATIONS.

DATE 8/15/12

Alex Baskous ~~M.D.~~, M.P.H.

ALEXANDER BASKOUS, M.D., M.P.H.
2841 DEBARR ROAD, SUITE 24
ANCHORAGE, AK 99508

Bristol

ALLIANCE OF COMPANIES™

Eric Barnhill

Has completed 8 hours of annual refresher training as required by

29 CFR 1910.120

Hazardous Waste Operations & Emergency Response

March 29 , 2012

Clark Roberts, C.I.H.
Instructor

OSHA Occupational Safety and Health Administration

35-600698938

This card acknowledges that the recipient has successfully completed a 30-hour Occupational Safety and Health Training Course in
Construction Safety and Health

Eric Barnhill

(Trainer name – print or type)

4/24/11
(Course end date)

U.S. ARMY CORPS OF ENGINEERS

PROFESSIONAL DEVELOPMENT SUPPORT CENTER
HUNTSVILLE, ALABAMA

CERTIFICATE

This is to certify that

Eric Barnhill

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

Given at AGC (Location) By Alaska District (Instructional District) 04/07/2011 (Date)

Facilitator

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Chief, USACE Professional Development Support Center

CERTIFICATE OF ACHIEVEMENT

This certifies that

Eric Barnhill

has successfully completed

Alaska Certified Erosion & Sediment Control Lead (AK-CESCL) Storm Water Training Program

Continuing Education Credits Earned:
12 Continuing Competency Credits Residential Endorsement Holders
Course approved by Alaska State Home Builders Association
16 Professional Development Hours for Architects, Engineers and Landscape Architects

AGC of Alaska
8005 Schoon Street

	February 2, 2011	**Anchorage, Alaska**
Alex Zimmerman , Instructor	Course Date	Location
	February 2, 2011	**February 1, 2014**
Juanita Kardell, CEF Training	Certification Date	Expiration Date

Eric Barnhill

Has successfully completed the training for
Alaska Certified Erosion & Sediment Control Lead

ID # AGC-11-0066   Expires February 01, 2014

Juanita Kardell

Juanita Kardell, CEF Training

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 23047 - 4930
Certificate Number

This is to certify that

Eric A. Barnhill

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher DOT

In compliance with 49 CFR 172.700-704 (3 Year Expiration)

Class Start Date: 3/22/2012 *Class End Date: 3/22/2012*

	3/22/2012	*3/22/2015*	*Stuart M. Jacques*
Erik Christenson	*Exam Date*	*Cert. Exp. Date*	*Director*

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 23048 - 4930
Certificate Number

This is to certify that

Eric A. Barnhill

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher IATA

Section 1.5 of IATA Dangerous Goods Regulations (2 Year Expiration)

Class Start Date: 3/23/2012 *Class End Date: 3/23/2012*

	3/23/2012	*3/23/2014*	*Stuart M. Jacques*
Erik Christenson	*Exam Date*	*Cert. Exp. Date*	*Director*

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

Certification Card

BasicPlus

G 2010

CPR, AED, and First Aid For Adults

ERIC A. BARNHILL

has successfully completed and competently performed the required knowledge and skill objectives for this program.

MEDIC First Aid

MICHAEL CITTI
Authorized Instructor (Print Name)

24819
Registry No.

3-28-12
Class Completion Date

3-28-14
Expiration Date

907 344-0302
Training Center Phone No.

54339
Training Center I.D.

This card certifies the holder has demonstrated the required knowledge and skill objectives to a currently authorized MEDIC First Aid Instructor. Certification does not guarantee future performance, or imply licensure or credentialing. Course content conforms to the *2010 AHA Guidelines for CPR and ECC,* and other evidence-based treatment recommendations. Certification period may not exceed 24 months from class completion date. More frequent reinforcement of skills is recommended.

EMILY CONWAY

Geologist

Years Experience
Total: 1.5; Bristol: 8 mos.

Areas of Expertise
Sample Analysis

Soil/Rock Testing

ASTM Standards

gINT Software

Training and Certifications
Hazardous Materials Transportation (IATA) - 12 hr

Hazardous Materials Transportation (DOT) -12 hr

Hazardous Waste Operations and Emergency Response (HAZWOPER) – 40-hr

First Aid / CPR / AED

Education
B.S., Geologic Sciences, Environmental Geology, University Alaska Anchorage, 2011

Ms. Conway graduated from the University of Alaska Anchorage in May of 2011 with a bachelor's of science in geology. She was a Bristol intern during the summer of 2011 and worked in a mobile chemistry lab on NE Cape, St. Lawrence Island, Alaska from July through September. The internship continued in the Anchorage office into November, 2011 when she was hired as a fulltime geologist.

Project Experience

- **Intern/Junior Field Chemist, Mobile Lab Technician – Remedial Action, NE Cape, USACE, Alaska District, St. Lawrence Island, Alaska (July - September, 2011)** Assisted the project chemist in the analysis of environmental samples in a remote field lab using Alaska and EPA methods including the rapid extraction of PCB and POL contaminated soils. Helped obtain environmental soil samples.
- **Geologist, Landfill and Well Evaluation, USACE, Alaska District, Fort Rich, Alaska.** Conducted quarterly and annual landfill gas monitoring on a Joint Base Elmendorf-Richardson landfill.

Professional Experience

- **Lab Technician, Golder Associates Inc., Anchorage, Alaska (July 2010 - May 2011).** Responsible for organizing incoming samples and completing soil and rock tests according to ASTM standards, compiling test results into gINT software data base. Experience obtaining soil and rock samples from test pits in Anchorage and remote Alaskan villages.

Bristol
ALLIANCE OF COMPANIES

ALEX BASKOUS, M.D., M.P.H.
OCCUPATIONAL MEDICINE
BOARD CERTIFIED IN OCCUPATIONAL MEDICINE
BY THE AMERICAN BOARD OF PREVENTAVIE MEDICINE
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FAX: (907) 334-9667
EMAIL: DRALEXBASKOUS@GMAIL.COM

PHYSICIAN'S WRITTEN OPINION

PURSUANT TO 29 CFR 1910.120(f) MEDICAL SURVEILLANCE:

NAME Emily Conway SS#

DATE OF EXAM 6/21/11

✓ A. NO MEDICAL CONDITIONS WERE DETECTED WHICH WOULD PLACE THE EMPLOYEE AT INCREASED RISK OF IMPAIRMENT OF THE EMPLOYEE'S HEALTH FROM WORK IN HAZARDOUS WASTE OPERATIONS OR EMERGENCY RESPONSE, OR RESPIRATOR USE.

THE FOLLOWING MEDICAL CONDITIONS ARE OCCUPATIONALLY PERTINENET:

✓ B. NO LIMITATIONS UPON THE EMPLOYEE'S ASSIGNED WORK.

THE FOLLOWING LIMITATIONS ARE RECOMMENDED:

✓ C. THE EMPLOYEE HAS BEEN INFROMED BY ME OF THE RESULTS OF THE EXAMINATIONS.

DATE: 06/21/11

[signature], M.D., M.P.H.

ALEXANDER BASKOUS, M.D., M.P.H.
2841 DEBARR ROAD, SUITE 24
ANCHORAGE, AK 99508

Bristol

ALLIANCE OF COMPANIES™

Emily Conway

Has completed 8 hours of annual refresher training as required by

29 CFR 1910.120

Hazardous Waste Operations & Emergency Response

March 29 , 2012

Clark Roberts, C.I.H.
Instructor

ENVIRONMENTAL MANAGEMENT INCORPORATED

Certificate of Training

T - 23034 - 20678
Certificate Number

This is to certify that

Emily M. Conway

has satisfactorily completed 12 hours

of

Hazardous Materials Transportation - 12 Hours (DOT)

In compliance with 49 CFR 172.700-704 (3 Year Expiration)

Class Start Date: 2/13/2012 *Class End Date:* 2/14/2012

	2/14/2012	2/14/2015	Stuart M. Jacques
Steven Schuler	*Exam Date*	*Cert. Exp. Date*	*Director*

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 23035 - 20678
Certificate Number

This is to certify that

Emily M. Conway

has satisfactorily completed 12 hours

of

Hazardous Materials Transportation - 12 Hours (IATA)

Section 1.5 of IATA Dangerous Goods Regulations (2 Year Expiration)

Class Start Date: 2/14/2012 *Class End Date: 2/15/2012*

	2/15/2012	2/15/2014	Stuart M. Jacques
Steven Schuler	Exam Date	Cert. Exp. Date	Director

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

© GOES 746

LITHO IN U.S.A.

Certification Card **BasicPlus** G2010

CPR, AED, and First Aid For Adults

Emily Conway

has successfully completed and competently performed the required knowledge and skill objectives for this program.

MEDIC First Aid

MICHAEL CITTI
Authorized Instructor (Print Name)

24815
Registry No.

3-28-12
Class Completion Date

3-28-14
Expiration Date

907 344-0302
Training Center Phone No.

54379
Training Center I.D.

This card certifies the holder has demonstrated the required knowledge and skill objectives to a currently authorized MEDIC First Aid Instructor. Certification does not guarantee future performance, or imply licensure or credentialing. Course content conforms to the *2010 AHA Guidelines for CPR and ECC*, and other evidence-based treatment recommendations. Certification period may not exceed 24 months from class completion date. More frequent reinforcement of skills is recommended.

CHARLES (CHUCK) CROLEY

Site Superintendent / Site Safety & Health Officer

Years Experience

Total: >35; Bristol: 6

Areas of Expertise

Quality Control

Site Superintendent

Safety and Health Management

Fuel Storage Tank (FST) Installation and Removal

Well Drilling and Sampling

Mobilization and Demobilization to Remote Sites

Training and Certifications

Certified UST Worker, State of AK No. 172 (Installation/Retrofitting and Decommissioning)

Certified Safety Instructor-ATV Safety Institute-ID No. 120099

U.S. EPA/ AHERA-Asbestos Abatement Worker - AK No. 5249

30-Hour OSHA Construction Safety and Health

40-hour EPA/AHERA Asbestos Supervisor/Worker / plus 8-hour Refresher

40-hour HAZWOPER / 8-hour Supervisor / 8-hour Refresher, current

8-hour Entry to Confined Spaces

24-hour Excavation, Trenching, and Soil Mechanics

USACE Construction Quality Management for Contractors

Hazardous Materials Transportation (DOT/IATA)

Certified Erosion & Sediment Control Lead

Education

Laramie High School, Laramie, Wyoming, 1963

Bristol ALLIANCE OF COMPANIES

Mr. Croley has worked on remote site projects throughout Alaska for over 35 years. From 1968 to 1979, he worked for a variety of construction and drilling contractors that conducted soils investigation and mining exploration work. The soils investigations included work for geotechnical studies for the Trans-Alaska oil pipeline. Projects in mining fields included mineral exploration and hydrological studies for dam foundations. Mr. Croley is an experienced Site Superintendent, Health and Safety Officer, and Contractor Quality Control Systems Manager (CQCSM) for projects encompassing construction, aboveground and belowground fuel tank installations and removals, monitoring well drilling, sampling for a variety of media, reserve pit closures, demolition projects, and oil field investigations.

Professional Experience

- **Site Supervisor/SSHO, N.E. Cape HTRW Remedial Actions, USACE, Alaska District, St. Lawrence Island, Alaska (05/2011 – 10/2011; $18M).** Directed mobilization / demobilization activities for a 40-man camp and all related equipment, supplies, and personnel to conduct removal actions for 15 tons of arsenic-contaminated soil, 1,773 tons of PCB-contaminated soil, 5,550 tons of POL-contaminated soil, 105 tons of PCB hazardous waste soil, and 34 tons of miscellaneous metal debris. Related activities included setting up an on-site chemical analysis laboratory, rebuilding and maintaining roads, and rebuilding and maintaining the airstrip runway and parking apron. Responsible for the supervision and safety of staff. Oversaw support of an independent, USACE supported, NALEMP project.
- **Site Supervisor/SSHO, FUDS, Demolition Project, Fort Sumner Army Airfield, USACE, Albuquerque District, Fort Sumner, New Mexico (01/2011-02/2011; $300K).** Directed demolition of various structures at WWII-era FUDS site to remove ongoing potential hazards. Activities included structure demolition, demolition and backfilling of various foundations, and the removal of metal hazards.

Supported site inspection activities that included monitoring well installations and closing water wells. Soil sampling activities included trenching/excavation activities. Oversee the removal of all demolition debris from the site.

- **Site Supervisor/SSHO, N.E. Cape Debris Removal, Landfill Cap, and Soil Removal, USACE, Alaska District, St. Lawrence Island, Alaska (05/2010 – 10/2010; $7.8M).** Directed mobilization / demobilization activities for a 40-man camp and all related equipment, supplies, and personnel to conduct debris removal from a landfill and construct a legal landfill cap; locate and remove in excess of 800 tons of PCB-contaminated soil; locate, remove, screen, and ship off-site 2500 tons of POL contaminated soil; conduct water and soil studies; set up a portable chemical analysis laboratory; and conduct debris removal activities from tundra / wetlands. Responsible for the supervision and safety of staff. Conducted three separate tours of the project for visiting dignitaries, ranging from one to 26 participants.
- **Site Supervisor/SSHO, FUDS, Tierra Amarilla Air Force Station, USACE, Albuquerque District, Tierra Amarilla, New Mexico (04/2010; $223K).** Directed a subcontractor for the excavation, removal, and shipment offsite of 360 tons of debris and the demolishment of physical hazards, such as open manways and a deteriorating sewage system with several large septic tanks.
- **Site Supervisor/SSHO, N.E. Cape In-situ Chemical Oxidation (ISCO) and Intrusive Drum Removal/Landfill Cap, USACE, Alaska District, St. Lawrence Island, Alaska, (05/2009 – 10/2009; $6.2M).** Directed the mobilization of a 30-man-camp and related heavy construction materials and equipment, via barge and landing craft, from Anchorage, Alaska to St. Lawrence Island, Alaska, which is located roughly 130 miles offshore west of the western coast of Alaska. Responsible for the supervision and safety of all Professional staff, equipment operators, laborers, surveyors, subcontractor personnel, and camp staff. The project included an In-situ Chemical Oxidation study on a subsurface hydrocarbon plume in arctic terrain and conditions. The project also included an intrusive removal of old drums containing waste oil that had been placed in a landfill, where the oil was recovered and the drums cleaned and reburied as inert debris in the landfill. The project included mining, hauling, and placing 28,000 cubic yards of cap material for the landfill and then re-vegetation of the landfill cap area. At the end of the project, all waste material, equipment, and camp were loaded on barges and demobilized.
- **Site Supervisor/SSHO, Clean and Inspect Diesel Fuel Tanks, FAA, Biorka Island and Level Island, Alaska (2008; $93K).** Supervised cleaning and inspection of diesel tanks and other activities. The scope of work included preparing planning documents and reports; mobilizing and demobilizing to and from Biorka Island; cleaning and inspecting five 20,000-gallon ASTs on Biorka Island; inspecting the secondary containment of the 20,000-gallon tanks; mobilizing and demobilizing to and from Level Island; and cleaning and inspecting two 10,000-gallon ASTs on Level Island.
- **Site Supervisor/SSHO, Phase II and Phase III, Landfill Remedial Action, FAA, Cape Yakataga, Alaska (Summers of 2007 and 2008; total project for two years: $14.3M).** Supervised remedial action activities for Bristol Construction, LLC on FAA project. Phase II and Phase III. Project included the excavation, containerization, and transportation of dioxin affected soil from an old landfill. During Phase II soil was placed in 8' X 20' containers,

trucked 40 miles and then loaded on Landing Craft and barges for transportation to the disposal site in Oregon. Phase III of the project involved loading the soil into 9 cubic yard supersacks, trucking the 40 miles and loading the supersacks onto Landing Craft and barges for transportation to the final disposal site in Oregon. Both phase of the project involved waste characterization and confirmation sampling for chemical analysis. Monitoring wells were installed for monitoring. Final site restoration included the establishment of a borrow source, hauling the backfill 8 miles, regarding the site, site restoration that included grass seeding, tree planting, and stream bank restoration to ADEC guidelines.

- **Site Supervisor/SSHO, Kodiak Air Traffic Control Tower (ATCT) AST Upgrades, FAA, Kodiak, Alaska (2007; $98K).** Supervised the removal of a 2,000-gallon AST and replaced with a newly designed 1,000-gallon AST. Installation included new fuel piping. Outside piping was secondarily contained and interior piping upgraded to include new fuel filtration and valve system. A new VeederRoot monitor and inventory control system was installed.
- **Site Supervisor/SSHO, Cold Bay AST Upgrades, FAA, Alaska (2007; $93K).** Supervised AST upgrade activities for Bristol Construction Services, LLC. Site activities included the removal of an old 500 gallon, single wall AST and associated piping with a newly designed 500 gallon double walled AST and new associated piping and the installation of a VeederRoot monitoring and inventory control system.
- **Site Supervisor/SSH, Biorka Island Groundwater Investigation, FAA, Alaska (2006; $99K).** Supervised the emergency removal of a 1000 gallon AST, the survey of a previously removed pipeline, the location of 5 historical POL release areas and the soil sampling of these areas for contaminants, and the air monitoring and sampling of a area underneath an occupied building to determine the presence of any contaminants.
- **Site Supervisor/SSHO, ATCT UST Upgrades, FAA, Anchorage, Alaska (2006; $45K).** Supervised UST upgrade activities for Bristol Construction that involved with the reconditioning of manway protective coating and pulling all of the fuel and return lines and replacing with new lines and valves. The project also called for the installation of new piping that would allow a newly installed emergency generator to use the UST as a primary fuel source.
- **Site Superintendent/SSHO and Equipment Operator, Airport Tower Installation, FAA, Adak, Alaska (2005; $500K).** Directed a project that involved the upgrades of navigation aids at a Critical Navigation Site without the disruption of services. The scope of work included resealing two radomes by re-caulking and re-bolting (in excess of six thousand bolts and gaskets), demolition of two remote communication air/ground (RCAG) antennas and construction of two new RCAG antennas inside the radomes; the installation and burial of electrical and communications cables in over 300 lineal feet of trenches; the installation of two uninterruptible power supply systems (UPS); the construction of three new antennas (C-3, Glideslope, and Localizer); the repair of the main power supply box; and the installation of a new LCD lighting system on the NDB towers. The project also included installation of a new monitoring system, new piping, and the repair of an aboveground storage tank (AST) that furnishes fuel to the site emergency generator.

- **CQCSM, N.E. Cape Debris and Tram Demolition, U.S. Army Corps of Engineers (USACE), Alaska District, St. Lawrence Island, Alaska (2005; $5.2M).** Set up the Project Quality Control and Site Safety Management System at the start of the fieldwork. Conducted all beginning of field project orientations and Preparatory inspections. Conducted five safety classes for all-terrain vehicles per EM 385-1-1.
- **CQCSM/Alternate SSHO, Landfill Project, CH2M Hill Constructors, Inc. (CCI), U.S. Air Force, Shemya, Alaska (2005; $2.1M).** Project involved capping an old landfill and constructing a new landfill with an adjoining asbestos cell. The project involved the excavation, placement, and grading of 112,000 cubic yards of three different soils types for the designed capping of the old landfill and excavation of 80,000 cubic yards in the construction of the new landfill and asbestos cell.

Professional Experience

- **Harding Lawson Associates, Anchorage, Alaska (01/1979 – 10/2004).**
  - Site Superintendent/ SSHO, and CQCSM for the Bureau of Land Management, and Equipment Operator for R & R Lodge Fuel Spill Cleanup, Alaska Range (2004; $100K). This project entailed excavation and sampling activities for a fuel spill from a fuel bladder and containment area at a remote hunting lodge in the Alaska Range. The project included the excavation of 55 cubic yards of fuel-contaminated soil over bedrock, alongside a short (1,600-foot) active airstrip, to a depth of 9 feet. Excavation was accomplished with small equipment. Five cubic yards of soil were removed from the site by small aircraft (Cessna 206) and 50 cubic yards were stockpiled on a liner for land-farming activities.
  - Contract Site Supervisor, Closure Activities at an Inactive Reserve Pit, Chevron/Texaco, West Kavik, Alaska’s North Slope (2004; $750K). The first phase consisted of mobilization, construction, and demobilization of a remote site camp with Rolligons. The camp included power generation, freshwater treatment, grey water treatment, and cooking facilities, as well as living accommodations for 20 persons. The second phase consisted of mobilization and demobilization of equipment capable of mining approximately 8,500 cubic yards of gravel from an old airstrip and placing the gravel on top of an inactive reserve pit. Acted as SSHO while he was on site.
  - Site Superintendent/SSHO, Restoration at Red Devil Mine, BLM, Alaska (2003; $450K). Project consisted of demolition activities, a site investigation, and a historical site sampling activity for restoration at Red Devil Mine, a remote Alaska site where all equipment and personnel were mobilized by aircraft. The project included the demolition of six ASTs ranging from 200- to 350-barrel tanks and an ore hopper and ore-crushing facility. Project included the on-site burial of materials from demolition activities (including metal, wood, and concrete). Demolition activities took place in supplied air because of the presence of lead and mercury contaminants. A site investigation was conducted using a probe-pounding rig. A successful Historical Site Investigation was conducted for an ore house that had been destroyed more than 50 years prior and the site had been built over. The investigation was conducted using present-day air photos, old maps and field books, and a backhoe.

– Contract Field Operations Manager, Closure Activities at Inactive Reserve Pits, Glenn Springs Holdings, Inc., a subsidiary of Occidental Petroleum, North Slope, Alaska (2002-2003; $1.25M). This project involved closure activities at three inactive reserve pits sites on the North Slope, Alaska. The first phase was the planning and mobilization of drilling equipment mounted on Rolligons to complete a subsurface investigation, and estimate drilling wastes and volumes of clean drill pad gravel. The second phase included the route selection and building and maintenance of eight miles of ice roads over tundra and river bottoms. The second phase also included the excavation and transport of 9,500 cubic yards of drilling wastes to the grind-and-inject facility at Prudhoe Bay from the reserve pit, and the hauling and placement of clean gravel, via Rolligon, at a third reserve pit. The work involved coordination among three oil companies and their contractors.

– CQCSM/Alternate SSHO, Demolition and Site Restoration, USACE, Alaska District (2001-2003; $5M). Managed demolition and site restoration of the Tok Fuel Terminal, Alaska. Site tasks included researching historical photographs; asbestos, polychlorinated biphenyls (PCBs), and lead-based paint (LBP) sampling; conducting a landfill investigation; construction of a solid waste landfill that included an asbestos cell; the removal and packaging of hazardous wastes; the removal of petroleum, oils, and lubricants (POL)-contaminated soil; site-wide abatement and disposal of asbestos and LBP; demolition and burial of 23 buildings; demolition and burial of four 1,000-gallon FSTs, one 1,000-barrel water storage tank, and one 5,000-barrel FST; and demolition and removal of one 1,000-barrel FST, two 5,000-barrel FSTs, nine 30,000-barrel FSTs, and 30,000 lineal feet of tank-farm-related fuel and fire retardant pipelines.

– CQCSM/Alternate SSHO, School Demolition Project, USACE, Alaska District, Eielson Air Force Base (2001; $1.2M). Managed the demolition of the Ben Eielson Taylor Elementary School, Eielson AFB, and the construction of an Olympic-sized soccer field, a softball field, bleachers and fencing of the entire sports complex. Complicated demolition and disposal activities were involved, including security concerns with off-site disposal of debris, asbestos removal prior to demolition, and suspected mercury releases. Construction included leveling and placement of several types of soils, installation of an underground water hydrant system, concrete, asphalt, grass seeding, and fencing activities. Supervised quality control for contractor and subcontractor activities.

– CQCSM/Alternate SSHO, Demolition of Long-Range Radar Station, USACE, Alaska District, Fort Yukon, Alaska (1999-2002; $5M). Managed multifaceted demolition of a long-range radar station. Directed removal and long-term storage of more than 650 cubic yards of POL-contaminated soils. Supervised asbestos removal and asbestos storage of materials from 13 buildings, four radar towers, and utility facilities; demolition of two 60-foot by 60-foot and two 120-foot by 120-foot radar towers; demolition and debris removal of 12 buildings; decommissioning and demolition of 26 ASTs; construction of a solid waste landfill; placement of various types of demolition debris in the landfill, including use of an asbestos cell; and capping of the landfill to State of Alaska criteria. Conducted soils exploration program and water sampling; constructed new fuel storage and monitoring system. Installed biovent system.

– CQCSM/SSHO, FST Upgrades, USACE, Alaska District/FAA, Various Locations, Alaska (1998). Responsibilities included on-site construction management and health and safety, developing reporting documents, and assisting in planning and submittal of documents Managed FST upgrades at Port Heiden, Wrangell, Metlakatla, Sand Point, and Dillingham, Alaska. Project entailed removal of seven regulated underground storage tanks (USTs) and one AST, and installation of five ASTs for prime fuel sources at remote navigation aid sites. Fuel systems included lead detection, inventory control, and remote site monitoring systems.

- CQCSM/SSHO, Tank Removal and Soil Remediation, USACE. Alaska District, Galena Air Force Station (AFS), Alaska (1997). Responsibilities included on-site construction management and assisting with completing planning and reporting documents, managing submittals, performing network analysis, and submitting pay requests. Managed cleaning of three bulk fuel ASTs; decommissioning of three USTs; and construction, operation, and maintenance of a 5,100-cubic-yard bioremediation cell. The project included demolition, asbestos abatement and waste management.
- CQCSM/SSHO, UST Removal at the Galena AF Power Plant, USACE, Alaska District, Galena, Alaska (1996-1997). Responsibilities included on-site construction management, site safety, and assisting with completing planning and reporting documents, managing submittals, performing network analysis, and submitting pay requests. The project included removal of two 12,000-gallon and two 25,000-gallon fuel USTs and five 55- to 1,000-gallon USTs that contained fuel and oil/water separator waste; removal and stockpiling of 700 cubic yards of contaminated soil; installation of two 30,000-gallon ASTs at a remote site off the road system.
- Contract Site Superintendent, Reserve Pit Closeout, Exxon Mobil, Flaxam Island, Alaska (2000-2001; $7.5M). Provided construction and safety oversight and permit compliance for closeout of two inactive reserve pits on Alaska’s North Slope. Winter 2001 activities included drilling a new 2,500-foot disposal well for grinding and injecting reserve pit wastes; excavation of two inactive reserve pits and two flare pits; confirmation sampling and on-site laboratory analyses; slurrying and injecting cuttings; and reviewing and verifying quantities and pay items. Winter 2002 activities included construction of a 68-mile offshore ice road on the Arctic Ocean; excavation of contaminated soil from reserve pits, and the excavation and hauling of 20,000 cubic yards of drilling wastes to the Prudhoe Bay grind and injection facility. Project considerations included sensitive wildlife habitats, construction in arctic conditions, and North Slope safety requirements. Job range: $7.5 million.
- Contract Site Quality Control Manager, Quality Assurance Monitoring, Alaska Department of Natural Resources, Joint Pipeline Office (JPO) for the Northstar Development Project, Point McIntyre/Point Storkerson, North Slope, Alaska ($3M). Provided in-field quality assurance monitoring during construction of two 10-inch pipelines running from Seal Island, offshore, to Point McIntyre, onshore, and then onshore and terminating at BP’s Gathering Center 1. The offshore underwater pipeline portion was approximately 6 miles long and depths to 50 feet.
- Site Superintendent, Cleanup at Fuel Site, Exxon Company, USA, Flaxman Island, Alaska Cleanup project at a former fuel storage area at the Alaska State A-1 drill site on remote Flaxman Island in the Beaufort Sea. The project involved the use of a field laboratory to field screen and segregate 1,000 cubic yards of soil during the winter. The excavated contaminated soil was then transported, via Roligon, back to the Prudhoe Bay area for treatment.
- Site Superintendent, Inactive Reserve Pit Investigations, for Exxon Company, USA, Flaxman Island, Alaska. The project consisted of winter investigations of two inactive reserve pits at Alaska State A-1 and G-2 drill sites on Flaxman Island, Alaska, a remote

Island in the Beaufort Sea. The investigations included relocation of the reserve pits, soil drilling with a drill rig transported via Roligon, excavation of trenches (in permafrost materials) for drill mud sampling and investigating the use of liners.

- Contract Site Quality Control Manager, Quality Assurance Monitoring, Alaska Department of Natural Resources, JPO for the Alpine Development Project, Colville River, North Slope, Alaska. Provided in-field quality assurance monitoring during horizontal directional drilling and installation of four pipelines beneath the Colville River. The crossing was approximately 4,100 feet long.
- Construction Manager/SSHO, Development of Soil Gas Recovery System, USACE, Alaska District, Fort Wainwright, Alaska. Provided construction management of an experimental soil gas recovery system that included the installation of two horizontally drilled wells, a 1,000-foot-long air-injection well, and a 750-foot-long vapor-extraction well. The experimental system included the installation of a variety of monitoring wells and nuclear density probe wells, as well as the compressor plant for the air injection. Also implemented site safety plan.
- Construction Superintendent/SSHO, FST Improvements, FAA, McGrath, Alaska.
- Supervised project to decommission eight FSTs and install seven FSTs. Also responsible for site safety.
- Construction Superintendent/SSHO, FST Improvements, FAA, Bethel, Alaska. Supervised the decommissioning of 14 FSTs and installation of 9 FSTs. Also responsible for site safety.
- Construction Superintendent/SSHO, UST Decommissioning, FAA, Cordova, Alaska. Supervised the decommissioning of 19 FSTs and installation of nine FSTs. Responsible for site safety.
- Construction Superintendent/SSHO, UST Decommissioning, Municipality of Anchorage, Alaska. Directed field operations for decommissioning of three USTs at a power-generating facility.
- Construction Superintendent/SSHO, FST Replacement, FAA, Statewide Alaska (1990-1998). Directed field operations for the FAA for Alaska (statewide) FST replacement project to decommission USTs and ASTs, construct new fuel systems, and clean up fuel-affected soil. Responsible for site safety. Completed projects at four Anchorage and 16 rural locations, involving 190 USTs and ASTs, 122 decommissionings, 79 installations, and 11 upgrades.
- Senior Technician, Hunters Point Annex Restoration, USACE, San Francisco, California. Logged borings, field-screened soil samples for radiation, installed and sampled monitoring wells, located drill borings for future projects, and mapped dump sites suspected of containing radiation-affected waste.
- Drilling Superintendent/Senior Technician, Groundwater Investigations, FAA, Bettles, Alaska. Performed groundwater investigations. Supervised drilling and environmental soil and water sampling program to trace the limits of a contaminant plume. Responsible for site safety.

- Drilling Superintendent/Senior Technician, Reserve Pit Monitoring, Confidential Client, Kenai, Alaska. Supervised a reserve pit monitoring project over a two-year period. Supervised field operations including drilling, environmental soil sampling, and groundwater testing for possible groundwater contamination.
- Drilling Superintendent, Milne Point Gravel Study, for Conoco, Inc., North Slope, Alaska. Directed a drilling and soil sampling program for gravel mine site exploration.
- Drilling Superintendent, Drilling and Soil Sampling Program at the Point McIntyre Development, ARCO Alaska, Inc., North Slope, Alaska. Supervised a drilling and soil sampling program for a foundation study for a drill pad design and pipeline construction. Installed a ground temperature monitoring system. Drilling activities included onshore and over-ice operations.
- Drilling Superintendent, Field Investigation, Sohio Petroleum Company, Beaufort Sea, Alaska. Supervised field investigation for the Endicott Geotechnical Investigation, which involved drilling onshore and offshore soil borings, and performing in-situ testing to establish design criteria for the development of Endicott oil field facilities. Coordinated field crews, maintained all equipment, and troubleshot drilling problems.
- Superintendent/Senior Technician, U5-A Slab Investigation, ARCO Alaska, Inc., North Slope, Alaska. Supervised drilling for an environmental soil sampling and geotechnical drilling program inside a warehouse in a permafrost area. The purpose of the project was to investigate a foundation failure and related chemical release.
- Drilling Superintendent, Support for FST Decommissioning, USACE, Alaska District, Various Sites throughout Alaska. Served as drilling superintendent for FST decommissionings and installations, soil and water investigations and studies, and remedial action and construction projects.
- Senior Technician, Remedial Investigation, USACE, Sacramento District, at Fort Ord, California. Performed remedial investigation for the installation and sampling of monitoring wells, and collection of inventory and control samples.
- Senior Technician, Heavy Metal Sampling, ARCO Alaska, Inc, Prudhoe Bay, Alaska . Developed a system to sample for heavy metals in high-pressure natural gas at Prudhoe Bay, Alaska.
- Senior Technician, Soil Sampling, Exxon Company, U.S.A, Seward and Valdez, Alaska. Conducted environmental soil sampling programs on and around contaminated soil stockpiles
- Senior Technician, Soil Sampling, Confidential Client, Beluga, Alaska. Conducted environmental soil sampling programs on a soil bioremediation project near Beluga, Alaska. The sampling took place at several remote gravel pads in southcentral Alaska. Directed the initial construction of two bioremediation cells.
- Senior Technician Tatitlek Soil Remediation Project, Exxon Company U.S.A., So
- Senior Technician, Sampling and Monitoring System, Chevron U.S.A., Inc. Directed drilling operations for sampling the core of a man-made ice island and constructing a monitoring system in the Beaufort Sea, Alaska. Conducted over-ice sampling for future ice or gravel island drilling locations.

- Senior Technician, Groundwater Investigation, State of Alaska, Minto, Alaska. Responsible for overseeing groundwater investigation and permanent abandonment of a freshwater production well.
- Senior Technician, Seismic Monitoring System Development, ARCO Alaska, Inc. Directed drilling operations and recovery of seismic equipment, and construction of a seismic monitoring system for a production well test (UGNU tiltmeters) on the North Slope, Alaska.
- Senior Technician, Reserve Pit Closeout, ARCO Alaska, Inc., and Conoco, Inc, North Slope, Alaska. Directed drilling and environmental soil sampling for reserve pit closeout permit requirements on the North Slope of Alaska, using hollow-stem auger and coring systems. Installed permanent ground temperature monitoring systems. Collected and field tested surface-water samples to monitor closeout permit compliance.
- Senior Technician, Drilling and Sampling Programs, Exxon Company, U.S.A, Alaska. Conducted drilling and sampling programs at a remote arctic exploration site (Point Thomson Units 1 and 4, North Slope, Alaska) during summer and winter. Directed bioremediation activities at the same site, including mobilization and demobilization of workers, equipment, camp facilities, and bioremediation work, using marine and overland transportation.
- Senior Technician, UST Removal at the Alaska Aviation Heritage Museum, Municipality of Anchorage, Alaska. Responsible for overseeing the removal of three USTs in a shallow groundwater area.
- Senior Technician, Site Investigation, Confidential Client, Anchorage, Alaska. Performed service station site investigation and directed drilling operations for soil testing around buried facilities and utilities.
- Senior Technician, Support Causeway, Municipality of Anchorage, Alaska. Drilled five offshore borings and performed cone penetrometer tests for a causeway linking Anchorage and Fire Island.
- Senior Technician, Third Avenue Shelter Project, Municipality of Anchorage, Alaska. Drilled three borings in an earthquake slide area in which cone penetrometer testing was conducted to a depth of 120 feet.

♦ **Senior Technician, Municipality of Anchorage Projects, Alaska.** Participated in the following area projects:

- Peters Creek Watershed Improvement District (W.I.D.)
- Nancy Local Improvement District 174 and W.I.D.
- Chester Creek Oil and Gas Separators
- West 42nd Avenue
- West High Culvert
- 56th Street Walls
- Girdwood Anchorage Telephone Utility Site
- 39th and 40th Streets, Anchorage Telephone Utility Site
- Southeast Interceptor Project

- Bear Valley Anchorage Telephone Utility Site
- Chugiak Fire Station
- Hiland Drive Slope Stabilization
- Diamond Trunk Storm Drainage Study
- Senior Field Technician/Drilling Superintendent, Geotechnical Investigation, ARCO Alaska, Inc. Performed geotechnical investigation for Prudhoe Bay Unit reserve pits on the North Slope of Alaska. Work consisted of drilling and logging test borings via 3-inch frozen cores. Project objective was to measure the depth of chemical contamination beneath the reserve pit. Collected soil samples for chemical analyses.
- Senior Field Technician/Drilling Superintendent, Groundwater Investigation, Union Oil Company of California. Performed groundwater investigation on the Kenai Peninsula, Alaska. Drilled borings and sampling soil and groundwater for geochemical analyses to evaluate impacts on groundwater resources and potential contaminant transfer.
- Senior Field Technician/Drilling Superintendent, Site Investigation, Butler Aviation, Anchorage, Alaska. Performed site background investigation. Drilled borings and sampled soil and groundwater for geochemical laboratory analyses.
- Senior Field Technician/Drilling Superintendent, Sampling Program, ARCO Alaska, Inc. Performed work on an environmental project on the North Slope of Alaska, to explore possible effects of dispersion and biological accumulation of chemical contaminants in tundra. Duties included sampling surface water, soil, and vegetation at 250 sampling points for geochemical analyses. Assisted in field measurements of pH, electrical conductivity, and dissolved oxygen content of water.
- Senior Field Technician/Drilling Superintendent, Groundwater Investigation, ARCO Alaska, Inc. Performed an investigation to examine the potential for reserve pit water to seep through gravel containment berms on the North Slope, Alaska. Assisted in installing and monitoring instrumentation to identify groundwater characteristics in saturated and unsaturated zones, and to profile ground temperatures. Collected groundwater, soil, reserve pit water, and drilling reserve samples for geochemical analyses.
- Senior Field Technician/Drilling Superintendent, Multiphase Groundwater Investigation, Confidential client, Alaska. Performed multiphase investigation of impacts of plant discharges on groundwater in a multi-aquifer system for the Bernice Lake Power Plant in Alaska. During the initial phase, performed geochemical sampling of groundwater to evaluate potential problems. In Phase II, assisted in installing and monitoring groundwater and ground temperature instrumentation.
- Senior Field Technician/Drilling Superintendent, Soil and Groundwater Investigations, Tesoro Alaska Petroleum, Alaska. Performed soil and groundwater contamination investigation for an underground hydrocarbon spill at an industrial facility. Participated in drilling test borings and sampling soil and groundwater.
- Senior Field Technician/Drilling Superintendent, Preliminary Site Investigation, Pacific Gas and Electric's Hinkley Compressor Station in Hinkley, California. Performed preliminary site appraisal and participated in collecting groundwater samples from approximately 100 wells including domestic, agricultural, public water supply, and industrial wells in an investigation of chromium-contaminated groundwater.

- Senior Field Technician/Drilling Superintendent, Geotechnical Investigation, ARCO Alaska, Inc. Performed geotechnical investigation project, sampled soil, performed resistivity testing, and installed thermistors as part of freeze-thaw studies to redesign a flare pit on the North Slope, Alaska.
- Senior Field Technician/Drilling Superintendent, Boring and Sampling Program, America North, Inc./Alaska Gold Nome, Alaska. Drilled borings for the Steadman Field Site Investigation, and sampled soil contaminated with mercury and arsenic in Nome, Alaska. Project included investigating a waste disposal area.
    - Other related project experience includes the following:
        - Duck Island Development Area, Beaufort Sea, Alaska
        - Port of Nome Over-Ice Investigation, Nome, Alaska
        - Soil Boring Programs, Trans-Alaska Pipeline Route
        - Mukluk Island Site, Beaufort Sea, Alaska
        - Offshore Drilling, Beaufort Sea, Alaska
        - Drilling of Five Island Sites, Beaufort Sea, Alaska
        - Wharf and Docking Facilities, Afognak Island, Alaska
        - Rotary Drilling and Wireline Coring, Remote Island in Indian Ocean
        - Alpine Permafrost Institute, Pikes Peak, Colorado

♦ **Driller, Senior Technician, Drill Superintendent, Construction Superintendent, and Field Operations Manager, MACTEC Engineering and Consulting Inc., and its predecessors (Harding ESE and Harding Lawson Associates) (1979 to 10/2004).** Performed the role of CQCSM and alternate SSHO on many USACE Projects throughout Alaska. Description of duties in the various positions are as follows:

- As senior technician, responsibilities included installing monitoring wells; sampling water and soil; handling oil and hazardous substances; performing field measurements on water samples; installing soil-gas wells; and installing thermistors, manometers, and piezometers. Conducted freeze-thaw studies, cone penetrometer tests, permafrost investigations, and percolation tests.
- As general drilling superintendent, operated and maintained drilling equipment, supervised drill crews, and was responsible for site safety. Experienced with permafrost drilling, refrigerated coring, mineral exploration, dam foundation drilling and testing, over-water and over-ice operations, and helicopter drilling.
- As construction superintendent, mobilized and demobilized construction crews and materials to various remote Alaska sites via air, land, and water transportation. Provided oversight for removal and storage of contaminated soil, decommissioning of USTs and ASTs, and installation of new FSTs and distribution systems, and was responsible for site safety.

Additional Training and Certifications

Certified in UST Installation/Retrofitting, International Code Council
No. 1057168-U1

Certified in UST Decommissioning, International Code Council-No. 1057168-U2

Certified in the Use of Nuclear Testing Equipment – Alaska No. 16619

40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER), plus 8-hour Supervisor and 8-hour Refresher, Bristol Industries

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

24-hour Construction Project Administration

Hydrogen Sulfide Safety Training

Radiation Protection Training

10-hour Construction Safety

Defensive Driving Training

ALEX BASKOUS, M.D., M.P.H.
OCCUPATIONAL MEDICINE
BOARD CERTIFIED IN OCCUPATIONAL MEDICINE
BY THE AMERICAN BOARD OF PREVENTAVIE MEDICINE
2841 DEBARR ROAD – SUITE 24

TELEPHONE: (907) 279-4953
FAX: (907) 334-9667
EMAIL: DRALEXBASKOUS@GMAIL.COM

PHYSICIAN'S WRITTEN OPINION

PURSUANT TO 29 CFR 1910.120(f) MEDICAL SURVEILLANCE:

NAME Charles Croley SS# ____________

DATE OF EXAM 04/16/12

✓ A. NO MEDICAL CONDITIONS WERE DETECTED WHICH WOULD PLACE THE EMPLOYEE AT INCREASED RISK OF IMPAIRMENT OF THE EMPLOYEE'S HEALTH FROM WORK IN HAZARDOUS WASTE OPERATIONS OR EMERGENCY RESPONSE, OR RESPIRATOR USE.

THE FOLLOWING MEDICAL CONDITIONS ARE OCCUPATIONALLY PERTINENET:

____

____

____

✓ B. NO LIMITATIONS UPON THE EMPLOYEE'S ASSIGNED WORK.

THE FOLLOWING LIMITATIONS ARE RECOMMENDED:

____

____

✓ C. THE EMPLOYEE HAS BEEN INFROMED BY ME OF THE RESULTS OF THE EXAMINATIONS.

DATE: 04/16/12

Alex Baskous, M.D., M.P.H.

ALEXANDER BASKOUS, M.D., M.P.H.
2841 DEBARR ROAD, SUITE 24
ANCHORAGE, AK 99508

Bristol

ALLIANCE OF COMPANIES™

Chuck Croley

Has completed 8 hours of annual refresher training as required by

29 CFR 1910.120

Hazardous Waste Operations & Emergency Response

March 29 , 2012

Clark Roberts, C.I.H.
Instructor

HARDING LAWSON ASSOCIATES

CERTIFICATE OF QUALIFICATION

This certifies that

Charles L. Croley

has completed 8 hours

SUPERVISORY HAZARDOUS MATERIALS/WASTE

HEALTH AND SAFETY TRAINING

in accordance with the requirements of
29 CFR PART 1910.120

HLA AUTHORIZED INSTRUCTOR

Chris Corpuz

Chris Corpuz | June 13, 1988
Date

Title Industrial Hygiene and Safety Specialist

MINING AND PETROLEUM TRAINING SERVICE

№ 14148

The University of Alaska Anchorage

CERTIFICATE

This is to certify that

CHARLES L. CROLEY

has satisfactorily completed

24 Hours

in

EXCAVATION, TRENCHING, AND SOIL MECHANICS

George Bradberry
INSTRUCTOR

February 20, 1992
DATE

DIRECTOR

MINING AND PETROLEUM TRAINING SERVICE

№ 18299

The University of Alaska Anchorage

CERTIFICATE

This is to certify that

CHARLES L. CROLEY

has satisfactorily completed

8 Hours

in

ENTRY TO CONFINED SPACES

Robert G. Strother
INSTRUCTOR

October 4, 1993
DATE

DIRECTOR

U.S. ARMY CORPS OF ENGINEERS

USACE LEARNING CENTER
HUNTSVILLE, ALABAMA

NAVFAC

CERTIFICATE

Chuck Croley

POA301252122

has completed the Corps of Engineers and Naval Facility Engineering Command Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS - #784

Anchorage, Alaska	April 5th & 6th, 2012	POA - Alaska District	David J. Gerland
Location	Training Date(s)	Instructional District/ NAVFAC	CQM-C Manager
Christopher L. Morgan	christopher.l.morgan@us.army.mil	907-384-7442	
Facilitator/Instructor	Email	Telephone	Facilitator/Instructor Signature

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Director, USACE Learning Center

AK-CESCL
Alaska Certified Erosion & Sediment Control Lead

CONSTRUCTION EDUCATION FOUNDATION INC. • ALASKA • CEF

CERTIFICATE OF ACHIEVEMENT

This certifies that

Chuck Croley

has successfully completed

Alaska Certified Erosion & Sediment Control Lead (AK-CESCL) Storm Water Training Program

Continuing Education Credits Earned:
12 Continuing Competency Credits Residential Endorsement Holders
Course approved by Alaska State Home Builders Association
16 Professional Development Hours for Architects, Engineers and Landscape Architects
Construction Education Foundation
8005 Schoon Street
Anchorage, Alaska 99518

April 2nd & 3rd, 2012	**Anchorage, AK**
Course Date	Location

	April 3rd, 2012	**April 3rd, 2015**
Carl Menconi , Instructor	Certification Date	Expiration Date

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 22370 - 3236

Certificate Number

This is to certify that

Charles L. Croley

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher DOT

In compliance with 49 CFR 172.700-704 (3 Year Expiration)

Class Start Date: 1/20/2011 *Class End Date: 1/20/2011*

Steven Schuler	1/20/2011	1/20/2014	Stuart M. Jacques
	Exam Date	*Cert. Exp. Date*	*Director*

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 22371 - 3236
Certificate Number

This is to certify that

Charles L. Croley

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher IATA

Section 1.5 of IATA Dangerous Goods Regulations (2 Year Expiration)

Class Start Date: 1/20/2011 *Class End Date: 1/20/2011*

Steven Schuler

1/20/2011
Exam Date

1/20/2013
Cert. Exp. Date

Stuart M. Jacques
Director

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

ATV Safety Institute®

A Division of the Specialty Vehicle Institute of America

Certificate of Completion

This certificate confirms that

Chuck Croley

has successfully completed an

ATV Instructor Preparation Course

Jane Bash
Chief Instructor

March 20, 2005
Date

This program complies with the instructional guidelines recommended by the ATV Safety Institute

NSC First Aid Course

Name: **Charles Croley**
Address: **111 W. 16th Avenue**
Address: **Third Floor**
City, State, Zip: **Anchorage, AK 99501**

Security Control No.
651104

Course Completion Date: **April 20, 2012**
Expiration Date: **April 20, 2015**

Training Center: Bristol Industries
Instructor Name: Robin Smith
Instructor Number: 1028878

Charles Croley

has successfully completed the NSC First Aid Course.

The National Safety Council saves lives by preventing injuries and deaths at work, in homes and communities and on the roads through leadership, research, education and advocacy.

THIS DOCUMENT IS VOID IF REPRODUCED

More life-saving courses from NSC

- NSC First Aid, CPR & AED
- NSC CPR & AED
- NSC Bloodborne & Airborne Pathogens

Security Control No.
651104

Charles Croley

has completed the
NSC First Aid Course

Training Center: **Bristol Industries**
Completion Date: **April 20, 2012**
Expires: **April 20, 2015**
Instructional Hours: **4.50**

R. Smith
Instructor Signature

1028878
Instructor No.

Keep this card for your records. Void if reproduced.

250M0911 73177-0000 Printed in the USA 82979

NSC CPR Course & AED

Name: **Charles Croley**
Address: **111. W 16th Avenue**
Address: **Third Floor**
City, State, Zip: **Anchorage, AK 99501**

Security Control No.
712005

Course Completion Date: **April 19, 2012**
Expiration Date: **April 19, 2014**

Training Center: Bristol Industries
Instructor Name: Robin Smith
Instructor Number: 1028878

Charles Croley

has successfully completed the NSC CPR Course based on the current Guidelines for CPR and ECC.

The National Safety Council saves lives by preventing injuries and deaths at work, in homes and communities and on the roads through leadership, research, education and advocacy.

THIS DOCUMENT IS VOID IF REPRODUCED

More life-saving courses from NSC
- NSC First Aid, CPR & AED
- NSC First Aid
- NSC Bloodborne & Airborne Pathogens

NSC—in it for life™ nsc.org/fatraining

Security Control No.
712005

Charles Croley
has completed the
NSC CPR Course & AED

Training Center: **Bristol Industries**
Completion Date: **April 19, 2012**
Expires: **April 19, 2014**
Instructional Hours: **2.75**

R. Smith
Instructor Signature

1028878
Instructor No.

Keep this card for your records. Void if reproduced.

250M0911 73178-0000 Printed in the USA 82980

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

McCoy and Associates

HAS CONFERRED UPON

Tyler Gerald Ellingboe

A CERTIFICATE OF COMPLETION FOR 3.1 CEU OR 31 HOURS OF TRAINING ON THE RCRA HAZARDOUS WASTE REGULATIONS

COURSES COMPLETED:

RCRA Fundamentals
Critical Generator Issues
Advanced RCRA Topics
RCRA Air Emissions and Land Disposal Restrictions
Remediation, Demolition, and Spills

FEBRUARY 7, 8, 9, 10 & 11, 2011; PHOENIX, ARIZONA

Instructor *Instructor*

McCOY

Emerald Alaska, Inc.

Certificate of Completion

is hereby granted to:

Tyler Ellingboe

to certify that they have completed to satisfaction

As per 40 CFR 265.16.

RCRA Refresher

Granted: March 31, 2008

Tyler G. Ellingboe

Instructor, Tyler Ellingboe

www.emeraldnw.com

Certificate of Attendance

TYLER ELLINGBOE

attended the

Hazardous Materials Transportation Workshop

conducted in Anchorage, AK

on

April 24, 2007

U.S. Department of Transportation

Pipeline and Hazardous Materials Safety Administration

Director, Office of Hazardous Materials Initiatives and Training

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 23047 - 240
Certificate Number

This is to certify that

Tyler Ellingboe

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher DOT

In compliance with 49 CFR 172.700-704 (3 Year Expiration)

Class Start Date: 3/22/2012 *Class End Date: 3/22/2012*

	3/22/2012	3/22/2015	Stuart M. Jacques
Erik Christenson	*Exam Date*	*Cert. Exp. Date*	*Director*

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 23048 - 240
Certificate Number

This is to certify that

Tyler Ellingboe

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher IATA

Section 1.5 of IATA Dangerous Goods Regulations (2 Year Expiration)

Class Start Date: 3/23/2012 *Class End Date: 3/23/2012*

Erik Christenson	3/23/2012	3/23/2014	Stuart M. Jacques
Erik Christenson	*Exam Date*	*Cert. Exp. Date*	*Director*

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

Certificate of Attendance

This is to certify that

Tyler Gerald Ellingboe

attended and successfully completed the

HazCat® Chemical Identification System

HazCat Course Days One, Two and Three

Anchorage, AK February 11-13, 1997

Michael Kotowski
Certified Hazcat® Instructor

HAZTECH
SYSTEMS,
I N C.™
Chemical Identification Training Seminars

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 (l993 – 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.

RUSSELL C. JAMES

Environmental Scientist

Years Experience

Total: 9; Bristol: 5

Areas of Expertise

Environmental Sampling and Monitoring

Contaminated Site Assessments/Remediation

Construction Quality Control Systems Management

Remote Site Logistics

Geographic Information Systems

Trimble Geographic Positioning Systems

Data Management

Training and Certifications

AK Certified Erosion and Sediment Control Lead (CESCL)

30-Hour Occupational Safety and Health Training

U.S. Army Corps of Engineers, Construction Quality Management for Contractors

HAZWOPER Supervisor Training – 3/ 2009, Bristol Industries

8-Hour HAZWOPER Training

CPR and First Aid for Adults, National Safety Council®

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

Hazardous Materials Transportation (DOT/IATA)

Defensive Driving Training

Education

B.S., *magna cum laude,* Environmental Geography; Minor, Geology, Valdosta State University, Valdosta, Georgia, 2005

Since 2003, Mr. James has gained proficiency and expertise in Geographic Information Systems (GIS) and Geographic Positioning Systems (GPS). He has integrated GPS and GIS for a number of projects with local governments, the US Army Corps of Engineers® (USACE) and private organizations, and is adept at incorporating GIS/GPS with environmental sampling, remediation and mapping. He is well versed in databases, data review and skilled in the use of ArcGIS, Geomedia Professional and Trimble® GPS equipment and software. Since 2007, Mr. James has been performing environmental field work in Alaska, Arizona, Washington and New Mexico. His experience includes collecting soil, sediment, surface water and groundwater samples; soil boring and monitoring well installations; remote site logistics, including remote Alaska sites; underground storage tank removal; conducting Phase I Site Assessments; and writing Removal Action and Site Investigation reports.

As an Environmental Scientist for Bristol, Mr. James is responsible for environmental sampling and monitoring, including soil boring and well installations, data collection, data review and GIS mapping; conducting site assessments and site investigations; participating in Removal Actions; and writing reports. Mr. James has spent three years serving as Construction Quality Control Systems Manager (CQCSM) for removal actions at remote Alaska sites.

Project Experience

- **Construction Quality Control Systems Manager (CQCSM) and Environmental Scientist, Northeast Cape Hazardous, Toxic, and Radioactive Waste (HTRW) Remedial Actions, USACE, Alaska District, St. Lawrence Island, Alaska (07/201 – 10/2011).** This project was a removal action performed at a former air force station on St. Lawrence Island consisting of the removal of DRO-, PCB- and arsenic-contaminated soil and debris removal. Responsibilities included ensuring contract specifications between USACE and Bristol were met; providing oversight for various activities performed in the field; and acting as liaison between Bristol and USACE. Tasks involved daily reporting to USACE through Daily Quality Control Reports (DQCRs), GPS, and GIS mapping services, meeting with subcontractors, conducting morning safety meetings, acting as interim Site Superintendent and Site Safety and Health Officer (SSHO), reporting to the Bristol home office, environmental sampling, authoring planning documents, and writing the Removal Action Report.

- **CQCSM and Field Technical Lead, Site Inspections of Kiska and Amchitka Islands Military Munitions Response Program (MMRP) Projects, and HTRW and CON/HTRW Projects, USACE, Alaska District, `Kiska and Amchitka Islands, Alaska (04/2011 – 05/2011).** This investigation involved searching for munitions and explosives of concern (MEC) on Kiska and Amchitka Islands as well as investigating historically contaminated sites on Amchitka Island in the Alaskan Aleutian Chain. Responsibilities included management of GPS data; completion of DQCRs; planning of daily field activities; ensuring contract specifications were met; communicating with USACE on work progress. Daily field tasks involved traversing Kiska and Amchitka Islands; collecting GPS data regarding MEC and site features; producing field maps; downloading and managing GPS data. Contributed to the planning documents and final reports.
- **CQCSM and Environmental Scientist, Northeast Cape HTRW Remedial Actions, USACE, Alaska District, St. Lawrence Island, Alaska (07/2010 – 10/2010).** This project consisted of the removal of DRO-, PCB-, and arsenic-contaminated soil, debris removal and the capping of a 1.6 acre landfill. Responsibilities included ensuring contract specifications between USACE and Bristol were met; providing oversight for various activities performed in the field; and acting as liaison between Bristol and USACE. Tasks involved completing DQCRs, GPS, and GIS mapping services, meeting with subcontractors, reporting to the Bristol home office, environmental sampling, authoring planning documents, and writing the Removal Action Report.
- **GIS Team Leader, Site Inspections and Removal Response Actions at Former Army Air Field Properties: Hobbs, Carlsbad, Deming and Fort Sumner, New Mexico and at Former Air Force Station Properties: Las Cruces, and Tierra Amarilla, New Mexico, USACE (04/2010 – 10/2011).** Provided GIS and technical support for various FUDS across New Mexico. Responsibilities included management and organization of GIS and GPS data; establishing ArcMap templates; populating Environmental Data Management System (EDMS); working with the Staged Electronic Data Deliverable (SEDD)format.
- **Site Superintendent/SSHO, Tierra Amarilla Air Force Station Removal Response, USACE, Tierra Amarilla, New Mexico (06/2010).** This project focused on removing physical hazards, primarily solid debris, from a FUDS property in New Mexico. Responsibilities included managing transportation of debris to the Rio Rancho Landfill for appropriate disposal; conducting safety meetings for on-site personnel; and management of scheduling, coordination and execution of on-site activities.
- **CQCSM and Environmental Scientist, Northeast Cape In-Situ Chemical Oxidation (ISCO) Study and Intrusive Drum Removal/Landfill Cap, USACE, Alaska District, St. Lawrence Island, Alaska (04/2009 – 12/2009).** This project involved an intrusive drum removal; landfill cap; and an ISCO study to remediate DRO-contaminated soil at a former Air

Force Station on St. Lawrence Island. Responsibilities included ensuring contract specifications between USACE and Bristol were met; providing oversight for various activities performed in the field; and acting as liaison between Bristol and USACE. Tasks involved completing DQCRs, GPS, and GIS mapping services, meeting with subcontractors, reporting to the Bristol home office, environmental sampling, authoring planning documents, and writing the Removal Action Report.

- **GIS Specialist, Monitoring Well Inventories, USACE, Alaska District, Fort Wainwright and Fort Richardson, Alaska (01/2009 – 10/2009).** The goal of this project was to update an existing database of monitoring well locations with the most current data and included a field reconnaissance. Responsibilities included updating the current database regarding monitoring wells, maintaining open communications with the USACE's GIS point of contact, and establishing effective field data collection techniques using GPS. The project goal was to implement a more effective and accurate GIS database regarding the status and position of monitoring wells on base. Tasks included GPS field collection, and data management and integration into USACE's GIS standards.
- **GIS Specialist, Wetlands Delineation and Project Management, Alaska Natural Gas Development Authority, Anchorage, Alaska (10/2008 – 12/2008).** This project involved wetland delineation of a potential corridor for a natural gas pipeline extending from North Pole, Alaska to Beluga, Alaska. Project responsibilities included prepping data and GPS units for field crews; maintaining and organizing GPS field data; and displaying field data in GIS map atlases, which consisted of hundreds of alignment sheets encompassing over 350 miles of potential pipeline corridor.
- **Environmental Scientist, Leaking Underground Storage Tank (LUST) Excavation Sites, EPA Region 9, Navajo Nation (08/2008 – 09/2008).** The goal of this project was to remove and dispose of six LUSTs in the Navajo Nation and characterize the sites for contamination. Assisted in the supervision of subcontractors excavating Underground Storage Tanks (USTs) for removal. Collected field screening headspace samples using a photoionization detector (PID). Collected soil and surface water samples for analysis at fixed laboratory. Six USTs were removed from three sites.
- **Environmental Scientist, Landfill Removal Project, Phase III, FAA, Cape Yakataga, Alaska (04/2008 – 7/2008).** Collected waste characterization and confirmation soil samples for the decommissioning of a landfill and biocell. Monitored the installation of soil borings and monitoring wells, and conducted groundwater sampling. Authored final report summarizing field activities, presenting analytical data, and providing recommendations for future site remediation.
- **Environmental Scientist, UST Corrective Action, USACE, Alaska District, Fort Richardson, Alaska (10/2007).** Project responsibilities included split spoon sample collection, soil boring oversight, soil classification, and acquisition of dig permits. Collected field-screening headspace samples using a PID.

- **Environmental Scientist, Release Investigation, FAA, Unalakleet, Alaska (9/2007 – 10/2007).** Acquired surface and subsurface soil samples from eight sites near Unalakleet, Alaska. Collected field-screening headspace samples using a PID. Also conducted field-screening using Horiba OCMA 350 Infrared Spectrometer.
- **Environmental Scientist, Treatability Study, Parsons, Joint Base Elmendorf-Richardson, Alaska (10/2007).** Assisted installation of bladder pump and set up of micro purge system for groundwater sampling from monitoring wells. Calibrated YSI brand water quality meter and logging system for groundwater monitoring. Helped with construction of well injection system.
- **Environmental Scientist, Landfill Removal Project, Phase II, FAA, Cape Yakataga, Alaska (08/2007 – 04/2008).** Responsible for soil sample collection; waste container data management, and packaging and shipping of soil samples. Composed interim progress report and authored work plan for 2008 field activities.
- **GIS Specialist, CAMPTEX Project, Bristol Bay Native Corporation (BBNC), Bristol Bay Region, Alaska (11/2006 – 07/2007).** Project responsibilities include organizing, analyzing, and maintaining GIS data; acquiring knowledge about the Alaska Native Claims Settlement Act (ANCSA), and adding/digitizing BBNC ANCSA lands into GIS using Geomedia.

Professional Experience

- **GIS Data Collector, South Georgia Regional Development Center (12/2003 to 09/2006**). Responsibilities included GPS collection of field data, analysis and presentation of data in GIS, as well as maintenance and training for Trimble GPS units and software.
  - GIS Data Collector, Campus Mapping Project, Tift County Board of Education, Tift County, Georgia. Responsible for GPS collection of utility points, post-processing analysis of GPS in ArcGIS, and digital production of gas, water, and sewer lines. Involved in acquisition and georeferencing of 14 school floor plans. Nominated for 2006 National Association of Development Organizations (NADO) Innovation Award.
  - GIS Data Collector, Utility Mapping Project, City of Douglas, Georgia. Responsible for the GPS collection and post-processing of utility points contained within public rights-of-way. Points collected include street lights, manhole covers, storm water collection inlets, fire hydrants, water meters, water valves, gas valves, and gas meters, etc. Points were collected with a Trimble GeoXT™ mounted onto a bicycle, post-processed in Pathfinder® Office, and combined into a GIS using ArcMap.
  - GIS Data Collector, Emergency 911 Address Mapping Project, Cook County, Georgia. Responsible for the GPS collection of every address “point-of-entry” within the limits of Cook County. Points were collected with a Trimble ProXR GPS and combined into a GIS using ArcMap 9.1.
  - GIS Data Collector, Utility and Right-of-Way Mapping Project, City of Tifton, Georgia. Responsible for GPS collection of utility points within public rights-of-way in the city of Tifton, Georgia. Points were collected using Trimble ProXR backpack unit and bicycle mount.
  - GIS Data Collector, Sign and Bridge Inventory, Thomas County, Georgia.

– Responsible for the GPS collection of signs and bridges along every county maintained road in Thomas County.

♦ **Geology Research Internship, 2004 ACRES Program, Georgia State University (05/2004 – 11/2004).** Analyzed the geochemistry of metamorphic rocks in the Uchee Belt, near Columbus, Georgia. Utilized ICP-MS and XRF for chemical analyses of prepared samples. Poster presentation at the Annual GSA Meeting in Denver, Colorado. Abstract can be found at http://gsa.confex.com/gsa/2004AM/finalprogram/abstract_79798.htm.

Awards

Outstanding Service Award, South Georgia RDC, 2006

Honor Graduate: Magna Cum Laude, 2005

Outstanding Student in Environmental Geography, 2005

Gertrude Odum Scholarship, 2000 - 2004

HOPE Scholarship, 2000 - 2004

ALEX BASKOUS, M.D., M.P.H.
OCCUPATIONAL MEDICINE
BOARD CERTIFIED IN OCCUPATIONAL MEDICINE
BY THE AMERICAN BOARD OF PREVENTAVIE MEDICINE
2841 DEBARR ROAD – SUITE 24

TELEPHONE: (907) 279-4953
FAX: (907) 334-9667
EMAIL: DRALEXBASKOUS@GMAIL.COM

PHYSICIAN'S WRITTEN OPINION

PURSUANT TO 29 CFR 1910.120(f) MEDICAL SURVEILLANCE:

NAME Russell James SS#____________

DATE OF EXAM 10/19/11

✓ A. NO MEDICAL CONDITIONS WERE DETECTED WHICH WOULD PLACE THE EMPLOYEE AT INCREASED RISK OF IMPAIRMENT OF THE EMPLOYEE'S HEALTH FROM WORK IN HAZARDOUS WASTE OPERATIONS OR EMERGENCY RESPONSE, OR RESPIRATOR USE.

THE FOLLOWING MEDICAL CONDITIONS ARE OCCUPATIONALLY PERTINENET:

____

____

____

____ B. NO LIMITATIONS UPON THE EMPLOYEE'S ASSIGNED WORK.

THE FOLLOWING LIMITATIONS ARE RECOMMENDED:

____

____

✓ C. THE EMPLOYEE HAS BEEN INFROMED BY ME OF THE RESULTS OF THE EXAMINATIONS.

DATE: 10/19/11

____________, M.D., M.P.H.

ALEXANDER BASKOUS, M.D., M.P.H.
2841 DEBARR ROAD, SUITE 24
ANCHORAGE, AK 99508

Bristol

ALLIANCE OF COMPANIES™

Russell James

Has completed 8 hours of annual refresher training as required by

29 CFR 1910.120

Hazardous Waste Operations & Emergency Response

March 29 , 2012

Clark Roberts, C.I.H.
Instructor

Bristol

INDUSTRIES

Russell James

Has completed 8 hours of Supervisor training as required by

29 CFR 1910.120

Hazardous Waste Operations & Emergency Response

March 6, 2008

Clark Roberts, CIH, CHMM

Instructor

OSHA Occupational Safety and Health Administration

26-600640037

This card acknowledges that the recipient has successfully completed a 30-hour Occupational Safety and Health Training Course in
Construction Safety and Health

RUSSELL JAMES

(Trainer name – print or type)

2-26-2010
(Course end date)

U.S. ARMY CORPS OF ENGINEERS

PROFESSIONAL DEVELOPMENT SUPPORT CENTER
HUNTSVILLE, ALABAMA

CERTIFICATE

This is to certify that

Russell James

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

Given at AGC By Alaska District 04/11/2008
Location Instructional District Date

Russell Flock Facilitator

Chief, USACE Professional Development Support Center

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

AK-CESCL
Alaska Certified Erosion & Sediment Control Lead

CONSTRUCTION EDUCATION FOUNDATION INC. · ALASKA · CEF

CERTIFICATE OF ACHIEVEMENT

This certifies that

Russell James

has successfully completed

Alaska Certified Erosion & Sediment Control Lead
(AK-CESCL) Storm Water Training Program

Continuing Education Credits Earned:
12 Continuing Competency Credits Residential Endorsement Holders
Course approved by Alaska State Home Builders Association
16 Professional Development Hours for Architects, Engineers and Landscape Architects

Construction Education Foundation
8005 Schoon Street
Anchorage, Alaska 99518

March 13th & 14th, 2012	**Anchorage, AK**
Course Date	Location

Michael D. Travis	**3/14/2012**	**3/14/2015**
Mike Travis , Instructor	Certification Date	Expiration Date

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 22370 - 12792
Certificate Number

This is to certify that

Russell C. James

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher DOT

In compliance with 49 CFR 172.700-704 (3 Year Expiration)

Class Start Date: 1/20/2011 *Class End Date: 1/20/2011*

Steven Schuler	1/20/2011	1/20/2014	Stuart M. Jacques
	Exam Date	Cert. Exp. Date	Director

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

ENVIRONMENTAL
MANAGEMENT
INCORPORATED

Certificate of Training

T - 22371 - 12792
Certificate Number

This is to certify that

Russell C. James

has satisfactorily completed 8 hours

of

Hazardous Materials Transportation Refresher IATA

Section 1.5 of IATA Dangerous Goods Regulations (2 Year Expiration)

Class Start Date: 1/20/2011   *Class End Date: 1/20/2011*

	1/20/2011	1/20/2013	Stuart M. Jacques
Steven Schuler	*Exam Date*	*Cert. Exp. Date*	*Director*

Environmental Management Inc. 206 E. Fireweed Lane Suite 201, Anchorage Alaska 99503 907-272-8852

NSC First Aid Course

Name: **Russell James**
Address: **111 W. 16th Avenue**
Address: **Third Floor**
City, State, Zip: **Anchorage, AK 99501**

Security Control No.
651106

Course Completion Date: **April 20, 2012**
Expiration Date: **April 20, 2015**

Training Center: Bristol Industries
Instructor Name: Robin Smith
Instructor Number: 1028878

Russell James

has successfully completed the NSC First Aid Course.

The National Safety Council saves lives by preventing injuries and deaths at work, in homes and communities and on the roads through leadership, research, education and advocacy.

THIS DOCUMENT IS VOID IF REPRODUCED

Security Control No.
651106

Russell James

has completed the
NSC First Aid Course

Training Center: **Bristol Industries**
Completion Date: **April 20, 2012**
Expires: **April 20, 2015**
Instructional Hours: **4.50**

R. G. Smith
Instructor Signature

1028878
Instructor No.

Keep this card for your records. Void if reproduced.

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NSC CPR Course & AED

Name: **Russell James**
Address: **111. W 16th Avenue**
Address: **Third Floor**
City, State, Zip: **Anchorage, AK 99501**

Security Control No.
712006

Course Completion Date: **April 19, 2012**
Expiration Date: **April 19, 2014**

Training Center: Bristol Industries
Instructor Name: Robin Smith
Instructor Number: 1028878

Russell James

has successfully completed the NSC CPR Course based on the current Guidelines for CPR and ECC.

The National Safety Council saves lives by preventing injuries and deaths at work, in homes and communities and on the roads through leadership, research, education and advocacy.

THIS DOCUMENT IS VOID IF REPRODUCED

Security Control No.
712006

Russell James

has completed the
NSC CPR Course & AED

Training Center: **Bristol Industries**
Completion Date: **April 19, 2012**
Expires: **April 19, 2014**
Instructional Hours: **2.75**

Toli Smith
Instructor Signature

1028878
Instructor No.

Keep this card for your records. Void if reproduced.

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GREG J. JARRELL, E.I.T.

General Manager

Years Experience
Total: 14; Bristol: 4.5

Areas of Expertise
Program/Project Management

Demolition

Fuels Construction

Hydrology

Investigation and Remediation

Regulatory Compliance

Affiliations
Society of American Military Engineers (SAME)

Training and Certifications
Permit Required Confined Space Training

DOT & IATA Hazardous Materials Transportation Training

40-Hour Hazardous Waste Operations and Emergency Response

Lead Awareness Training

First Aid & CPR, Anchorage, Alaska

USACE, Construction Quality Management for Contractors

EPA, Environmental Remediation Technologies Course

Education
M.S., Geologic Engineering, South Dakota School of Mines and Technology, Rapid City, 2000

B.S., Geology, University of Montana, Missoula, 1995

Mr. Jarrell has been managing and performing environmental and construction projects throughout Alaska and the western United States for 14 years. His experience includes fuels infrastructure construction and repair, large scale demolition, HTRW investigation and removal, facilities sustainment, restoration, and modernization (SRM), groundwater quality monitoring, surface water sampling and analysis, monitoring well installation, soil sampling and analysis, groundwater modeling, fate transport modeling, AutoCAD, site investigations, bioremediation design and operations and maintenance, proposal and cost estimate preparation, and work plan preparation.

As General Manager of Bristol Fuel Systems, LLC., Mr. Jarrell's responsibilities include operations planning and oversight, ensuring compliance with all company policies and procedures, and budgetary oversight and understanding of the company's financial performance and reporting requirements. Additional duties include resource management and oversight, business development, contract management, implementation of strategic business and/or operational plans, and ensuring that the company is in compliance with local, state, and federal regulations.

Project Experience

Operations Manager, Indefinite Delivery/Indefinite Quantity (IDIQ) Contract for Immediate/Rapid Response for HTRW and SRM Nationwide, USACE, Omaha District, (2010 - Present, $9M). Primary point of contact between Bristol and the USACE Rapid Response Program Managers and Project Management Team. Also responsible for negotiating, receiving, acknowledging, approving, staffing, and implementing task orders issued under the contract by the Contracting Officer. Additional duties include maintaining and accounting for all costs incurred in accordance with Contract Management Procedures and cost control at all levels of work.

- **Program Manager, Indefinite Delivery/Indefinite Quantity (IDIQ) Contract, FAA, Design, Construction, Decommissioning, Demolition, Environmental Remediation, and Other Engineering Services for the FAA's Western Service Area (2010 - Present; Unlimited Ceiling).** Serves as the single point of contact for the client and has the authority to commit the company and its' resources to task orders under this contract. Has the overall responsibility for performance, cost control, schedule control, safety, staffing, and technical quality of the work. Work under the contract includes but is not limited to, sustainment, maintenance, and repair of FAA Facilities, road repair, antennae repair, engine generators, fuel storage tanks, decommissioning activities, asbestos and/or lead abatement, debris disposal, environmental remediation, site investigation, sampling and analysis, system installation, monitoring, and reporting.
- **Program Manager, Indefinite Delivery/Indefinite Quantity (IDIQ) Contract, FAA, Engineering and Construction Services for the FAA's Western Service Area (2007 - 2010; Unlimited Ceiling ~$16.8M to date).** Served as the single point of contact for the client and had the authority to commit the company and its' resources to task orders under this contract. Responsible for performance, cost control, schedule control, safety, staffing, and technical quality of the work. Work under the contract included but was not limited to, infrastructure refurbishment, fuel storage life cycle management and repair, site investigation and environmental remediation, environmental and OSHA compliance, decommissioning, and other engineering services as specified. Project locations included Alaska and the western U.S.
- **Project Manager, Umm Qasr Pier and Seawall Fuel and Water System Construction, CCI, Inc., Umm Qasr, Iraq (2009 - 2010; $1.5M).** Responsible for job cost estimating, project coordination, budgeting, staffing, submittals, and logistics. Also performed construction estimating and management. Project was a design-build contract for the construction of a fuel and water distribution system for the new pier and seawall in Umm Qasr, Iraq. The project included the construction of three 100,000 liter storage tanks with transfer pumps, pipelines, a truck loading/unloading platform, and dispensing systems at each ship berthing area on the pier and floating docks. Project also included the construction of a potable water system that included a 70,000 liter storage tank, pipeline distribution systems, and dispensing systems at each ship berth for water wash down and potable water supply.
- **Project Manager, Anchorage and Merrill Field Air Traffic Control Tower HVAC Control Replacement, Federal Aviation Administration (FAA), Anchorage, Alaska (2008 - 2009; $465K).** Responsible for job cost estimating, client coordination, budgeting, work plan preparation, health and safety, report preparation, submittals, and logistics. Also performed construction estimating and management. Project included replacement of all the existing hardware, firmware, and software for the heating, ventilation, and air conditioning (HVAC) systems at the Anchorage International Airport and Merrill field air traffic control towers. Work was performed in a highly secure environment with restricted working hours.
- **Project Manager, ID/IQ Contract Environmental Projects - Old Landfill Site (Phase II and Phase III, FAA, Cape Yakataga, Alaska (2007 - 2008; $14.7M).** Responsible for all management aspects of large scale hazardous waste remediation project. Project Management duties include the preparation of remedial work plans, site-specific health and

safety plans, state and federal permitting, mobilization and demobilization (air and marine) to and from a remote Alaska site, collection of soil samples for laboratory analysis, soil excavation and containerization, and hazardous waste transportation, treatment, and disposal. Cape Yakataga is a remote landfill site containing dioxin concentrations greater than the U.S. Environmental Protection Agency's (EPA) allowable Risk Based Concentrations in soil. Analytical results also indicated that lead was located throughout the landfill soils above Resource Conservation and Recovery Act levels along with polychlorinated biphenyls (PCBs), diesel fuel, and various other organic compounds, including chlorinated solvents at low levels. The Alaska Department of Environmental Conservation (ADEC) mandated that the FAA perform a soil removal and disposal action to mitigate the potential environmental impacts of the dioxin-contaminated soil remaining in the landfill.

- **Project Manager, Underground Storage Tank (UST) Investigation and Closure Project, USACE, Alaska District, Fort Richardson, Alaska (2007 - 2008; $178.5K).** Responsible for job cost estimating, client coordination, regulatory compliance, budgeting, work plan preparation, health and safety, supervision of soil excavation, soil sampling, data collection, report preparation, submittals, and logistics. Also performed construction estimating and management. Project entailed the investigation, remediation, and closure of three UST sites.
- **Project Manager, F22A-Fighter Infrastructure Contaminated Soil Removal Project, USACE, Alaska District, Elmendorf Air Force Base, Alaska (2008 - 2009; $109K).** Responsible for job cost estimating, client coordination, regulatory compliance, budgeting, work plan preparation, health and safety, supervision of soil excavation, soil sampling, data collection, report preparation, submittals, and logistics. Project entailed the investigation, remediation, and disposal of drums and soil contaminated with DDT, arsenic, chromium, and petroleum.
- **Project Manager, AST Cleaning and Inspection Projects, FAA, Biorka and Level Islands. Alaska (2007 - 2008; $181K).** Responsible for job cost estimating, client coordination, budgeting, work plan preparation, health and safety, report preparation, submittals, and logistics. Also performed construction estimating and management.
- **Project Manager, Kodiak Air Traffic Control Tower (ATCT) AST Upgrades, FAA, Kodiak, Alaska (2007; $86K).** Responsible for client coordination, budgeting, work plan preparation, health and safety, report preparation, submittals, and logistics. The overall purpose of this project was to replace the existing AST serving the ATCT at Kodiak, Alaska with a new 1,000-gallon capacity dual-wall AST currently under design by the FAA.
- **Project Manager, AST Upgrade Project, Federal Aviation Administration (FAA) Cold Bay, Alaska (2007; $93K).** Responsible for client coordination, budgeting, work plan preparation, health and safety, report preparation, submittals, and logistics.
- **Project Manager, Debris Removal Project (Phase I), FAA, Cape Yakataga, Alaska (2007 - 2009; $700K).** Responsible for job cost estimating, client coordination, regulatory compliance, budgeting, work plan preparation, health and safety, supervision of soil excavation, soil sampling, data collection, report preparation, submittals, and logistics. Original intent of the project was to segregate, remove, and dispose of solid wastes related to the historical landfill at the Cape Yakataga Air Station. During project performance hazardous wastes were

encountered. Wastes included drums with unknown contents, soil contaminated with lead, dioxin, petroleum, and PCBs. The FAA awarded additional work under Phase II and Phase III for large scale remediation efforts.

Professional Experience

- **Project Manager, BNC International, Inc. (BNCI)/Bethel Services, Inc. (BSI), Anchorage, Alaska (02/2002 - 03/2007).** Project Manager specializing in environmental, construction, and demolition projects.

  Program/Project Manager, FAA ID/IQ Contract Environmental Projects. Responsible for all management aspects for large scale Remedial Investigation Feasibility Study (RIFS) projects performed under BNCI's ID/IQ contract. Projects involved environmental drilling, well installation, soil sample collection, groundwater sampling, aquifer testing, Method 3 and Phase IV risk calculation, and waste management. Project locations included Yakutat, Johnstone Point, Woody Island, Homer, Fairbanks, and Juneau, Alaska. Responsible for job cost estimating, client coordination, budgeting, work plan preparation, health and safety, supervision of soil excavation, soil sampling, data collection, report preparation, submittals, and logistics. Also performed construction estimating and management. Projects included facility remodeling, construction of new facilities, and navigational aide tower installation under the FAA's CAPSTONE safety program.

  – Project Manager, FAA Decommissioning Projects. Responsible for all management aspects for large scale demolition projects in Farewell, Alaska and Woody Island, Alaska. Responsible for budgeting, work plan preparation, health and safety, supervision of soil excavation, soil sampling, data collection, and logistics. The Scope of Work for the projects was to abate, demolish, and completely remove the remaining structures at the FAA Housing Complexes, and Flight Service Station Infrastructure, including foundation components and other mechanical appurtenances. The projects included removal/abatement of asbestos-containing material (ACM), lead-based paint (LBP), hazardous materials, aboveground and underground storage tanks (USTs and ASTs), and polychlorinated biphenyl (PCB) contaminated soil.

  – Project Manager, U.S. Army Corps of Engineers (USACE) Haines Military Cutoff Road Tank Removal, Haines, Alaska. Responsible for all management aspects for Site Investigation and UST Removal. Project involved geophysical surveying, environmental soil sampling and removal of 10 USTs, and approximately 200 feet of fuel pipeline.

  – Project Manager, USACE and Formerly Used Defense Sites (FUDS) Whittier Utilidor and Pipeline Removal, Whittier Alaska. Project entailed the demolition and removal of approximately 300 feet of fuel pipeline and concrete utilidor, ACM pipeline, and 25,000 gallons of water contaminated with Bunker "C" fuel oil. The project included the disposal of free phase Bunker "C"fuel oil and associated contaminated soil, installation of product recovery wells, and soil sampling.

  – Project Manager, USACE Tanani Point Site Investigation and Pipeline Removal, Haines, Alaska. Responsible for all management aspects for Site Investigation. Contaminants of concern included, PCBs, Dioxins, DRO, GRO, BTEX, Lead, and VOCs. Approximately 40 soil samples were collected throughout the life of the project, and approximately 415 feet of pipeline was removed.

- Project Manager, BP Exploration (Alaska) Bioremediation Projects at Service City Pad and Sea Air Motive Pad, Prudhoe Bay, Alaska. Responsible for all management aspects for large scale bioremediation of POL-contaminated soil, including budgeting, work plan preparation, health and safety, supervision of soil excavation, monitoring well installation, soil sampling, data collection, and logistics. Soils with petroleum hydrocarbon contamination in excess of the Alaska Department of Environmental Conservation (ADEC) Method 1 cleanup level for the Arctic Zone and areas of petroleum–stained soil were identified, excavated, and placed in bioremediation cells. The corrective action included landfarming of petroleum-affected soils.
- Project Manager, BP Exploration (Alaska) Pipeline Removal Project, Deadhorse Airport, Deadhorse, Alaska. Responsible for all aspects of underground fuel line removal project, including project management and field supervision. Project entailed the removal and disposal of an underground fuel line associated with two former USTs.

♦ **Project Manager/Hydrogeologist, IT Corporation (IT Corp.), Anchorage, Alaska (07/2000 – 02/2002).** Project Manager/Field Hydrologist for construction and environmental projects.

- Project Manager, Air Force Center for Environmental Excellence (AFCEE) landfill capping project, Clear Long Range Radar Station, Alaska. Responsible for all aspects of landfill capping project in support of landfill closure. Managed subcontractors and field personnel. Project included clearing, grubbing, surveying, subgrade preparation to design grade lines, QA/QC, and site safety. Responsible for coordinating field changes and redesign of final grade lines with ADEC to ensure compliance with state regulations when unforeseen changes in site conditions were encountered.
- Site Engineer/Geologist, Phase II site investigation for Laidlaw Transit Inc., in Delta Junction. Supervised equipment operators in the excavation of test pits for site investigation. Performed field investigation and collected soil samples to determine if any contamination-related concerns existed on the property prior to purchase by Laidlaw Transit, Inc. Generated documentation of work completed, site findings, and recommendations.
- Site Engineer, AFCEE, Bulk Fuel Storage Tank Inspection & Repair, Yokosuka, Japan. Supervised a 20-man crew performing cleaning, inspection, and repair activities for an 8-million gallon UST. Project included sand blasting, re-coating, non-destructive testing (mag particle and X-ray), and inspection. Duties included QA/QC, reporting, safety compliance, and inspection of work performed.

♦ **Hydrogeologist / Project Environmental Engineer, U.S. Geological Survey, Water Resources Division, Rapid City, South Dakota (USGS) (1997 - 2000).**

- Watershed modeling and Analysis for the Black Hills Hydrology Study, Black Hills, South Dakota Tasks included aquifer vulnerability analysis, regional flow analysis (surface water and groundwater), groundwater/surface water interaction analysis, determination of groundwater residence times, and determination of aquifer properties.

♦ **Graduate Research Assistant, South Dakota School of Mines & Technology, Rapid City, South Dakota (1999 – 2000).**

- Contaminant Inventory of Rapid City West Quadrangle. Project included GIS analysis of potential contaminants and aquifer vulnerability, on-site treatment systems analysis, and GIS analysis of septic systems and aquifer vulnerability.

STEVEN A. JOHNSON, P.E.

CEO/Bristol Environmental Remediation Services, LLC

Years Experience

Total: >35; Bristol: 11

Areas of Expertise

Project and Program Management

Environmental and Geotechnical Projects

Soil and Groundwater Investigation

Site Remediation

Registration

Registered Civil Engineer, State of Alaska, 1990 (CE8052)

Affiliations

Vice Chairperson, State of Alaska Board of Storage Tank Assistance

Association of Engineering Geologists

Member S.A.M.E.

Training and Certifications

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

8-Hour HAZWOPER Refresher

8-Hour HAZWOPER Supervisor

Education

M.S., Engineering Geology, Purdue University, West Lafayette, Indiana, 1974

B.S., Geological Engineering, University of Alaska, Fairbanks, 1973

Mr. Johnson has provided multidisciplinary environmental and geotechnical services as an engineering geologist in Alaska for over 35 years. He has managed soil and groundwater investigations for property assessments, remedial investigations (RIs), and feasibility studies (FSs) at hazardous waste sites and for underground fuel spills. Mr. Johnson provides direction in project development, program management, quality control, scope of work assessment, and technical review. Since 1990, he has served as program manager for environmental remediation contracts totaling more than $100 million. Mr. Johnson also has been responsible for managing contracts for construction of new fuel facilities statewide worth more than $15 million.

Since 2007, Mr. Johnson has served as the Chief Executive Officer (CEO) of Bristol Environmental Remediation Services, LLC (BERS). He is responsible for conducting all of the day-to-day operations of BERS' business including all administrative, personnel, and marketing functions.

Project Experience

- **Program Manager, HTRW Immediate/Rapid Response (RR/IR) Contract, USACE, Omaha District Indefinite Delivery/Indefinite Quantity Contract, (04/2010 – 03/2013; NTE $9M).** Program Manager for this 3-year ID/IQ contract with the Omaha District for remediation of various hazardous waste sites and Facilities Sustainment, Restoration, and Modernization (SRM). The contract requires Bristol to furnish and transport all plant, labor, materials, and equipment to complete RR/IR task orders nationally including the Continental United States, Alaska, Hawaii, and the U.S. Territories. To date, Bristol has been awarded six RR task orders under the contract worth approximately $1.5 million for work in Montana, Texas, Nebraska, and Utah.

- **Program Manager, Environmental Remediation Services (ERS) Contract, USACE, Alaska District Indefinite Delivery/Indefinite Quantity Contract (04/2006 - 03/2016, NTE $180M).** Since 2006, served as Bristol's single point of contact for this 10-year IDIQ contract with the Alaska District. As Bristol's Program manager, responsible for coordinating program issues with the USACE and the overall management of the contract including cost, schedule, and technical quality. He also oversees the development and implementation of task orders under the contract including subcontract administration. To date, Bristol has been awarded several task orders under the contract totaling approximately $8 million. The following task orders have been completed or are underway on this contract:
  - Hoonah Radio Relay Station (RRS), Hoonah, Alaska – During the period 2006 to 2008 Bristol performed a site investigation and excavated, transported and disposed over 2,900 tons of PCB-contaminated soil from the Hoonah RRS site.As a result of this work, the site was conditionally closed by the ADCE and U.S. EPA.
  - Remedial Investigations (RIs) at Nuvagupak, Kogru, and Collinson Pt. – Performed RIs at three remote sites on Alaska's North Slope. Field crews used a helicopter and light aircraft to complete the field work during the summer of 2008.
  - CANOL Pipeline Decommissioning, Fort Wainwright, Alaska – In 2010 Bristol traced and surveyed approximately 24,000 linear feet (LF) of the CANOL POL pipeline at Fort Wainwright, and closed approximately 5,100 LF of the historic Canol pipeline. Work in 2011 will include additional investigative and closure activities on the CANOL line.
- **Project Manager, White Alice Tram and Debris Removal 2005, USACE, Alaska District, Northeast Cape on St. Lawrence Island, Alaska (07/2004 - 03/2006; $5.2M).** Responsible for managing all aspects of the project including scope, schedule, budget, and reporting. The removal action was performed at a remote Formerly Used Defense Site (FUDS) site located in the Bering Sea, approximately 135 air miles southwest of Nome and inaccessible by road. Bristol. prepared planning documents; made improvements to 6 miles of roads and 3 miles of trails in order to access work sites; demolished the tram line and associated line support towers and wire/cable groups; removed approximately 26 tons of debris from two debris fields on Kangukhsam Mountain; removed more than 200 metal and wooden poles and approximately 25 miles of power and communications wire and cable; sorted, processed, packaged, and transported more than 1,520 tons of demolition debris; disposed of over 370 tons of burnable wood on-island; excavated, packaged, manifested, transported, and disposed of over 160 tons of PCB-contaminated concrete; excavated, packaged, manifested, transported, and disposed of over 290 tons of PCB-contaminated soil; and manifested and transported approximately 1,500 tons of waste off-island for disposal or recycling.
- **Project Manager, Municipal Solid Waste Landfill (MSWL) Closure, CH2M Hill, Eareckson Air Station, Shemya, Alaska (2005; $2.1M).** Responsible for managing all aspects of the project including redesign, schedule, budget, construction activities, and reporting. Eareckson Air Station is located approximately 1,600 miles south-southwest of Anchorage, Alaska, on remote Shemya Island. Project objectives were to close the existing Municipal Solid Waste Landfill (MSWL) and construct a new MSWL and asbestos disposal cell, in accordance with the U.S. Air Force's Solid Waste Permit from the Alaska Department of Environmental Conservation (ADEC). Bristol's client was asked to implement plans and specifications prepared by another contractor. After the initial site visit, it was obvious that significant

redesign would be required to complete the project. Bristol supported a geotechnical investigation to relocate the borrow area, reviewed constructability, and provided consultation for the client. Significant accomplishments included: assisting in the investigation to confirm that suitable borrow material was available; participating in the redesign of the project; preparing a site-specific Work Plan, CQC Plan, and a SSHP; modifying the SSHP to include procedures for avoiding Munitions and Explosives of Concern (MEC); mobilizing/demobilizing all of the heavy equipment via barge to Shemya from Anchorage, Alaska; providing an MEC Technician III to implement and oversee MEC avoidance activities; excavating, hauling, placing and compacting a total of over 100,000 cubic yards of various borrow materials over a five-week period; and completing the project approximately four weeks ahead of schedule. Type of construction: Heavy civil

- **Project Manager, White Alice Site Removal Action 2003, USACE, Alaska District Northeast Cape on St. Lawrence Island, Alaska (2003 - 2004; $12.3M).** Responsible for managing all aspects of the project including scope, schedule, budget, and reporting. The removal action was performed at a remote FUDS for the USACE, Alaska District. The objective of the project was to remove old Cold War era buildings and structures that posed physical and chemical hazards. Bristol prepared planning documents; made improvements to roads and trails in order to access work sites; performed hazardous material removal and asbestos abatement in more than 30 buildings and other structures, followed by demolition and disposal; demolished approximately 650 feet of fuel line and 14 aboveground fuel storage tanks; demolished and disposed of approximately 60 miles of power and communication poles and wires; decontaminated, demolished, and disposed of three septic systems; and, performed asbestos abatement then demolished and disposed of over 4,000 linear feet of utilidors and piping. Packaged, manifested, transported, and disposed of approximately 6,300 tons of wastes.
- **Task Order Manager, ROTHR Facility Demolition and Environmental Closeout, U.S. Navy, Amchitka Island, Alaska (05/2001 – 09/2001; $12M).** Responsible for managing all aspects of the work including: preparing planning documents; providing logistics support; demolishing and disposing of 56 structures and 52 storage tanks; removing, identifying, packaging, transporting, and disposing of approximately 100 tons of hazardous materials and hazardous waste from the ROTHR facilities; cleaning and closing a sewage lagoon containing approximately 2,000 cubic yards of sewage sludge contaminated with polychlorinated biphenyls (PCBs); thermally treating 2,500 cubic yards of petroleum-contaminated soil on site; and preparing a closure report.
- **Task Order Manager, Focused Feasibility Study (FFS) at the South of Runway 18/36 Area, U.S. Navy, Former Naval Air Facility, Adak (2000 - 2001; $300K).** Responsible for managing all aspects of a Remedial Investigation and preparation of a Focused Feasibility Study for a site on Adak Island, Alaska. At the 5-acre affected area, soil and groundwater contamination resulted from releases from a diesel fuel pipeline constructed during World War II. The FFS presented a detailed analysis of potential remedial alternatives for free product and soil and groundwater contamination. Complete life-cycle costs were evaluated for a range of soil and groundwater remedial alternatives.

Professional Experience

- **Program Manager, Harding Lawson Associates, Anchorage, Alaska (1978 – 2000).**
  - Program Manager, Indefinite Delivery Type Remedial Action Contract, USACE, Alaska District, Various Locations throughout Alaska (1996 - 2000; $2M). Responsible for overall management, control, and administration of the contract including quality and production. Developed and coordinated joint venture cost estimate and scope of work procedures, prepared and negotiated scopes of work, managed subcontract selection, and provided expert technical consulting support. This project was conducted as a joint venture between Harding Lawson Associates and Wilder Construction Company, to provide remedial services at hazardous, toxic, and radioactive waste sites throughout Alaska. The following projects were conducted under this contract.
    - Site Investigation, Galena, Alaska. Performed a subsurface investigation, excavated 1,000 cubic yards (yd3) of hydrocarbon-contaminated soil, collected soil samples from the excavation to evaluate the extent of contamination, and transported the soil to a bioremediation pile (biopile) for treatment.
    - Bioremediation, Galena, Alaska. Designed, constructed, operated, and monitored a biopile to remediate 11,000 yd3 of previously stockpiled contaminated soil.
    - Alaska Communication System Removal Action, Northway Junction, Alaska. Removed fuel storage tanks and associated piping, chemical containers, and storage drums; sample soil, containers, and tanks for waste characterization; excavated and disposed of 350 tons of hydrocarbon contaminated soil; and transported solid and hazardous wastes for disposal.
    - Cape Romanzoff Long Range Radar Site Biopile. Constructed, operated, and maintained two biopiles to remediate approximately 3,000 yd3 of hydrocarbon-contaminated soil at two locations at the station. One biopile was on the station cantonment within 1/4 mile of the minimally attended station facilities. Contractor designed an active biopile to treat soil at this facility with an electrically powered regenerative blower to oxygenate the soil. The second, passive, biopile, approximately 4 miles from the main facilities, used wind power to ventilate the soil.
    - Wildwood Air Force Station Interim Removal Action. Planned and executed the removal of several types of wastes, hydrocarbon-contaminated soil, and abandoned structures that threatened public safety. Scope of work included excavation and thermal remediation of approximately 1,000 yd3 of hydrocarbon-contaminated soil; asbestos abatement in two abandoned buildings, abatement of lead-contaminated ash in one burned-out building, demolition of seven buildings, disposal of building debris in a regulated landfill, mitigation of other safety hazards, and backfilling of disturbed areas. Prepared a remedial action report describing cleanup activities and documenting post-cleanup site conditions. The report included a complete manifest package consisting of hazardous waste manifests, bills of lading, and certificates of recycling/disposal for all waste streams.
    - Northway Staging Area Interim Removal Action. Removed several types of wastes at the Northway Staging Area, approximately 10 square miles near the Northway, Alaska, airport, 285 air miles northeast of Anchorage. The site consists of abandoned airfield support facilities built since the start of World War II. Private

residences have been built on some of the property. Contractor was responsible for “cradle-to-grave” handling of the waste streams, including scrap metal from the recovery and cleaning of 413 fifty-five-gallon drums; one 500-gallon tank; and approximately 185 smaller containers of petroleum products, soil, water, and a white powder thought to be sodium hydroxide. The 500-gallon tank and about one hundred 55-gallon drums are in two shallow lakes; the other containers are scattered throughout the staging area. The following materials were encountered: approximately 2,000 gallons of petroleum products; approximately 3,800 gallons of asphalt from surface spills and containers; nine batteries suspected to contain nickel and cadmium; approximately 1 yd3 of asbestos; approximately 850 yd3 of asphalt-coated wood staves; and approximately 720 yd3 of asphalt-contaminated sand.

– Program Manager, RI/FS Investigation, U.S. Air Force, Eielson Air Force Base (AFB), Alaska (1989 - 1991; $2.6M). Responsible for overall management, control, and administration of the contract, including quality and production for completing an RI/FS addressing 23 hazardous waste sites at Eielson AFB under the U.S. Air Force Installation Restoration Program. Supervised development of the risk assessment procedure, the project work plans, and a community relations plan. Managed the field tasks, including soil-gas surveys, geophysical surveys, monitoring well installations, soil and water sampling, and aquifer tests.

♦ **Project Manager/Engineer, Harding Lawson Associates, Anchorage, Alaska (1978 – 2000).**

– Project Manager, Statewide Underground Storage Tank (UST) Program, Federal Aviation Administration (FAA), Alaska (1996; $200K). Developed a procedure to assess human-health risks and the threat to groundwater from fuel-affected soil. Project required developing an acceptable human-health-risk screening procedure and implementing a vadose zone model to assess leachability of various fuel constituents.

– Project Manager, Statewide Fuel Storage Tank Program, FAA, Various Locations throughout Alaska 1990 to 1998; $18M). Developed standard remedial designs for fuel-affected soil and groundwater. The remedial action alternatives were implemented on a fast-track basis through a planned, coordinated program.

– Project Engineer, Alternative Cleanup Level Development Project, FAA, Various Sites throughout Alaska (1996; $350K). Developed methodology to establish alternative cleanup levels for fuel-affected soil. Project objectives were to develop a procedure to assess human-health risks and the threat to groundwater by fuel-affected soil. Project required developing an acceptable human-health-risk screening procedure, and implementing a vadose-zone model to assess leachability of various fuel constituent.

– Project Manager, Property Transfer Assessment, Confidential Client, Anchorage, Alaska (1997; $180K). Managed the technical and financial aspects of this soil and groundwater investigation for a confidential client. Prepared a work plan/quality assurance plan and a site investigation report recommending remediation at the site. Acted as liaison between the client and the Alaska Department of Environmental Conservation.

– Project Engineer, Old Seward Highway Contaminant Survey, Alaska Department of Public Transportation and Public Facilities, Anchorage, Alaska (1995; $250K). Planned and directed subsurface investigations of five sites needed for right-of-way acquisitions. Tested soil and groundwater samples and conducted soil-gas surveys. Project Manager, Railbed Soil Contaminant Investigation-White Pass and Yukon Route, White Pass and Yukon Railway, Skagway, Alaska (1989 - 1990; $230K). Managed a site investigation to assess the magnitude and extent of heavy metal contamination of railbed soil. attended scoping meetings between the regulatory agency and the client, prepared a work plan/quality assurance plan, conducted the field investigation, and prepared the final report. All work was completed in 3 weeks to meet deadlines.

- Project Manager, Naval Air Station Contaminant Investigation, U.S. Navy, Adak, Alaska (1988; $500K). Managed a site investigation to evaluate toxic and hazardous material contamination at 20 sites, including landfills, drum storage and disposal areas, fuel storage areas, a waste-oil pit, a pesticide disposal area, spill areas, and the fire fighting training area. Characterized the origin, nature, and extent of possible contamination in water, soil, and unknown media in drums. Field tasks included geophysical surveys, soil sampling and analysis, monitoring well installation, lysimeter installation, water sampling and analysis, and water-level surveys.
- Project Engineer, Cannery Loop Unit No. 2 Contaminant Investigation, Burr, Pease, and Kurtz, Kenai, Alaska (1985 - 1986; $350K). Assisted in a hydrogeologic and geochemical study to assess the impact of hazardous substances on groundwater resources and the potential for contaminant transfer. Project included site reconnaissance; records search; geophysical survey; and work, site safety, and quality assurance/quality control (QA/QC) plan development. Field tasks included soil probe installation, soil and water sampling and analysis, monitoring well installation, and aquifer tests.
- Project Engineer, Aleutian Air Station Detachment Site Investigation, U.S. Coast Guard, Cold Bay, Alaska (1987; $300K). Responsibilities included a literature search, geophysical surveys, subsurface investigations, laboratory testing (groundwater, soil, and soil-gas samples), and environmental studies. Investigated proposed sites for a support facility for U.S. Coast Guard search and rescue efforts. Project objectives included evaluating potential soil and water contamination from an adjacent landfill and investigating the potential encountering of landfill materials on the proposed sites.
- Project Manager, Investigation of the Poppy Lane Gravel Pit, Union Oil Company of California, Soldotna, Alaska. (1987; $280K). Managed a petroleum contaminant investigation to evaluate the vertical distribution of purgeable aromatic hydrocarbons in groundwater and locate the hydrocarbon source. Field tasks included installing monitoring wells, sampling soil and water for laboratory analysis, surveying geophysical characterizations to evaluate the extent of past waste-disposal activities at the site, and installing piezometers.
- Project Manager, Bernice Lake Power Plant Hydrogeologic Investigation, Chugach Electric Association, Nikiski, Alaska (1992; $150K). Activities included researching physical and chemical groundwater characteristics and evaluating possible sources of thermal and chemical groundwater contamination and the effects of steam blowdown discharge. In addition, provided recommendations for the location and operation of groundwater monitoring wells, and the nature and location of the plant discharges.
- Project Manager, Tundra Environmental Chemistry Study, ARCO Alaska, Inc., North Slope, Alaska (1989; $650K). Managed a contaminant investigation of the tundra surrounding reserve pits at the Kuparuk River Unit. Evaluated whether concentrations of constituents increased in different sample types to assess the distance over which increases occurred and determine whether differences in constituent concentrations could

be attributed to separate contributions from gravel placement, reserve pit seepage, and/or reserve pit dewatering. Collected more than 250 soil, water, and vegetation samples; geochemically and statistically analyzed laboratory results; and developed and implemented a QA/QC program.

- Project Manager, Moose River No. 1 Hazardous Substance Monitoring Program, ARCO Alaska, Inc., Sterling, Alaska (1989; $175K). Managed a baseline soil, groundwater, and vadose zone investigation and long-term monitoring program at a planned hazardous materials disposal site. Project objectives were to evaluate site conditions before, during, and after facility use in accordance with Alaska Solid Waste Management Regulations.
- Project Director, Remedial Action Plan, Confidential Client, Anchorage, Alaska (1991; $115K). Planned and directed the removal of waste oil-laden soil for a confidential client. Project included investigating the site to identify the limits of contamination, and recommending and implementing remedial action. Negotiated cleanup levels with the ADEC and developed a plan for QA/QC and documentation of the cleanup.
- Project Consultant, Bioremediation Pilot Study, Exxon Company, USA, Point Thomson, Alaska (1990; $300K). Project consultant for the investigation and bioremediation of hydrocarbon-bearing soil at a remote North Slope exploration pad. Planned and conducted a release investigation to establish the extent and concentration of hydrocarbons in pad gravel, and performed bench- and full-scale pilot studies to implement bioremediation at the site.
- Project Manager, Soil Remediation Project, Anchorage, Alaska. Remediated contaminated soil at a former service station site. Responsible for the in situ removal of volatile organic compounds from the vadose zone.
- Project Manager, Kenai Gas Field Contaminant Investigation, Unocal, Kenai, Alaska. Managed a hydrogeologic and geochemical study for Kenai Gas Field and Cannery Loop units to assess the impact of substances on groundwater resources and the potential for contaminant transport. Created a comprehensive water well database and a conceptual model of study area hydrogeology. Coordinated hydrogeochemical and computer modeling aspects of the study and wrote the final report.
- Project Manager, Steadman Field Site Investigation, Alaska Gold Company, Nome, Alaska. Managed multiple site investigations. Developed a remedial action plan, and identified and designed a solid waste disposal site for soil containing arsenic and mercury.
- Project Manager, Prudhoe Bay Seepage Study, ARCO Alaska, Inc., North Slope, Alaska. Managed a seepage transport study to assess the extent of reserve pit fluid migration to the tundra. Installed more than 50 monitoring wells, installed thermistors, monitored and assessed groundwater, and evaluated migration potential.
- Project Manager, Reserve Pit Hydrogeologic Study, ARCO Alaska, Inc., Kuparuk Field on the North Slope, Alaska. Managed a hydrogeologic and contaminant transport study to evaluate the potential for reserve-pit water containing hazardous chemicals to seep through containment berms. The investigation involved sampling and analyzing groundwater, soil, reserve-pit water, and drilling reserves; evaluating groundwater and containment berm characteristics; conducting dye-tracer tests to track fluid movement and measure flow velocity; and installing tensiometers.

- **Geologist/Field Manager, Geotechnical and Hydrogeological Investigations, Harding Lawson Associates, Anchorage, Alaska (1978 - 2000).**

  – Project Geologist, Reserve Pit Permitting, Conoco, Inc., North Slope, Alaska. Prepared solid waste permit applications for drill site reserve pits at the Milne Point Unit. Prepared fluid management and monitoring plans to comply with State of Alaska Solid Waste Management Regulations.

  – Field Manager, Over-Ice Drilling Investigations, Lease Sale Area 71, Major Oil Company and Members of Alaska Oil and Gas Association, Harrison Bay, Alaska. Managed field investigations for release sale studies. Planned and coordinated two concurrent operations involving a 36-person crew and two Rolligon-mounted, enclosed drilling rigs to collect more than 90 core samples to depths of 150 feet below mud line. Ice was used as the drill platform. Responsible for ice-safety reconnaissance.

  – Field Manager, Duck Island Development Project, Exxon Company, USA, in the Beaufort Sea, Alaska. Managed field operations for an onshore and offshore geotechnical investigation. Supervised a 15-person crew during the investigation for first major offshore production wells in the Beaufort Sea. Geotechnical data were used to develop preliminary foundation design criteria for offshore islands, buried pipelines, causeway, and onshore facilities.

  – Technical Manager, Geotechnical Investigation and Bathymetric Survey of a Storage Site, Glomar Beaufort Sea 1 Concrete Island Drilling Site (CID, Global Marine Drilling Company, Beaufort Sea, Alska. Managed a geotechnical investigation to define the seabed topography and subsea soil conditions at a proposed temporary set-down storage site for the CIDS. Conducted a bathymetric survey through the sea-ice canopy, prepared a map overlay showing the sounding locations and bathymetric contours, described sea bottom conditions, and provided laboratory test results on the samples obtained. Also recommended additional work required at the proposed site.

  – Field Manager, Niguanak Well Sites Geotechnical Investigation, Shell Western and Production, Inc. Beaufort Sea, Alaska. Managed the field operations of a geotechnical investigation of proposed well sites located approximately 17 nautical miles east of Barter Island, Alaska. Field tasks included bathymetric surveys of sites, cone penetrometer tests, and test boring drilling and sampling. Evaluated the geology of the proposed sites.

  – Field Manager, Knik Arm Crossing Investigation, Alaska Department of Transportation and Public Facilities, Cook Inlet, Alaska. Managed the field investigation of a marine soil drilling and sampling program for a major crossing of Knik Arm. Established boring locations and coordinated field phases of the program.

  – Field Project Manager, Sampling Investigation-Mukluk Island Site, Sohio Petroleum Company, in Beaufort Sea, Alaska. As field project manager, conducted an over-ice drilling and sampling investigation with a helicopter-support operation 20 miles offshore.

  – Field Manager, Geotechnical Investigation, Alpetco Company and Santa Fe Engineering, Valdez Harbor, Alaska. Supervised an offshore soil exploration drilling program for a docking facility.

- Engineer, Artificial Ice Island Project, Mobile Oil Company, Beaufort Sea, Alaska. Participated in designing an artificial ice island for onshore drilling program. Obtained and analyzed subsea soil-strength data and worked with the project engineer to develop design parameters.
- Field Manager, Port of Nome Over-Ice Investigation, City of Nome, Alaska. Managed the field program for a helicopter-supported, over-ice drilling operation. Drilled more than 20 borings to bedrock onshore and offshore and obtained bedrock cores.
- Field Manager, Waterflood Project, Prudhoe Bay Joint Operating Group, Prudhoe Bay, Alaska. Managed field operations for an offshore investigation of island, pipeline, and dredged channels.
- Engineer, Geotechnical Investigation, Kodiak Lumber Mills, Inc., Afognak Island, Alaska. Participated in a geotechnical investigation for wharf and docking facilities. Supervised the offshore drilling program, analyzed data, and prepared the final report.
- Field Engineer, Offshore Drilling Investigations at Four Sites, Major Oil Company, Beaufort Sea, Alaska. Managed field operations for an offshore drilling investigation conducted from a barge. Borings were drilled to 100 feet below mud line.
- Field Engineer, Well Site Geotechnical Investigation, Major Oil Company, Nation River, Alaska. Directed a geotechnical investigation to provide well site facility preliminary design data for five remote exploration drilling sites.
- Project Geologist, Geotechnical Investigatiopn-Gravel Search, UIC, North Slope, Alaska. Performed geotechnical investigation of proposed gravel mine sites to identify approximately 3 to 5 million yd3 of gravel. Summarized geologic information required for the gravel search.
- Project Engineer, Geotechnical Reconnaissance-Pruess Drive Slope Failure, Municipality of Anchorage in Eagle River, Alaska. Conducted geotechnical reconnaissance of a failed slope. Provided recommendations for preliminary remediation and slope stabilization.
- Project Manager, Geotechnical Investigation-Airport Siting, Alaska Department of Transportation and Public Facilities, Kake, Alaska. Reviewed existing aerial photographs and soil data, conducted geological reconnaissance of alternative runway sites, and provided preliminary analysis and recommendations.
- Project Manager, Geotechnical Evaluation-Airstrip Project, Alaska, Department of Transportation and Public Facilities in Circle, Alaska. Managed a geotechnical evaluation, including aerial photograph interpretation, review of existing data, and recommendations for a runway location.
- Project Supervisor, Soil Boring Programs-Trans-Alaska Pipeline Route, Alyeska Pipeline Service Company, Alaska. Supervised numerous soil boring programs to confirm that the selected construction method was compatible with soil conditions. Coordinated fieldwork and enforced proper sampling techniques for frozen and thawed soil.
- Engineer, Power Plant Foundation Design, Chugach Electric Association, Beluga, Alaska. Participated in a geotechnical investigation and the design of a foundation for a new generating facility. Supervised soil boring analyses and prepared the final report.

- Engineer, Placer Gravel Evaluation, Hope Mining Company, Resurrection Creek, Alaska. Directed geophysical and sampling programs to evaluate the character of gold-bearing placer gravel.
- Engineer, Route Selection and Design, Alyeska Pipeline Service Company on the Trans-Alaska Pipeline System, Alaska. Involved in several geotechnical studies for pipeline route selection and design. Primary work involved dynamic and static analyses of slope stability. Drilled soil borings with an 8-inch hollow-stem auger and collected soil samples in frozen and thawed ground.
- Engineer, Coal Exploration Study, Placer-Annex, Inc., on the Beluga Basin, Alaska. Performed a field survey and coordinated helicopter support for a large-scale exploratory program. Authored the engineering geology and hydrogeology sections of an environmental impact statement.
- Engineer, Tanker Dock Siting and Design, Standard Oil Company of California, Ketchikan, Alaska. Involved in a rock drilling program for tanker dock siting and design. Specified necessary laboratory tests and analyzed test data.
- Engineer, Hydroelectric Feasibility Study, Alaska Power Authority in the Bethel area, Alaska. Provided field reconnaissance support during a review of five potential hydroelectric sites on Kisaralik and Kipchuk rivers.
- Engineer, Potential Well Pad Locations, Two Major Oil Companies, Lower Yukon Delta and Yantarni Bay, Alaska. Conducted a drilling program involving helicopter transport with a portable drilling rig.
- Engineer, Bethel to Napakiak Road, Alaska Department of Transportation and Public Facilities, Bethel, Alaska. Managed a geotechnical evaluation, including library search, aerial photograph interpretation, and field analysis of the west terminus of the road.

Publications

With J.T. Brown and M. Stelljes, Methodology for Calculating Alternative Cleanup Levels of Petroleum Hydrocarbon Contaminated Soil, Joint CSCE-ASCE National Conference on Environmental Engineering, Montreal, Canada, July 12 to 14, 1993.

CLARK A. ROBERTS, C.I.H., C.H.M.M.

Health and Safety Manager

Years Experience
Total: 29; Bristol: 10

Areas of Expertise
Risk Management

Regulatory Compliance Assessment

Quality Assurance Audits

Sampling & Analytical Procedures

Data Validation and Verification

Training and Certifications
OSHA 500 – Construction Trainer

AHERA Asbestos Inspector

AHERA Asbestos Management

Asbestos Abatement Designer

ATSDR Public Health Assessment & Risk Communication

Mitigation Techniques for Microbial Contamination in Indoor Environments

ISO 14001 Environmental Management Systems Auditing

HAZWOPER, 40 hour

HAZWOPER Supervisor, 8 hour

Safety and Health Management for Construction Activities

Confined Space Entry Operations

Advanced Techniques for Workplace Ergonomic Assessments

Education
M.S., Public Health, University of Illinois, Chicago, 1983

B.S., Chemistry and Biology, Heidelberg College, 1978

Mr. Roberts began his career in 1982 and has invaluable experience in developing solutions to client needs in the areas of regulatory, operational, and liability risk management. He is experienced in developing specifications for hazard abatement and managing technical and professional personnel. Mr. Roberts has developed national policies and programs for the U.S. Navy and U.S. Department of Energy (DOE) in management of occupational health issues. Mr. Roberts has performed over 500 occupational workplace investigations and reviews, including asbestos, lead and chemical exposure investigations, accident/fatality investigations, regulatory compliance assessments, remedial site investigations, and a variety of performance based evaluations. As a former compliance officer for the Occupational Safety and Health Administration (OSHA), Mr. Roberts has significant experience with determining potential exposure to health and safety hazards, setting appropriate exposure limits, recommending controls, and assessing the effectiveness of existing program efforts. Mr. Roberts is also an EPA-accredited asbestos building inspector, management planner, and abatement designer.

Project Experience

- **Project Industrial Hygienist, Alamodome Stadium Paint Removal and Facility Upgrade; Building Exterior Renovation, San Antonio, Texas (2006 – 2007; $1.6M).** Developed and implemented the site-specific health and safety, lead compliance and environmental protection plans. Developed technical approaches for removal of existing lead-containing paint on the entire building exterior, while protecting workers from lead exposures in excess of the OSHA Action Level. Paint removal operations were conducted at heights exceeding 220 feet in some areas of the stadium, necessitating use of specialty scaffolding, man lifts and crane supported work platforms. Performed oversight on all worker and environmental monitoring for lead exposure and release to the environment. Designed final clearance methods and procedures to document removal of lead-containing paint.

- **Program Health and Safety Manager, Construction of Navy Off-Crew Administration Building (OCAB), NAVFAC Engineering Command NW, Silverdale, Washington (2006 - 2007; $9M).** Performed technical review and direction for development of accident prevention plan for the entire project. Major definable features of work included demolition, excavation, concrete, electrical system installation, mechanical systems installation, steel erection, roofing, and interior finishing. Developed activity hazard analyses (AHA) for all definable features of work, including trenching/excavation, confined space entry, and heavy equipment operations.
- **Program Safety and Health Manager, White Alice Site Demolition and Removal Action, USACE, Alaska District, St. Lawrence Island, Alaska (2002 - 2010; $27M).** Responsible for the development, implementation, oversight, and enforcement of the APP and SSHP, that implements appropriate engineering controls, work practices and personal protective equipment for material handling, container loading/unloading, demolition, excavation, asbestos abatement, lead materials removal, PCB waste removal, hazardous waste sampling and characterization, construction debris cleanup and waste removal. Performed in-depth activity hazard analysis, asbestos/lead abatement oversight, verification of air monitoring and site clearance activities for 30 buildings and structures.
- **Program Manager, Remedial Actions/Long-Term Monitoring Program, U.S. Naval Facilities Engineering Command, SE, Jacksonville, Florida (2002 - 2008; $3M).** Responsible for environmental investigations, asbestos bulk sample surveys, industrial hygiene monitoring, geophysical investigations, remedial plans & designs, abatement plans, quality control, budget, and contract administration for NAVFAC SE sites in south Texas.
- **Program Safety and Health Manager, Remote over the Horizon (ROTHR) Facility Demolition and Environmental Closeout, U.S. Navy EFA-NW, Amchitka Island, Alaska (2001-2002; $15M).** Developed and implemented APP and SSHP for demolition removal and closure of all on-island facilities. Demolition included over 20 buildings, ASTs up to 1 million gallons, and 2 miles of utilidors. Safely demobilized 2,000 tons of equipment, salvaged materials, and hazardous materials and waste from the site. Provided safety oversight for an on-island work force of 45 persons, and successfully completed over 40,500 direct labor hours without any lost-time accidents, injuries, or illnesses.

Professional Experience

- **Director of Services, McCrone Environmental Services (1988 - 1992).** Managed the western region staff of 12 science professionals to meet client needs in the areas of environmental consulting, industrial hygiene surveillance, and regulatory compliance. Established analytical services and developed the quality assurance/control program for accreditation from the National Institute of Standards & Technology (NIST) and the National Voluntary Laboratory Accreditation Program (NVLAP).

- **Compliance Safety and Health Manager, the U.S. Department of Labor – OSHA (1983 - 1988).** Managed a team or safety engineers and industrial hygienists to perform workplace inspections/investigations for compliance with standards for occupational safety and health protection, including asbestos, lead, benzene and other toxic materials. Conducted accident/fatality investigations in maritime, general industry and construction environments.

The

American Board of Industrial Hygiene®

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AMERICAN BOARD OF INDUSTRIAL HYGIENE®

organized to improve the practice of Industrial Hygiene
proclaims that

Clark A. Roberts

having met all requirements through
education, experience, and examination,
is hereby certified in the

COMPREHENSIVE PRACTICE
of
INDUSTRIAL HYGIENE

and has the right to use the title and designations

CERTIFIED INDUSTRIAL HYGIENIST
CIH

date June 30, 1988

Chairman ABIH
Charles E. Adkins, CIH

certificate number 3957

Secretary ABIH
Loren A. Anderson, Jr., CIH

Institute of Hazardous Materials Management

Certifies that

Clark Roberts

has successfully met all requirements of education,
experience and examination, and is hereby designated a

Certified Hazardous Materials Manager

Master Level

September 2007	14467	September 30, 2013	John H. Frick
Certified	Number	Expiration Date	Executive Director

So long as this credential is renewed according to schedule and is not otherwise revoked.

MT

U.S. ENVIRONMENTAL PROTECTION AGENCY

This certifies that

CLARK ROBERTS

has completed the

HAZARDOUS MATERIALS INCIDENT RESPONSE OPERATIONS

Supervisor Training

April 1, 1991

Presented by the

OFFICE OF EMERGENCY AND REMEDIAL RESPONSE

In Cooperation With
Marine & Environmental Testing, Inc.

Troy Conlin
Course Director

Bruce Potoka
Training Coordinator,
Environmental
Response Branch

MOLLY WELKER

Senior Project Manager

Years Experience
Total: 23; Bristol: 5

Areas of Expertise
Project Management
Regulatory Compliance
Hydrology
Geology
Research
Water, Stormwater, and Wastewater Analysis
Water Quality Programs
Environmental Baseline Studies
Public Outreach and Education

Training and Certifications
HazMat Transportation – (DOT/IATA) Section 1.5 IATA Compliance Refresher
HazMat Transportation – (DOT/IATA) 49 CFR 172.700-704 Compliance Refresher
40-hour HAZWOPER
8-hour HAZWOPER Supervisor Training
8-hour HAZWOPER Refresher Training, current
RCRA Hazardous Waste for Supervisors
USACE Construction Quality Management for Contractors
First Aid / CPR

Education
M.S., Geology, Texas A & M University, 1985
B.S., Geology, Montana State University, Bozeman, 1982

Ms. Welker began her career in developing and administering water quality monitoring programs for private, state, and federal agencies in 1985. Project responsibilities have included proposal development, budget administration, field logistics, quality control, regulatory agency coordination, community relations, and preparation of planning documents and final reports. Ms. Welker has been responsible for managing USACE environmental remediation contracts in Alaska totaling over $20M. Ms. Welker is experienced in partnering with federal, state, city, and county government agencies, educational institutions, and environmental consulting firms. She serves on the board of directors for the non-profit Anchorage Waterways Council. Ms. Welker is well versed in regulatory compliance for Alaska Department of Conservation, U.S. Environmental Protection Agency (EPA), EPA Drinking Water Standards, Chronic Aquatic Life Criteria, National Pollutant Discharge Elimination System permits, the Total Maximum Daily Load Program, and Storm Water Pollution Prevention Plans.

As a Senior Project Manager with Bristol, Ms. Welker is responsible for developing proposals, contract negotiations, project management, coordination of field work and subcontractors, and development of plans and report preparation.

Project Experience

Senior Project Manager, NE Cape HTRW Remedial Actions, USACE, Alaska District, NE Cape, St. Lawrence Island, Alaska (11/2009 – Present; $16.4M). Projects included designing and constructing a landfill cap, excavating, processing and disposing of approximately 9,500 tons of PCB- and petroleum-contaminated soils, removing miscellaneous debris, metal and pole stumps tundra-wide from the remote site, developing and implementing a monitored natural attenuation program for sediment and groundwater, and conducting an ultraviolet optical screening tool (UVOST) investigation. A project presentation at RAB meetings in Savoonga is part of the scope of work for these two contracts.

- **Senior Project Manager, NE Cape In-Situ Chemical Oxidation (Phase I ISCO) and Intrusive Drum Removal/Landfill Cap Project, USACE, Alaska District, NE Cape, St. Lawrence Island, Alaska (03/2009 – 09/2010; $6M).** Responsible for developing proposals, project management, coordination of field work, and plans and report preparation. The project included mobilization and demobilization to a remote site; designing and implementing the Phase I ISCO treatability study, designing and constructing a landfill cap, and excavation, removing, and disposing contaminated soil, drums, and miscellaneous waste streams off site.
- **Senior Project Manager, Hoonah RRS Remedial Action Project Phase I and II, USACE, Alaska District, Hoonah, Alaska (03/2008 – 03/2009; $3.9M).** Responsible for developing proposals, project management, coordination of field work, and plans and report preparation, and conducting a public outreach meeting. The project included mobilization and demobilization to the site; excavation, sampling, and backfilling; transport of contaminated soils off site; and a final report. The work consisted of excavation of approximately 1,271 tons of PCB-contaminated soil from a former soil stain area; a composite building area and generator room trench discharge area; a 32,000-gallon diesel underground storage tank (UST) area and radio relay building area; a gasoline UST and AST area and stockpile area; a bulk tank dike and fuel transfer area; and a former septic tank outfall.
- **Senior Project Manager, Nuvagapak/Kogru/Collinson Remedial Investigation Project, USACE Alaska District, North Slope, Alaska (06/2007 – 02/2008; $489K).** The work included soil, water, and sediment sample collection and analysis for various contaminants, including DRO, GRO, RRO, PCBs, PAH, TAHs, TAqHs, lead, and arsenic, from various areas of concern. The project included preparing planning documents, mobilization and demobilization to and from the sites, performing a coastal erosion study and sample collection, sample transport and laboratory analysis, and final RI report for the Nuvagapak Point (BAR-A) Distant Early Warning (DEW) Line Station, Collinson Point (POW-D) DEW Line Station, and Kogru DEW Line Station. The sites are located on the remote northeast coast of Alaska within the Arctic Wildlife Refuge. .

Professional Experience

- **Project Manager/Lead Scientist, HDR Alaska, Inc., (2004 - 2006).**
  - Senior Project Manager, Baseline Water Quality Project – Mine Site, Northern Dynasty Mines, Inc., near Iliamna, Alaska (10/2004 – 10/2006; $350K). Performed project management activities and managed field program related to the Pebble Gold/Copper Mining project. Managed a team of interdisciplinary scientists conducting baseline field studies related to surface water quality, seep, and fine-grain bed sediment sampling in the project area. Project objective was to collect water quality data for an environmental baseline report for a proposed copper-gold mine.
  - Contract Technical Writer, Multiple-Scale Ecosystem Assessment and Conservation Project, U.S. Forest Service, Rocky Mountain Region, Denver, Colorado (2002 - 2004). Editor and technical writer for this document which involved terrestrial, riparian, wetland, and aquatic ecosystems for the Species Conservation Project for Region 2 of the USDA Forest Service Water Outreach Coordinator for the City of Laramie, Wyoming, 1999 to 2002. Interfaced science, management, and public opinion for the protection and

conservation of the City's drinking water supply. Served as editor and project manager of Laramie Regional Drinking Water Protection Plan. Managed state and federal grants, and wrote draft municipal ordinances, and quarterly and final reports. Responsible for budget administration and student intern supervision. Provided staff support to City Manager, City Council, and City/County Environmental Advisory Committee.

- **Research Associate, University of Wyoming, Water Resources Center, Laramie, Wyoming (1997 - 1999).** Successfully acquired state funding and drafted a statewide ambient groundwater quality monitoring plan for the Wyoming Department of Environmental Quality – Water Quality Division.
  - Project Manager, Colorado State University, National Atmospheric Deposition Program, Fort Collins, Colorado (1993 to 1997). Developed and administered an environmental monitoring program that collected weekly samples for total mercury in precipitation from more than 30 sites in the country. Responsibilities included fundraising, grant writing, budget administration, laboratory contract oversight, marketing, oral and written presentations, and development of field methodology, data collection, and quality assurance protocols.
- **Associate Engineering Geologist, California Department of Health Services, Toxic Waste Division, Sacramento, California (1990).** Provided technical reports for the cleanup and abatement of hazardous and toxic wastes at contaminated sites throughout the state. Reviewed geologic, engineering, and chemical data for proposed remedial actions. Interpreted state and federal water laws.
- **Hydrologist, U.S. Geological Survey (USGS), Water Resources Division, Sacramento, California (1985 - 1990).** Assembled geohydrologic and geochemical information for analysis related to a regional surface and groundwater study. Supervised hydrologic technicians, performed quality assurance/quality control procedures, and published study results as USGS Water Supply Paper.

Awards

USFS Certificate of Merit 2003

Other Training and Certifications

8-Hour Hazardous Waste Operations & Emergency Response (HAZWOPER) Supervisor Training

8-Hour HAZWOPER Refresher Training

Security Awareness Training

Sampling for Defensible Environmental Decisions

Environmental Monitoring Workshop

Bear Safety

Hypothermia Awareness

Helicopter Safety

Remote Site Safety

Water and Boating Safety

Avalanche Awareness

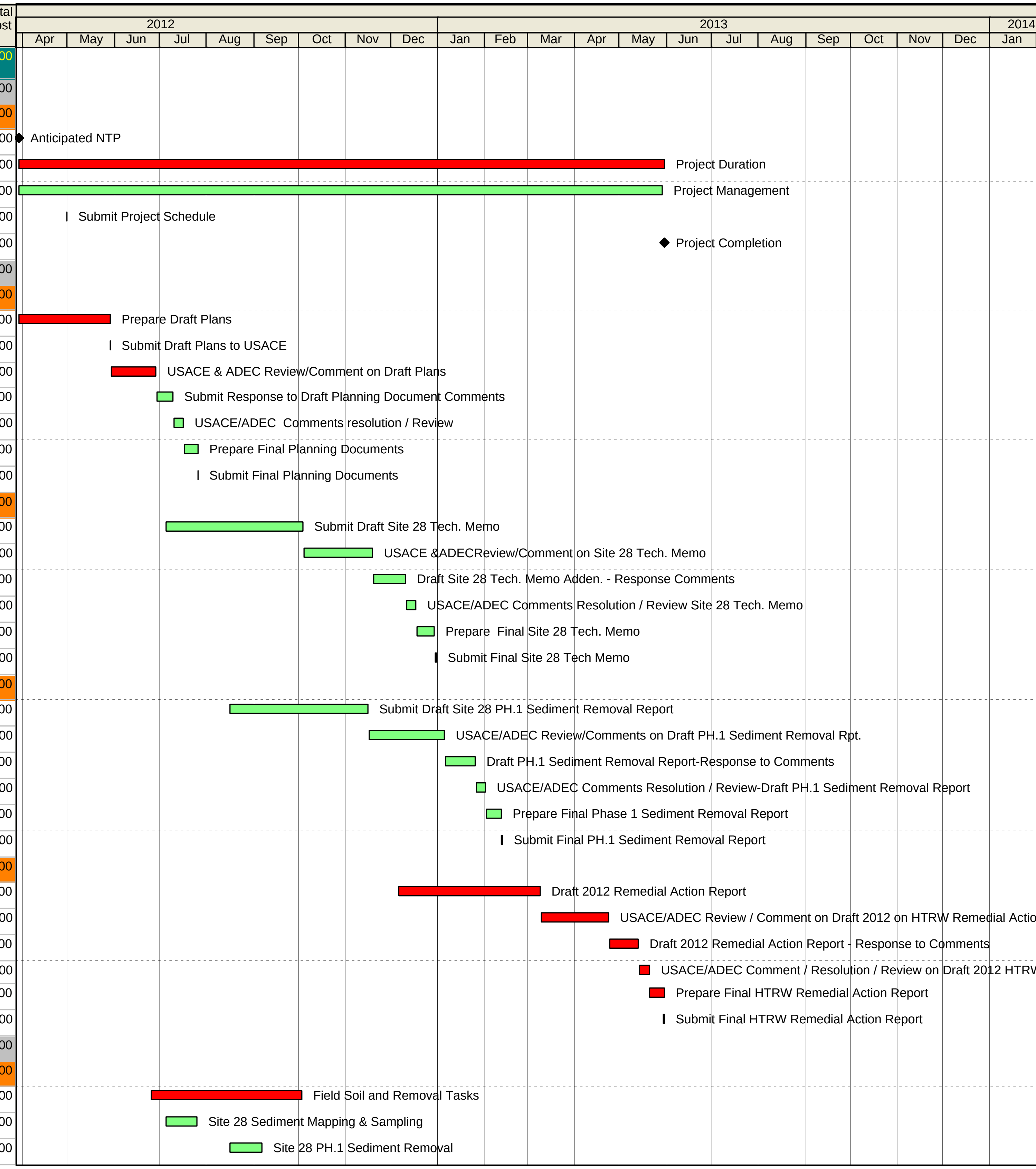
Hazard Communication

Office Safety

APPENDIX H

Project Schedule

Activity ID	Activity Name	OD	Early Start	Early Finish	TF	Budgeted Total Cost
Total		534	Mar-30-12	May-30-13	0	$5,999,300.00
General Conditions		534	Mar-30-12	May-30-13	0	$143,705.00
General Conditions		534	Mar-30-12	May-30-13	0	$143,705.00
GC01	Anticipated NTP	0	Mar-30-12		0	$0.00
GC03	Project Duration	417	Mar-30-12	May-30-13	0	$0.00
GC05	Project Management	416	Mar-30-12	May-29-13	1	$143,705.00
GC06	Submit Project Schedule	1	Apr-30-12	Apr-30-12	27	$0.00
GC04	Project Completion	0		May-30-13	0	$0.00
Submittals		534	Mar-30-12	May-30-13	0	$370,717.00
Planning Doc's		149	Mar-30-12	Jul-26-12	58	$109,613.00
P01	Prepare Draft Plans	60	Mar-30-12	May-29-12	0	$72,345.00
P01-1	Submit Draft Plans to USACE	1	May-29-12	May-29-12	0	$0.00
P01-2	USACE & ADEC Review/Comment on Draft Plans	30	May-30-12	Jun-28-12	0	$0.00
P02	Submit Response to Draft Planning Document Comments	10	Jun-29-12	Jul-09-12	45	$5,000.00
P03	USACE/ADEC Comments resolution / Review	7	Jul-10-12	Jul-16-12	45	$0.00
P04	Prepare Final Planning Documents	10	Jul-17-12	Jul-26-12	45	$32,268.00
P05	Submit Final Planning Documents	1	Jul-26-12	Jul-26-12	45	$0.00
Site 28 Tech Memo Addendum		224	Jul-05-12	Dec-30-12	86	$77,393.00
P500	Submit Draft Site 28 Tech. Memo	90	Jul-05-12	Oct-03-12	67	$62,393.00
P501	USACE &ADECReview/Comment on Site 28 Tech. Memo	45	Oct-04-12	Nov-18-12	67	$0.00
P502	Draft Site 28 Tech. Memo Adden. - Response Comments	20	Nov-19-12	Dec-10-12	67	$5,000.00
P503	USACE/ADEC Comments Resolution / Review Site 28 Tech. Memo	7	Dec-11-12	Dec-17-12	67	$0.00
P505	Prepare Final Site 28 Tech. Memo	10	Dec-18-12	Dec-29-12	67	$10,000.00
P507	Submit Final Site 28 Tech Memo	1	Dec-30-12	Dec-30-12	67	$0.00
Site 28 Ph.1 Sediment Removal Report		226	Aug-16-12	Feb-12-13	31	$49,865.00
P200	Submit Draft Site 28 PH.1 Sediment Removal Report	90	Aug-16-12	Nov-15-12	25	$34,865.00
P201	USACE/ADEC Review/Comments on Draft PH.1 Sediment Removal Rpt.	45	Nov-16-12	Jan-05-13	25	$0.00
P202	Draft PH.1 Sediment Removal Report-Response to Comments	20	Jan-06-13	Jan-25-13	25	$5,000.00
P203	USACE/ADEC Comments Resolution / Review-Draft PH.1 Sediment Removal Report	7	Jan-26-13	Feb-01-13	25	$0.00
P205	Prepare Final Phase 1 Sediment Removal Report	10	Feb-02-13	Feb-11-13	25	$10,000.00
P206	Submit Final PH.1 Sediment Removal Report	1	Feb-12-13	Feb-12-13	25	$0.00
2012 HTRW Remedial Action Report		220	Dec-06-12	May-30-13	0	$133,846.00
P250	Draft 2012 Remedial Action Report	90	Dec-06-12	Mar-09-13	0	$99,925.00
P251	USACE/ADEC Review / Comment on Draft 2012 on HTRW Remedial Action Report	45	Mar-10-13	Apr-23-13	0	$0.00
P252	Draft 2012 Remedial Action Report - Response to Comments	20	Apr-24-13	May-13-13	0	$5,000.00
P253	USACE/ADEC Comment / Resolution / Review on Draft 2012 HTRW Remedial Action R...	7	May-14-13	May-20-13	0	$0.00
P255	Prepare Final HTRW Remedial Action Report	10	May-21-13	May-30-13	0	$28,921.00
P256	Submit Final HTRW Remedial Action Report	1	May-30-13	May-30-13	0	$0.00
Remedial Activities		125	Jun-25-12	Oct-02-12	0	$5,484,878.00
Remedial Activities		125	Jun-25-12	Oct-02-12	0	$5,484,878.00
1003	Field Soil and Removal Tasks	98	Jun-25-12	Oct-02-12	0	$4,876,740.00
1004	Site 28 Sediment Mapping & Sampling	21	Jul-05-12	Jul-25-12	46	$258,684.00
1005	Site 28 PH.1 Sediment Removal	21	Aug-16-12	Sep-06-12	25	$349,454.00



Actual Work
Remaining Work
Critical Remaining Work
Milestone

2012CP00

NE Cape 2012 Remedial Action MW

Page 1 of 1

Bristol
ENVIRONMENTAL
REMEDIATION SERVICES, LLC

Date	Revision	Checked	Approved
Apr-18-12	cost edits		

APPENDIX I

Response to Comments

REVIEW COMMENTS

PROJECT: NE Cape HTRW Remedial Actions W911KB-12-C-0003
DOCUMENT: Draft Work Plan – May 2012
Location: St. Lawrence Island, Alaska

U.S. ARMY CORPS OF ENGINEERS	DATE: 11 June 2012 REVIEWER: Jeremy Craner PHONE: 753-2628	Action taken on comment by:

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
1.	General	As mentioned during the UFP-QAPP meeting, specific sampling guidance must be referenced as applicable in a consistent manner throughout the text since Bristol SOPs generally do not contain specific references. Additionally, lack of detail exists for certain types of sampling. Must describe what you are going to do, how you are going to do it, what equipment/instruments you are going to do it with, and what guidance you are going to follow to demonstrate that pre-planning has occurred and that the fieldwork and data collection is conducted according to state and federal standards. Comments have been added accordingly below.	Comment acknowledged.	A
2.	Pg. 2 and Appendix C	The third bullet following "This WP contains the following elements:" lists the title of Appendix C as "Accident Prevention Plan (APP)." Appendix C contains the APP (placed 1st) and the SSHP (placed 2nd). Please re-title both the bullet and Appendix C to APP/SSHP.	Text modified accordingly.	A
3.	Pg. 3, last sentence	Add formal SWPPP reference to this sentence.	Text modified accordingly.	A
4.	Pg. 7, 2nd paragraph	States: "Beach material is primarily cobble (1-inch stones), with some sand. Some areas have large boulders and rocks." According to USCS, cobbles are 2.9 – 11.8 inches in diameter, boulders are >11.8 inches in diameter, and "rocks" have no classification. Please revise to: "Beach material primarily consists of coarse gravel approximately 1-inch diameter with minor sand. Areas along the beach also contain large concentrations of cobbles and boulders."	Text modified accordingly.	A
5.	Pg. 9 and 10	Section 2.8 contains three paragraphs of information and no references. Please add references to this section accordingly. Section 2.10 also does not contain a reference. Please add.	References will include information provided in the GFM and from past Work Plans and Reports associated with the NE Cape.	A
6.	Pg. 13	8th bullet. Revise to "Excavation and disposal of 1 ton of drums, ~~50~~ 100 gallons of drum liquids,…" based on the exercising of Option 4.6.13. Add a bullet following the 11th bullet that states "Removal	Text modified accordingly.	A

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
		and disposal of an additional 10 tons of debris/drums/poles." Option 4.6.12 has been exercised and is not mentioned in this cumulative bullet list.		
7.	Pg. 14, Section 3.2.1, 2nd paragraph	First sentence: Cut-and-paste error. Change 2010 to 2011.	Text modified accordingly.	A
8.	Pg. 14, Section 3.2.1, 2nd paragraph	Second sentence: Revise to "Bristol estimated between 11,000 and 16,000 tons of contaminated soil ~~that~~ could feasibly be excavated at the MOC gravel pad." Third sentence: Revise to "The amount of contaminated soil that can be removed is dependent on depth to groundwater ~~depth~~ which ~~may vary by several feet~~ generally follows surface topography (see topographic contours and groundwater elevation contours on Figure 4). During past field operations, groundwater elevations have been observed to vary seasonally and also respond quickly to rainfall events.	Text modified accordingly.	A
9.	Pg. 15, Section 3.2.1, 3rd paragraph	Following first sentence add this sentence: "Based on available data, monitoring wells onsite are thought to be screened within the shallow water table aquifer." Third sentence: Revise to "~~A~~ Perched aquifers of unknown extent ~~is~~ are potentially present in some areas…" We have not proven that these are in fact isolated perched zones or just the shallow aquifer.	Text modified accordingly.	A
10.	Pg. 15, Section 3.2.1, 4th paragraph	First sentence: Reference Figure 12 to orient reader to well locations and associated data. *Concentrations of analytes for MW88-10 in Figure 12 don't match the discussion in this paragraph. Please address and revise accordingly.	Figure 12 and text modified accordingly.	A
11.	Pg. 16, Table 3-1	MW88-11 data for 2011 does not match data presented in Figure 12. Same as MW88-5. Please revise. In notes section, define acronym RSK and change MOA to MOC. Also, add a sig fig to MW88-5 2011 RRO conc.	Figure 12 and text modified accordingly.	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 11 June 2012** **REVIEWER: Jeremy Craner** **PHONE: 753-2628**	**Action taken on comment by:**

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
12.	Pg. 17, sentence on top of page	Revise to: These factors are an indication that natural attenuation is occurring, and the 2011 results are generally consistent with results from the 2010 sampling event.	Text modified accordingly.	A
13.	Pg. 17, Section 3.2.2, 1st paragraph	First sentence: Reference Figure 3 at end of sentence.	Text modified accordingly.	A
14.	Pg. 17, Section 3.2.2, 2nd paragraph	First sentence: Reference Figure 7 at end of sentence.	Text modified accordingly.	A
15.	Pg. 17, Section 3.2.3, 1st paragraph	First sentence: Reference Figure 3 at end of sentence.	Text modified accordingly.	A
16.	Pg. 18, Section 3.2.3, last paragraph	Last sentence: Reference Figure 8 at end of sentence.	Text modified accordingly.	A
17.	Pg. 18, Section 3.2.4, 1st paragraph	First sentence: Reference Figure 3 at end of sentence.	Text modified accordingly.	A
18.	Pg. 19, Section 3.2.4, last paragraph	Last sentence: Reference Figure 9 at end of sentence.	Text modified accordingly.	A
19.	Pg. 19, Section 3.2.5, 1st paragraph	First sentence: Reference Figure 3 at end of sentence.	Text modified accordingly.	A
20.	Pg. 20, Section 3.2.5, 4th paragraph	This paragraph presents 2010 Site 8 MNA results in units of µg/kg and mg/kg. The DD and ADEC cleanup levels for the COCs discussed are all in mg/kg. Never present results in different units (this is especially confusing to the public who are not used to converting units on the fly), especially when the results are more easily displayed as the preferred unit (i.e., 7,500 µg/kg vs. 7.5 mg/kg). Please revise to mg/kg.	Units modified to present data in mg/kg.	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 11 June 2012** **REVIEWER: Jeremy Craner** **PHONE: 753-2628**	**Action taken on comment by:**

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
21.	Pg. 20, Section 3.2.5, last paragraph	First sentence: Reference Figure 11.	Text modified accordingly.	A
22.	Pg. 20, Section 3.2.6, 1st paragraph	First sentence: Reference Figure 3.	Text modified accordingly.	A
23.	Pg. 20, Section 3.2.6, 2nd paragraph	First sentence: Reference Figure 10.	Text modified accordingly.	A
24.	Pg. 22, Section 3.2.6, last paragraph	First sentence: Officially reference Site 28 Drainage Basin report (BESC 2012).	Site 28 Technical memorandum cited.	A
25.	Pg. 23, Section 4.0, first sentence and first bullet	Revise to: "The field ~~activities~~ work at NE Cape for the 2012 field season will consist of the following major activities: First bullet item: add period at end of sentence.	Text modified accordingly.	A
26.	Pg. 25, Section 4.1.2, last paragraph	Last sentence, need to clarify. Revise to: "It will require approximately 10 landing craft to transport ~~only those~~ the remaining 451 bags from 2011 that are filled with soil and ready for transport ~~from~~ currently staged at the NE Cape site.	Text modified accordingly.	A
27.	Pg. 28, Section 4.1.11	Third sentence: States "A signed quarry agreement between Bristol and the local Native corporations is included in Appendix F." After checking Appendix F, no quarry agreement exists. Please add agreement to final WP.	The Quarry Agreement will be included in Appendix F	A
28.	Pg. 32, Section 4.1.15, 2nd paragraph	Last sentence: States "….and those soils less than 7,360 mg/kg DRO will be used as backfill." This is the first mention in the report of the 7,360 mg/kg field action level. Cleanup level is 9,200 mg/kg. Please give background on the 7,360 mg/kg DRO field action level for clarification.	The following sentence has been added: "The 7,360 mg/kg field action level is 80 percent of the certified laboratory confirmation sample cleanup level of 9,200 mg/kg, and is used as a conservative screening level for field laboratory results."	A
29.	Pg. 33, Section 4.1.16, last	States: "Any stockpile intended to be used as backfill will be sampled prior to its use as backfill to confirm that	Text has been modified to read as follows: "Any stockpile intended to be used as backfill will be	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 11 June 2012** **REVIEWER: Jeremy Craner** **PHONE: 753-2628**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
	sentence	contaminants are not present in soil." Specifically, what contaminants will be sampled? Please note that this is an ADEC requirement (*ADEC Draft Field Sampling Guidance*, Section III C3) (ADEC 2010) and reference here as such.	sampled in accordance with ADEC guidance prior to its use as backfill to confirm that contaminants of concern are not present in the soil (ADEC, 2012)."	
30.	Pg. 34, Section 4.1.20, 1st paragraph	Following first sentence, add the following sentence: "All waste characterization samples will be collected in accordance with *ADEC Draft Field Sampling Guidance* (ADEC 2010).	Text modified accordingly.	A
31.	Pg. 35, Section 4.1.20, last paragraph	Last sentence states: "More detail regarding waste characterization is provided in the UFP-QAPP." Please also state that the UFP-QAPP is located in Appendix D and also since the UFP-QAPP is very large, state what section/subsection this information can be found.	Text modified accordingly.	A
32.	Pg. 35, Section 4.1.21, 1st paragraph	Revise second sentence to state: "Decontamination efforts will be implemented to prevent cross-contamination and will be conducted according to *ADEC Draft Field Sampling Guidance*, Section VIII E (ADEC 2010).	Text modified accordingly.	A
33.	Pg. 35, Section 4.1.21, last paragraph	Revise first sentence to state: "Heavy equipment ~~may~~ will require decontamination following a soil excavation and prior to relocating to a new work area." Due to the high concentrations of DRO and PCBs within the soil at the site.	Text modified accordingly.	A
34.	Pg. 36, Section 4.1.23, 1st paragraph	Revise last sentence to: "Wastewater from MW 88-4 and MW 88-5 will be contained in 5-gallon buckets pending analytical results and treated appropriately following their receipt." Based on 2011 analytical results, please containerize and characterize wastewater from both wells MW 88-4 and MW 88-5.	Text modified accordingly.	A
35.	Pg. 36, Section 4.1.23, last paragraph	Last sentence states: "This water (from soil/sediment removal activities) will be treated with a water scrubber, impounded, and then sampled to confirm that it is below the ADEC Table C groundwater cleanup level of 1.5 mg/L DRO prior to discharge to the ground." Since other	In the past Bristol has been approved by ADEC to use the groundwater cleanup level. Prior to discharging the water collected from the Site 28 dewatering impoundment will be analyzed for GRO/BTEX, DRO/RRO, PAHs, Total/Dissolved Metals, and PCBs	A, but need to change text to include the full suite of analytes, only DRO listed. Assume that the Total/Dissolved Metals

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
		analytes such as benzene, arsenic, and RRO have been identified at concentrations greater than cleanup levels, shouldn't these also be analyzed in addition with DRO? What about TAqH? Should we be screening against gw cleanup levels or surface water levels (18 AAC 70)? Please request guidance from ADEC on addressing these issues.		mentioned are the 8 RCRA metals plus nickel, vanadium, and zinc as listed in Comment 50. Also, please add text to end of sentence "as previously approved by ADEC."
36.	Pg. 36, Section 4.2, 1st paragraph	Revise to: "…an estimated total of ~~6,787.8~~ 6,781.5 tons among Contract Number W911KB-06-D-0007, Task Order 0007 (~~4,787.8~~ 4,781.5 tons)…." Based on previously agreed upon values.	Text modified accordingly.	A
37.	Pg. 37, Section 4.2, 2nd paragraph	Following the second sentence, please add the following sentence for clarification: "Field action level for DRO results from the field laboratory will be 7,360 mg/kg." Briefly explain where 7,360 mg/kg came from.	The text has been modified to include the following: Field action level for DRO results from the field laboratory will be 7,360 mg/kg. The field action level is 80% of the cleanup level and is a conservative value used to ensure field laboratory results fall below the 9,200 mg/kg confirmation sample cleanup level."	A
38.	Pg. 37, Section 4.2, 3rd paragraph	First sentence: Reference Figure 4. Fourth sentence: Reference Figure 7.	Text modified accordingly.	A
39.	Pg. 38, Section 4.2, 6th paragraph	This paragraph contains the first mention/description of field screening. First sentence: Add "as described in the *2010 ADEC Draft Field Sampling Guidance* (ADEC 2010)." Second sentence: States: "Sidewall samples will be collected from the depth exhibiting the highest percent relative emittance (%RE) response for the nearest UVOST probe location, or at a preferential pathway identified in the field." Sidewall samples should be collected from not only the highest %RE and/or preferential pathway, but must also consider the soil horizon most likely to be contaminated (top of a confining layer, base of a porous layer, or at an	The term "preferential pathway" is inclusive of soil horizons most likely to be contaminated. The text has been modified as follows: "…or at a preferential pathway identified in the field with consideration for the hydrologic characteristics of the soil profile." The text has been modified to refer to the 7,360 mg/kg as a "field action level" as described in section 4.2, 2nd paragraph, last sentence.	A, this was meant to trigger some thought and subsequent detail to this section of text. "Preferential pathway" suggests a zone of previous or current migration.

U.S. ARMY CORPS OF ENGINEERS	**DATE: 11 June 2012** **REVIEWER: Jeremy Craner** **PHONE: 753-2628**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
		interface). This especially applies to NEC due to the dense layer of clays/silts that underlie the site that is not a preferential pathway. Please add this detail to this sentence to confirm you will that these other conditions into consideration when deciding where to sidewall sample. Fourth sentence: Make sure to briefly explain the 7,360 mg/kg DRO concentration as mentioned in an earlier comment.		
40.	Pg. 38, Section 4.2, 8th paragraph	First sentence: Revise to "Field laboratory samples will be collected from stockpiled soil at a rate of three, plus one sample for each additional 200 cubic yards (as required in ADEC 2010)." Or similar.	Text modified accordingly.	A
41.	Pg. 38, Section 4.2, 9th paragraph	Mentions surface water sampling timing and locations, but no description of how the sampling will be conducted. Please explain how the sampling will be done and with what equipment, or reference where this is detailed in the UFP-QAPP. Will water quality parameters also be collected?	Text will be modified to include the following statement: Sampling will be conducted as described in Table 11-2 and Attachment 1 of the UFP-QAPP (Appendix D).	A
42.	Pg. 43, Section 4.3, 1st paragraph	Revise first sentence to: "Bristol will excavate up to ~~2,000~~ 2,600 tons of PCB-contaminated soil…" 2,000 tons base and 600 tons from Option 4.6.2 = 2,600 tons.	Text modified accordingly.	A
43.	Pg. 44, Section 4.3, 2nd paragraph	Third sentence states: "Waste characterization sampling will be conducted as described in Section 4.1.20." Section 4.1.20 lacks detail – if going to reference this section need to add sampling methodology and references as requested in above comment. Last two sentences: Discuss 80% of cleanup level again…must clarify. Suggest selecting a good location, explain one time, then reference throughout document as necessary.	The 80% "field action level" has been described in section 4.2 and will be referenced as the field action level in the document.	A
44.	Pg. 45, Section 4.3, 6th paragraph and bullet items	Describes concrete sampling procedures but has no reference. Revise fourth sentence to: "Field and sampling procedures will consist of the following as determined by TSCA	Text modified accordingly.	A

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
		requirements and 40 CFR Part 761.125:”		
45.	Pg. 46, Section 4.3.1	Says “may be exercised.” This option was exercised. Add sentence at end of paragraph: “This option has currently been exercised six times for an additional 600 tons.”	Text modified accordingly.	A
46.	Pg. 46, Section 4.4.1	This option was also exercised for an additional 50 tons, 100 tons of arsenic soil total. Revise accordingly.	Text modified to read: “This option has currently been exercised five times for an additional 50 tons of arsenic-contaminated soil, making 100 tons total weight of arsenic-contaminated soil for removal.”	A
47.	Pg. 47, Section 4.5, 1st paragraph	Last sentence states: “Soil samples will be collected in accordance with Bristol SOP “BERS-01 Soil Sampling SOP_Rev2” (Attachment 1 in UFP-QAPP) and Draft Field Sampling Guidance (ADEC, 2010).” This is a good way to reference sampling since it links both SOPs and formal guidance, but is the only location in the document where it is done this way. Suggest consistently referencing where possible in this manner throughout the WP.	Comment acknowledged.	A
48.	Pg. 47, Section 4.5, 2nd paragraph	Mention that photographic documentation will also be conducted. Important for describing and showing to public.	Text has been modified as follows: “Photographic documentation will be provided and results will be described in the HTRW RA Report”	A
49.	Pg. 51, Section 4.7	Geotubes® were first mentioned on Pg. 50. “Geotube” is mentioned six times on Pg. 51. Add registered trademark for accuracy/consistency.	Text modified accordingly.	A
50.	Pg. 51, Section 4.7, 4th paragraph	Fourth sentence states: “Wastewater samples will be collected from the secondary impoundment and analyzed at TestAmerica for all contaminants of concern.” Specifically, what parameters will be analyzed? This clarification was also brought up in an earlier comment.	The impoundment samples will be analyzed for GRO/ BTEX, DRO/RRO, PAHs, PCBs, and the 8 RCRA metals plus nickel, vanadium, and zinc. This information will be provided in this Section.	A
51.	Pg. 52, Section 4.7, 6th paragraph	Sixth and seventh sentences state: “Two representative dewatered sediment samples will be collected and submitted to a geotechnical laboratory to determine	The text will be clarified to state that in-situ samples are to be collected from a representative “average” soil	A

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		moisture content and density. One sample will also be subjected to sieve-test analysis." Want to clarify that "in-situ" samples are to be collected from a representative "average" soil type/water content from the Geotubes®. Specify what ASTM method will be used for each geotech sample type, how the sample will be collected, and with what type/size of sampler to ensure this is done properly.	type/water content from the Geotubes®. The ASTM methods will include ASTM D2216-10; ASTM 27263-09; and ASTM D422-63(07). A 2" brass sleeve will be pushed into the Geotubes® to collect the samples required for the geotechnical analyses	
52.	Pg. 52, Section 4.7, 7th paragraph	Last sentence states: "Surface water samples will also be analyzed for field turbidity." What will field turbidity be analyzed with (type instrument)? Or, ref. where detailed.	Text modified to "Surface water samples will also be analyzed for field turbidity using a Hach® Portable Turbidimeter"	A
53.	Pg. 54, Section 4.8, 2nd paragraph	Add a sentence at end of paragraph that states: "MI sampling details are described below in Sections 4.8.1, 4.8.2, and 4.8.3."	Text modified accordingly.	A
54.	Pg. 55, Section 4.8.2, 1st paragraph	Start of last sentence has x2 periods. Remove one.	Did not locate this x2 period	
55.	Pg. 56, Section 4.9, 1st paragraph	Second sentence states: "It is believed that additional drums are present in the vicinity of Site 10." Site 10 is not depicted on any figure. Please add Site 10 to a figure and reference accordingly here.	Site 10 is depicted in Figure 3 and a reference has been added.	A
56.	Pg. 57, Section 4.9.1	States Optional task 4.6.13 "may be" exercised – this option was official exercised, please revise text accordingly.	Text modified accordingly.	A
57.	Pg. 57, Section 4.10, 2nd paragraph	Second sentence: Revise to "One DU ~~was~~ will be established upstream…"	Text modified accordingly.	A
58.	Pg. 59, Section 4.11	Section 4.11 basically states what wells will be sampled and for what field/lab parameters. There is no discussion or reference to how the sampling will be conducted and following what specific guidance. I don't see this detail anywhere in the QAPP. Add the following detail to this section: -Briefly describe how the gw samples will be collected;	The following text has been modified/added: Groundwater samples will be collected using a Monsoon submersible pump and high density polyethylene tubing using a low-flow sampling protocol as described in the Bristol SOP "BERS-02 Groundwater Sampling SOP_Rev2" (Attachment 1 in UFP-QAPP),and in accordance with Section IV of the	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 11 June 2012** **REVIEWER: Jeremy Craner** **PHONE: 753-2628**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
		using what instruments/equipment (type of: tubing, pump, water meter, water level indicator, etc.); - How will you determine when a sample is ready to be collected?; How will decon of equipment, especially the pump, be conducted to ensure no cross-contamination occurs? Will you sample from least to most contaminated wells? - State that you will collect groundwater samples in accordance with 2010 *ADEC Draft Field Sampling Guidance*, Section IV (ADEC 2010). USACE wants to ensure that quality, representative, and reproducible gw samples are collected at the MOC.	ADEC draft Field Sampling Guidance (ADEC, 2010) Groundwater parameters including temperature, pH, DO, conductivity, ORP will be collected in the field using a YSI 556 water quality meter with flow-through cell. Turbidity measurements will be taken using a HACH portable turbidimeter, and water level measurements will be taken using a water level meter. Groundwater samples will be taken when parameters have stabilized or 3 casing volumes have been purged in accordance with Section IV of the ADEC draft Field Sampling Guidance (ADEC, 2010). Groundwater samples will be analyzed in the field using HACH kits for nitrate, sulfate, ferrous iron, alkalinity, and dissolved manganese. Groundwater samples will be analyzed by a fixed-based laboratory for methane, BTEX, GRO, DRO/RRO, PAHs, PCBs, and the RCRA 8 metals plus nickel, vanadium, and zinc. Equipment will be decontaminated as described in section 4.1.21 and IDW will be handled as described in section 4.1.23	
59.	Pg. 60, Sections 4.13 & 4.13.1	Both Optional task 4.6.11 and 4.6.12 were exercised, please revise text in these two sections accordingly.	Text modified accordingly.	A
60.	Pg. 63, Section 4.15	Last paragraph: Optional tasks 4.6.17 and 4.6.18 were exercised, please revise text accordingly.	Text modified accordingly.	A
61.	Figure 2	-Label "Bering Sea" -Names of bay to NW and Sekinak Lake cut off. Change scale so that these site features are included in figure.	Figure has been modified as suggested	A
62.	Figure 4	-Suggest adding shading to those areas that require excavation (small area in Area A1, A2, B2, B3, etc.). I did this with a highlighter when reviewing and it was very helpful. Maybe do the same as Figure 5?	Figure has been modified as suggested	A

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Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
		In legend: -Change "Ponding" to "Surface Water" -Ground surface elevation contours and groundwater surface contours are both displayed, but the legend is confusing and does not depict which is which very clearly. Legend has "Water Elevation", "Ground Elevation", "Plume Identification", together with similar symbols and "Ground Water Contour" symbol separate. What is "Water Elevation?" Please revise to clarify.		
63.	Figure 5	In legend: -Change "Ponding" to "Surface Water" -Add topographic contour symbol and label.	Figure has been modified as suggested	A
64.	Figure 6	The A1 proposed excavation area based on one sample with DRO concentration of 12,000 mg/kg is to remove a section of sidewall 20' x 20' by about 18 feet deep. This approach seems a bit aggressive. Suggest a more conservative approach since we are close to DRO cleanup level of 9,200 mg/kg. In legend: - Add topographic contour symbol and label. -Notes: Mention samples 11NCMOCSS029, -031, and-045 but these are not on the figure. Remove note.	Figure has been modified as suggested	A
65.	Figure 7	Lots of lines and no color or shading. Can't tell what is what. Suggest adding color/shading/labeling similar to previous figures so that these important features can be distinguished. In legend: - Add topographic contour symbol and label. -Add excavation area (dark line) to legend.	Figure has been modified as suggested	A
66.	Figure 8	-Add hatching to concrete similar to Figure 7. -Add excavation area (dark line) to legend. -Large white dashing delineating the areas that contain different excavation depths are too bold and appear to be some type of boundary at first glance. Just label the north	Figure has been modified as suggested	A

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
		area with excavation depth 7-14 feet bgs and south area are with excavation depth 5-10 feet bgs and remove large white dashes.		
67.	Figure 10	-Please revise “Sediment Trap” label to “Approximate Location of Sediment Trap” and add text that states “sediment trap location will be adjusted based on field conditions and on the final selected sediment removal location.”	Figure has been modified as suggested	A
68.	Figure 12	-Titled “MOC Monitoring Well Locations and Sample Results” but sample results are only displayed for select wells and for select COCs. Revise title to “MOC Monitoring Well Locations and Sample Exceedance Results” or something similar. -Change “Water Depth” at each well to “DTW below TOC” and DTW (depth to water) and TOC (top of casing) to legend. “Water Depth” suggests this is the depth of the water in the casing which is inaccurate. -The MW88-10 2011 results are incorrect, same results as presented for MW88-5 2011. Please correct.	Figure has been modified as suggested	A

REVIEW COMMENTS **PROJECT: NE Cape HTRW Remedial Actions W911KB-12-C-0003**
DOCUMENT: Draft Work Plan, Rev. 0 – May 2012 **Location: St. Lawrence Island, Alaska**

U.S. ARMY CORPS OF ENGINEERS	**DATE: June 20, 2012** **REVIEWER: Carey Cossaboom** **PHONE: 753-2689**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
1.	Pg. 1, 2nd sen.	The contract is with BERS, not BESC.	This work plan incorporates information regarding both the 2011 contract with BESC and the 2012 contract with BERS. This will be further clarified in this section with both contracts identified	A
2.	Pg. 12, bottom	A comma should be used instead of a semicolon in 5 instances.	The text will be corrected to replace the semicolons with commas	A
3.	Pg. 14, next to last sen.	"Bristol estimated ~~between~~ that 11,000 ~~and~~ to 16,000 tons of contaminated soil ~~that~~ could feasibly …."	The text will be changed as suggested	A
4.	Pg. 14, last sen.	" …. which may vary by several feet across the site, presumably due to perched water table horizons.	The text will be changed as suggested in J. Craner's comments	A
5.	Pg. 15, 2nd sen.	"A perched aquifer ~~is~~ must be present in some areas ~~where~~ since shallow GW ~~is encountered~~occurs between 4 and 7 feet bgs in certain proximal areas."	The text will be changed as suggested in J. Craner's comments	A
6.	Pg. 15, 2nd par., 3rd sen.	" … cleanup levels for DRO (1.5 mg/L) at 3.3 …"	The text will be changed as suggested	A
7.	Pg. 17, top sen.	"These factors ~~are an indication~~suggest that natural attenuation is occurring, …"	The text will be changed as suggested	A
8.	Pg. 17, top sen.	The final clause of the sentence is ambiguous. What do you mean by consistent?	This final clause will be changed to read ….and the 2011 results are generally consistent with results from the 2010 sampling event.	A
9.	Pg. 17, 3.2.2, 3rd	Prior to 2010, ...over ~~700~~ 300 tons of PCB…. Unless you can reference the source	The text will be changed as suggested	A

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Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
	sen.			
10	Pg. 17, 3.2.2, 2nd par., 1st sen.	“… former Building 110 foundation (Fig, 5.7).	The text will be changed to include Figure 7	A
11	Pg. 20, 2nd sen.	“2-Meth … exceeded ADEC soil cleanup levels (600 ug/kg) in field …” See Craner comment #20.	The text will be changed to include 0.6 mg/kg based on J. Craner comment	A
12	Pg. 20, 3rd sen.	It’s fluorene, not fluorine	The text will be corrected as suggested	A
13	Pg. 20, 3.2.5, bottom	“ … no petrogenic sheen was ~~observed~~seen.”	The text will be changed as suggested	A
14	Pg. 21, bottom	“ … from 0.39 to 2.3 mg/L~~,~~; ~~which is not above~~ the ADEC Table C cleanup level is 1.5 mg/L.	The text will be changed as suggested	A
15	Pg. 36, last sen.	“ …below groundwater, whichever occurs first~~,~~. ~~for a~~An estimated total of 6,787.8 tons of POL soil is scoped for removal. ~~among~~ Contract Number W911KB-06-D-0007, Task Order 0007 ~~(~~has 4,787.8 tons of POL soil remaining to excavate~~)~~, and contract W911KB-12-C-0003 has ~~(~~2,000 tons~~).~~ of POL soil for removal. See Craner comment # 36.	The text will be changed as suggested and the tonnage corrected to 6,781.5 tons and 4,781.5 tons	A
16	Pg. 37, 2nd par.	“Bristol will utilize the UVOST information, and information in Table 4-2, as a guide to excavating locations and targeting	The text will be changed as suggested	A

REVIEW COMMENTS | **PROJECT: NE Cape HTRW Remedial Actions W911KB-12-C-0003**
DOCUMENT: Draft Work Plan, Rev. 0 – May 2012 | **Location: St. Lawrence Island, Alaska**

U.S. ARMY CORPS OF ENGINEERS	**DATE: June 20, 2012** **REVIEWER: Carey Cossaboom** **PHONE: 753-2689**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
17	Pg. 43, 4.2.1, last sen.	" … POL-contaminated soil and may be exercised up to two times ~~(once in 2012 and once in 2013),~~ for a total additional weight of 4,000 tons.	The text will be changed as suggested	A
18	Pg. 44, bottom.	The deviation is noted in Worksheet #21 of the QAPP. I don't see this in the QAPP.	The following Note is included at the bottom of Worksheet #21:*Note: Heavy equipment decontamination will deviate from the SOP slightly. No water will be used to decontaminate the heavy equipment. Rakes, shovels, and brushes will be used to remove all soil from the excavator bucket and tracks. It is expected that only the excavator buckets will contact contaminated soil.	A
19	Pg. 47, 4.5, 2nd sen.	" As a result, Bristol will ~~re-locate these~~resample such areas and collect six discrete soil samples from ~~areas in~~ this vicinity	The text will be changed as suggested	A
20	Pg. 47, 4.6, 2nd sen.	Results from the2011 sampling event found contaminants that included DRO, RRO, …"	The text will be changed as suggested	A
21	Pg. 50, middle par.	" … the stream channel where Transect-7 was established and the pond where soil sample 11NC28SS036 was collected (Figure 10)."	The text will be changed as suggested	A
22	Pg. 57, 4.10, 3rd par.	"Data from each year will be compared to ~~determine~~ approximate the rate of natural attenuation."	The text will be changed as suggested	A
23	Pg. 59, 4.11	Please mention here that you will attempt to approximate a time when site cleanup levels might be attained and a Site 28 Phase I Sediment Removal Report if optional tasks 4.6.17 and 4.6.18 are exercised..	Given the very limited MNA data set collected from the MOC monitoring wells in 2010 & 2011 Bristol is unable to extrapolate when the groundwater will meet cleanup levels.	D. Per the SOW (Sec. 4.5) the report requires "groundwater MNA monitoring and comparison with data

U.S. ARMY CORPS OF ENGINEERS	**DATE: June 20, 2012** **REVIEWER: Carey Cossaboom** **PHONE: 753-2689**	**Action taken on comment by:**

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				from previous years including: interpretation of data trends for all analytes, calculating the biodegradation rate for POLs as well as the timeframe in which site cleanup levels will be achieved, and conclusions based on all data” Granted, you might conclude that you will be unable to extrapolate when the groundwater will meet cleanup levels; but an indication that the proposition was considered, is required.
24	Pg. 60, 4.13, 1st par.	“ … 25 tons of miscellaneous metal debris, 1 ton of drums and 100 pole stumps ~~if~~ per optional task 4.6.11 ~~is exercised~~.”	The text will be changed as suggested	A
25	Pg. 60, last sen.	“The option ~~may be~~has been exercised a maximum of 10 times for a total additional weight of 10 tons.”	The text will be changed as suggested	A

REVIEW COMMENTS — **PROJECT: NE Cape HTRW Remedial Actions W911KB-12-C-0003**

DOCUMENT: Draft Work Plan, Rev. 0 – May 2012 — **Location: St. Lawrence Island, Alaska**

U.S. ARMY CORPS OF ENGINEERS	DATE: June 20, 2012 REVIEWER: Carey Cossaboom PHONE: 753-2689	Action taken on comment by:

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
26	Table 4-4	Please insert "Yes-All" where multiple options could be exercised, and all options have been awarded (4.6.9, 4.6.12, 4.6.13, 4.6.15).	Table 4-4 will be corrected to include 'All' as suggested	A
27	Pg. 63, last sen.	"…and a Site 28 Phase I Sediment Removal Report ~~if optional tasks 4.6.17 and 4.6.18 are exercised~~." They are awarded.	The text will be changed as suggested	A
28	Figure 7	Please distinguish excavation boundaries from plumes somehow visually.	Figure will be updated	A
29	Figure 8	I don't understand the large white-dashed areas. Where is the excavation boundary?	Figure will be updated to better highlight the excavation boundary and the large white dashed areas removed.	A

REVIEW COMMENTS **PROJECT: Northeast Cape F10AK0969**
DOCUMENT: Draft Work Plan, 2012 RA

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-GES-TI	DATE: 25 June 2012 REVIEWER: Gordon Osgood PHONE: 907-753-5599	Action taken on comment by:

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USACE RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	GIS General	Information on planning for GIS was found in SOP BERS-17, and page 85 of UFP QAPP Worksheet 11. Requirements for GIS planning are listed in the 2011 MED, Section 6.1. It will be appreciated if Bristol will add the following information: - Which version of SDSFIE is anticipated to be used for vector data generation? 2.6 or 3.0? or TBD? - Will vector data be delivered in the form of geodatabase, shapefiles, or spreadsheet(s). Or TBD?		Russell James, Bristol's GIS specialist, for the NE Cape project is currently out of the office. He will contact the USACE GIS representative when he returns in early July to provide the SDSFIE version. Bristol has provided the vector data in shapefiles to the USACE in the past. This information will be included in UFP-QAPP Worksheet #11	A

REVIEW COMMENTS | **PROJECT: NE Cape HTRW Remedial Actions W911KB-12-C-0003**
DOCUMENT: Draft SSHP/APP – May 2012 | **Location: St. Lawrence Island, Alaska**

U.S. ARMY CORPS OF ENGINEERS	**DATE: 13 June 12** **REVIEWER: David Prado** **PHONE: 753-5712**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
1.	Section 6.2 of the APP, Appnedix C, p 15	1. Section 6.2 of the APP, Appendix C, p 15, states that "No internal safety inspections are required or anticipated for this project." This is in contradiction to the requirement in the EM 385-1-1 section 1.A.12.	Bristol will review EM 385-1-1 section 1.A.12 and adjust our protocol accordingly.	A
2.	Section 7.1 of the APP, pg 17	2. Section 7.1 of the APP states that "No exposure data monitoring is anticipated for this project." It is understood that no hazardous atmosphere exposures are anticipated but all project related work hours need to be reported per section 01.D.05(c) or the EM 385-1-1	A sentence will be added to the APP to state that project related work hours will be and have been tracked in Daily Quality Control Reports	D- A monthly summary report of the hours worked in each month is required in addition to daily QC reports. Section 01.D.05(c) states to "Submit project work hours to the COR monthly in the format provided by the COR. Work hours include all hours on the project where an employee is in an on-duty pay status."
3.	section 7.2 of the APP appendix C, p17	3. The requirement for USACE accident report forms in section 7.2 of the APP appendix C are not quite correct, changes have been made in italics in the following two paragraphs for insertion into the APP: Any accident or incident beyond first aid (a recordable event as defined by OSHA) *or resulting in any property* damage will be reported verbally and in writing to the Contracting Officer within a 24-hour period by using the USACE Pacific Ocean Division (POD) Form 265-E, Immediate Report of Accident, in Attachment 5. USACE Engineer (ENG) Form 3394 will be completed and submitted within 5 days *for injuries/illnesses beyond first aid or for property damages of $2,000 or more.* This	The suggested text changes have been made to the APP.	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 13 June 12** **REVIEWER: David Prado** **PHONE: 753-5712**	**Action taken on comment by:**

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
		form is located in Attachment 5.		
4.	section 1.14.3, pg 45, attachment 1	4. The SSHP accident reporting procedures on section 1.14.3, pg 45, attachment 1, do not match and the APP. The information and the major accident reporting procedures in the APP and the SSHP need to match. (see comment #3 above)	The change has been to the SSHP, and now the SSHP and APP match with regard to the accident reporting procedures	A
5.	. section 8.2.3 of the APP, pg 21	5. Some general statements need to be more specific for understanding, e.g. section 8.2.3 of the APP states "All construction equipment will be furnished with properly sized fire extinguishers", but this statement is not clear about the size and type that needs to be used. EM 385-1-1 mentions specific sizes and types for specific uses, e.g. section 18.G.23 of the 385-1-1 states : "18.G.23 Each bulldozer, scraper, dragline, crane, motor grader, front-end loader, mechanical shovel, backhoe, and other similar equipment shall be equipped with at least one dry chemical or CO2 fire extinguisher with a minimum rating of 10-B-C." Section1.3.2.2 of the SSHP, attachment 1, states "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." While section 09.B.03 of the Em 385-1-1 states, "a. At least one portable fire extinguisher rated 20-B:C shall be provided on all tank trucks or other vehicles used for transporting and/or dispensing flammable or combustible	Language will be added to clarify the type and placement of onsite fire extinguishers.	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 13 June 12** **REVIEWER: David Prado** **PHONE: 753-5712**	**Action taken on comment by:**

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
		liquids. b. Each service or refueling area shall be provided with at least one fire extinguisher rated not less than 40-B:C and located so that an extinguisher shall be within 100 ft (30.4 m) of each pump, dispenser, underground fill pipe opening, and lubrication or service area."		
6.	Section 1.14.1 of the SSHP attachment 1, pg 44	6. Section 1.14.1 of the SSHP attachment 1, does not address who will conduct site safety inspections for documentation into the DQCR.	The Site Safety and Health Officer or the CQCSM (Alternate SSHO) will conduct site safety inspections. This information will be added to this section of the SSHP.	A
7.	P46 of the SSHP, attachment 1	7. The Corps contact information on the charts on P46 of the SSHP, attachment 1, need to be reviewed and updated as needed . COR; District Safety Manager: Harry (Buster) Godwin, harry.b.godwin@usace.army.mil, 907-753-2896; USACE Industrial Hygienist: Steve Oneill, 907-753-2681	The updates have been made as suggested.	A
8.	Attachment 2 and section 1.13.8 ,page 42, of attachment 1	8. Provide a copy of Mr. Chuck Crowley's (SSHO) and Mr. Russel James's (alternate SSHO per section 1.13.8 ,page 42) safety and health training certificates. Per section 01.A.17 of the EM 385-1-1, they are required to, at minimum, have the 30 hour OSHA and 24 additional hours of formal safety and health training every 4 years.	Mr. Croley and Mr. James attend 8 hour HAZWOPER training annually; the most recent certification for this training along with their 30 hour OSHA training certificates will be added to their qualifications.	A
9.	Attachment 3	9. The AHAs show that designated competent/qualified personnel have not been identified for specific functions	Bristol's field crew of operators and laborers have worked at the project site for the last 3 years and their qualifications are	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 13 June 12** **REVIEWER: David Prado** **PHONE: 753-5712**	**Action taken on comment by:**

Item No.	Page No., Spec. Para.	COMMENTS	BRISTOL RESPONSE	COMMENTOR REPLY (A-AGREE) (D-DISAGREE)
		or equipment/tool usage. Proof of these individuals qualification will be required once identified per EM 385-1-1, section 01.A.13 (c).	based on their work history with Bristol and the past 3 years at NE Cape. All operators and laborers responsibilities and hours are shown on the Daily Quality Control Reports from 2009-2011. The two new laborers in 2012 will be supervised, mentored, and trained on site.	

REVIEW COMMENTS **PROJECT: NE Cape HTRW Remedial Actions W911KB-12-C-0003**
DOCUMENT: SWPPP – May 2012 Location: St. Lawrence Island, Alaska

U.S. ARMY CORPS OF ENGINEERS	DATE: 31 May 2012 REVIEWER: Jeremy Craner PHONE: 753-2628	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1.	Pg. 5, Section 3.1, last paragraph	The project construction site notice is not located in Appendix H as mentioned. Please add to Appendix H.		The documents that will make up the construction Site Notice will be added to Appendix. H.	A
2.	Pg. 9, Section 4.0, middle paragraph, last sentence	Please reference both Figures 2 & 3since this is the first mention of the impoundment area. This links the reader to the placement onsite of the impoundment (Fig 2) as well as the specific impoundment plan (Fig 3).		The suggested change has been made.	A
3.	Pg. 9, Section 4.1, last paragraph, third sentence	Change “From Site 21, an estimate 10 tons…” to “From Site 21, an estimated 100 tons...”		The suggested change has been made.	A
4.	Pg. 25, Section 11.11	This section discusses the dewatering impoundment as shown on Figure 3, which is good. I do not see any discussion regarding the “sediment trap” to be installed at the base of Site 28 as depicted on Figure 6 anywhere in the SWPPP. This sediment trap needs to be discussed an described to address the following: - That the final selected location of the sediment trap will be approved by the QAR prior to installation. - How will the sediment trap be constructed? Will it be done as shown in Appendix B, pgs B-46 through B-48? - Will this be done by hand (no road along drainage)? If not, how? We want to ensure that the sediment trap installed is temporary and is located in the most effective area for collecting sediment but also allow for the maximum amount of sediment removal work to be achieved.		A segmented discussing the Site 28 Sediment Trap has been added in Section 11.4. The text includes the following information: A sediment trap will be installed at the base of site 28 (Figure 6) The final selection of the trap will be determined in consultation with the QAR and approved by the QAR prior to installation. The sediment trap will be a temporary measure and will be constructed in accordance with the Alaska SWPPP guide BMP AK-15 (Appendix B) as practicable. Construction will be performed using available heavy equipment and/or UTVs and/or hand labor as dictated by field conditions.	A
5.	Pg. 35, Section 12.1	As the main site QAR, I will ensure that Eric Barnhill is doing inspections at least 7 calendar days and request that		A section will be added to the DQCR.	A

U.S. ARMY CORPS OF ENGINEERS	**DATE: 31 May 2012** **REVIEWER: Jeremy Craner** **PHONE: 753-2628**	**Action taken on comment by:**

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE** **A - comment accepted** **W - comment withdrawn** **(if neither, explain)**	**CONTRACTOR RESPONSE**	**USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
		each of these inspections be included in that days DQCR for our record keeping purposes. Also, I suggest that you add a small SWPPP section to the DQCR where brief comments can be recorded and inspections tracked.			
6.	Pg. 35, Section 12.2	Please add that each inspection form will be included in the DQCR for the date that the inspection was conducted.		The suggested change has been made.	A
7.	Figure 4	The figure and associated legend shows the "2010 Excavation." Please revise figure to display the "2011 Excavation."		Figure will be modified as suggested	A
8.	Figure 5	Can't see flow direction arrows very well. Please change to light color so they can be viewed easier.		Figure will be modified as suggested	A
9.	Figure 6	Change sediment trap symbol and label to read "Approximate Location of Sediment Trap."		Figure will be modified as suggested	A
10.	General	In the 2011 NE Cape SWPPP, Appendix I contained a memo written and stamped by Isaac Pearson, P.E. summarizing a stability analysis for the final BMP stabilization. Shouldn't this be included as an appendix and discussed in the 2012 SWPPP?		This memo has been added to Appendix H	A, please add to appendix AND briefly discuss the memos relevance in appropriate location in text.
11.	General	Once this SWPPP is approved, an original signed Government SWPPP Authority Delegation Letter to the Contractor will be provided to you and should be included in the final SWPPP (Section 4.2.6, pg. 39 of the Scope of Work).		This document will be added to the SWPPP	A
12.	General	I see the NOI is to be submitted June 1st. Please add the submitted NOI Form, acknowledgement letter, and associated info to Appendix F in final SWPPP.		These documents are in Appendix F.	A
		----- End of Comments ----			

REVIEW COMMENTS | **PROJECT: NE Cape HTRW Remedial Actions W911KB-12-C-0003**
DOCUMENT: Draft SWPPP – May 2012 | **Location: St. Lawrence Island, Alaska**

U.S. ARMY CORPS OF ENGINEERS	**DATE: June 8, 2012** **REVIEWER: Eric Marcellus** **PHONE: 753-2734**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
1.	Operator Plan Authorization/Certification/Delegation	Operator Plan Authorization/Certification/Delegation must be signed by corporate officer.	A corporate officer will sign the Operator Plan Authorization/Certification/Delegation.	A
2.	1.2	Subcontractors have not been identified in section 1.2 of SWPPP.	A table of Bristol's subcontractors has been added to section 1.2	A
3.	2.0	Must ID person updating SWPPP, person conducting inspections, person conducting monitoring, and person operating an active treatment system in section 2.0 of SWPPP.	Additions have been made to section 2.0 clarifying the person updating SWPPP, person conducting inspections, person conducting monitoring, and person operating an active treatment system	A
4.	App E	Appendix E has a ADEC Delegation of Authority Form in it but list Ben English and EIE 327 Arctic Survival FOP which does not appear to be correct.	The form has been updated with an accurate form	A
5.	4.4	In section 4.4 area to be disturb is .85 acres. This is under the AGCP limit and technical does not require permit coverage. Note that it is close to 1 acre and if the operators think it may bleed over 1 acre then applying for coverage may be prudent. If that is the case I would recommend listing the amount of disturbed acreage as 1 acre.	The construction site area to be disturbed and the total project area will be increased to a total of 1 acre each	A
6.	Site Maps	Additional info that needs to be incorporated into site maps including: Locations of areas that will not be disturbed and natural features to be preserved, Locations where authorized non-storm water will be used, Locations where storm water discharges to waters of the U.S., or an MS4, Dumpsters, Portable sanitary facilities, Stabilized construction exits. See checklist for more clarification.	Additional BMPs will be notated on site maps. In addition to the maps in the plan, there is a live field map in which updates are noted as they occur. Being a remote site, there is no Municipal Separate Storm Sewer System or dumpsters. At NE Cape all solid waste is burned in 2 Smart Ash cans at a lined diked area, on the camp pad. The burned residue is placed into 85 gallon over-pack containers that are temporarily stored at the honhazardous waste accumulation area that will be shown on Figure 1 of the SWPPP. The waste is sampled for characterization and then disposed of offsite at the end of the	D-With regard to the dumpster, you aren't going to have any trash generated on the project? During most construction projects there is some type of solid waste generated and there is some receptacle for it. This is what the CGP is looking for.

U.S. ARMY CORPS OF ENGINEERS	**DATE: June 8, 2012** **REVIEWER: Eric Marcellus** **PHONE: 753-2734**	**Action taken on comment by:**

Item No.	**Page No., Spec. Para.**	**COMMENTS**	**BRISTOL RESPONSE**	**COMMENTOR REPLY (A-AGREE) (D-DISAGREE)**
			season. (response added on 6/29/12) It is stated in the SWPPP that "The site access points, roads, and all areas where construction equipment will be driven consist of the same material; as such, special access points will not be developed. Figures 2 and 4 will include some annotation about general access/exit roads at the MOC and Site 13 (response added on 6/29/12). Vehicle wheels and tracks will be cleaned of excess materials to avoid tracking from site to site. "Areas of Non-Storm water use – which are limited to camp water and boot washes at Sites 13 and 31, will be marked.	D- I assume that when you say "The site access points, roads, and all areas where construction equipment will be driven consist of the same material" you are talking about dirt roads. Just realized it is still possible to track sediment from a project even onto a dirt road. Note that the ADEC CGP specifically says in section 4.2.4 "A permittee must establish construction vehicle access and exit points which must be stabilized."
7.	7.1	In section 7.1 the SWPPP talks about an unnamed lake. ID this on the site maps.	The Suqitughneq R. forms a lake prior to emptying into open water. This area has been identified on Figure 1.	A
8.	7.2	In section 7.2 explain how you determined TMDL applicability.	Bristol performed a check of the State of Alaska listed TMDL streams. The Suqitughneq nor any other streams for St. Lawrence island appear on the list. A notation about the TMDL list in Appendix D has been added to this section.	A
9.	App H	Why is EI327 Arctic Survival addressed in Appendix H? If there is a connection between it and the Northeast Cape project explain it.	The Arctic Survival information was placed in App H in error. It has been removed.	A
10.	16.2	In section 16.2 it says the completed NOI is in Appendix H but App H is for Additional Info. The NOI should be in App F.	The NOI and NOI reply letter have been added to Appendix F	A

REVIEW COMMENTS

PROJECT: Northeast Cape
DOCUMENT: NE Cape HTRW Remedial Actions UFP-QAPP

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 14 June 2012 REVIEWER: Teresa Lee PHONE: 907-753-2788	Action taken on comment by:

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1.	Wks 8	The location of training records/certificates is not listed for the UTV training.		Training will be provided by the SSHO on site.	
2.	WKS 10	In the section "The Rationale for Inclusion of Chemical and Nonchemical Analysis", paragraph 2, there is no mention of the samples to be collected both pre and post in the footprint of the lined temporary stockpile areas.		Third sentence second paragraph modified to state: *Stockpile areas will be field screened by the mobile lab before and after any temporary stockpile area is constructed.*	
3.	Wks 10	In the section "The Rationale for Inclusion of Chemical and Nonchemical Analysis", Paragraph 3, it states that soils samples will be collected at Site 8. It should state that sediment samples will be collected at Site 8.		Per Carey Cossaboom comments on the 2010 RA report Site 8 is soil because it was formed in place and was not transported nor deposited by water.	
4.	Wks 10	In the section "The Rationale for Inclusion of Chemical and Nonchemical Analysis", Paragraph 3, it is missing the GRO analysis for the sediment samples. Only DRO/RRO, TOC, and PAHs are listed.		If you're referring to Site 8, Section 4.4.11 of the contract only states to analyze for DRO/RRO (with and without SG), PAHs and TOC. If you're referring to Site 28 it has GRO included.	
5.	Wks 11	In the "What Types of Data are Needed?" section, it states that the field screening samples will be collected using the same criteria as the confirmation samples, however, the PCB confirmation samples are composite samples while the field screening samples are discrete samples. These have 2 very different collection strategies. Please strike this sentence.		The field screening and confirmation samples are all collected as discrete samples and then composited by either the field screening lab or the fixed base laboratory.	

REVIEW COMMENTS	**PROJECT: Northeast Cape** **DOCUMENT: NE Cape HTRW Remedial Actions UFP-QAPP**

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	**DATE:** 14 June 2012 **REVIEWER: Teresa Lee** **PHONE: 907-753-2788**	**Action taken on comment by:**

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
6.	Wks 11 Table 11-1 11-2	Please revisit your MS/MSD totals. I notice a side note stating that one set of MS/MSD samples is = 2 samples. What does this mean? 2 sample jars? Billed as 2? If you are referring to billing, that has no place here in the QAPP. Either way, I see several areas where estimated numbers for MS/MSD are off, on the high end. It may be a result of a buffer for possible multiple shipments which would be fine. I just wanted to make sure it was intended.		The sample comment on Table 11-1 states that one set of MS/ MSD samples = 2 samples which refers to 1 MS and 1 MSD to clarify what 1 means in the Analytical Suite columns. This is not a reference to billing. The number of estimated MS/MSDs is based on previous years' analyses with a project MS/MSD per extraction batch as stated in QSM 4.2 box D-7.	
7.	Wks 11 Pg 84	In the last sentence of the first paragraph, there is a reference to a Chemical Data Verification Report. It should be a Chemical Data Quality Review.		Sentence revised to state Chemical Data Quality Review. Made correction to Chemical Data Quality Review in several other Worksheets as well.	
8.	Table 15-1	Please revisit the NOAA Squirt Sediment Screening Criteria for Metals. It appears that the entries are in parts per billion instead of parts per million as indicated in the units column.		Table 15-1 was checked against NOAA SQUIRT tables and revisions had been made.	
9.	Wks 17	The sample preservation section states that appropriate preservation will be added to the sample containers at the laboratory prior to sample container shipment. Proper sample preservation should be added at sample collection. Please revise.		Water preservation is added at the lab, only methanol is added in the field. Worksheet 17 revised to state: "Appropriate preservatives will be added to the sample containers at the laboratory prior to sample container shipment except for methanol, which will be added to the sample containers in the field".	
10.	Wks 19	AK102/103 water samples have a hold time of 14days to extraction, 40 days to analysis. Not 7 as listed. Please revise. Also, there is no extraction limit listed for PCBs in water by the ADEC. Please revise the 7 days from sample collection to extraction for this analyte.		AK102/103 changed to 14 days. Holding time until extraction removed for PCB waters. PCB waters now states: "40 days from extraction until analysis".	

REVIEW COMMENTS

PROJECT: Northeast Cape
DOCUMENT: NE Cape HTRW Remedial Actions UFP-QAPP

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 14 June 2012 REVIEWER: Teresa Lee PHONE: 907-753-2788	Action taken on comment by:

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
11.	Wks 19	Column for maximum Holding time for soil samples has some errors. Please review the ADEC Field Guidance and revise.		Worksheet 19 has been revised so that soil holding times are corrected in accordance with ADEC Draft Field Sampling Guidance document.	

SWPPP Completion Check List

Check the appropriate box for each item as appropriate. To fill the box electronically, double-click and then click "Checked." Click OK.

Identifying Information			
Project:		**Yes**	**No**
	Have you included project name, site location/address, city, state, zip code, and phone number (if appropriate)?	☒	☐
Operator(s)			
	Are there multiple operators on this permit?	☒	☐
	If YES, have you included company/organization name, contact person, address, (including city, state, and zip code), and telephone/fax/email contact information?	☒	☐
	If NO, have you included the above information for the single operator?	☐	☐
SWPPP Contact(s)			
	Have you identified the contact person for SWPPP questions or concerns, including: company/organization name, contact person, address, (including city, state, and zip code), telephone/fax/email contact information?	☐	☐
	Have you identified the date the SWPPP was prepared (MM/DD/YYYY)?	☒	☐
	Have you identified the (estimated) start and completion of construction (MM/DD/YYYY)?	☒	☐
	APDES Tracking Number? include once NOI is submitted	☐	☐
	Have revisions to the SWPPP been documented on the Record of SWPPP Amendments?	☒	☐
	Has the *Operator Plan Authorization/Certification/Delegation* form been **completely** filled out, dated, and signed by a Responsible Corporate Officer?	☐	☒
Section 1 - General information			
Permittee (5.3.1)			
	Have you identified **all** Operator(s)/Contractor(s) for the project, including address, contact information, and area of control?	☒	☐
	Have you identified **all** Subcontractor(s) for the project, including address, contact information, and area of control/specialty/responsibility?	☐	☒
Storm Water Contacts (5.3.2)			
	Have you identified the qualified person(s) for the following **required** positions?		
	Storm Water Lead	☒	☐
	Person(s) preparing SWPPP	☒	☐
	Person(s) updating SWPPP	☐	☒
	Person(s) conducting inspections mentioned in a different location in the SWPPP but	☐	☐

should be listed under Stormwater Contacts

	Person(s) conducting monitoring (if applicable)	☐	☒
	Person(s) operating an active treatment system (if applicable)	☐	☒
	(If all positions are carried out by a single individual, check here)	☐	
	Are the individuals named in this section Qualified Persons as described in ACGP Appendix C? Are their qualifications documented in Appendix E of this SWPPP? shown in App N which is OK but in App E	☐	☒
Project Information (5.3.3) it has Ben English name & E/E327			
	Have you included the following information?		
	Project Site/Name	☒	☐
	Street/Location, City, Borough, State, Zip	☒	☐
	Latitude and longitude (in one of the specified formats) and method for determining	☒	☐
	Site-Specific Conditions:	☒	☐
	Precipitation	☒	☐
	Soil types	☒	☐
	Slopes	☒	☐
	Topography	☒	☐
	Drainage patterns	☒	☐
	Growing season	☒	☐
	Existing vegetation	☒	☐
	Historic site contamination	☒	☐
Nature of Construction Activity (5.3.4)			
	Have you described/identified:		
	The general scope of work for the project, including major phases and approximate start/complete dates?	☒	☐
	Function of the project	☒	☐
	Sequence and timing of soil-disturbing activities	☒	☐
	Size of project area AND total area expected to be disturbed	☒	☐
	Runoff coefficient and impervious area estimates	☒	☐
	Potential sources of sediment from construction project	☒	☐
	Other potential pollutants and their sources	☒	☐
Site Maps (5.3.5)			
	Have you included a General location Map?	☒	☐
	Have you included site maps containing the following information?		
	Property boundaries	☒	☐
	Locations where earth-disturbing activities will occur, noting phasing	☒	☐
	Locations of areas that will not be disturbed and natural features to be preserved	☐	☐

	Direction of storm water flow and approximate slopes anticipated after grading activities	☒	☐
	Locations where control measures will be or have been installed	☒	☐
	Locations where exposed soils will be or have been stabilized	☒	☐
	Locations where post-construction storm water controls will be or have been installed	☒	☐
	Locations of support activities	☒	☐
	Locations where authorized non-storm water will be used	☐	☒
	Locations of all waters of the U.S. on-site and within 2,500 feet of the site boundary	☒	☐
	Locations where storm water discharges to waters of the U.S., or an MS4	☐	☒
	Sampling point(s), if applicable ID if applicable	☐	☐
	Areas where final stabilization has been accomplished update as necessary	☐	☐
	Staging and material storage areas (construction materials, hazardous materials, fuels, etc.)	☒	☐
	Dumpsters	☐	☒
	Portable sanitary facilities	☐	☒
	Concrete, paint, or stucco washout areas	☐	☒
	Stabilized construction exits	☐	☒
Discharges			
	Have you identified other industrial storm water discharge locations and allowable non-storm water discharges?	☒	☐
	Section 2: Compliance With Standards, Limits, And Other Applicable Requirements		
Receiving Waters			
	Have you listed and described ANY water bodies that could potentially receive stormwater from the construction site, includng sewer and/or drainage systems?	☒	☐
	Are they indicated on the site map? what lake are you refering to	☐	☒
Total Maximum Daily Load (TMDL) (3.2, 5.6)			
	Have you included documentation supporting a determination of permit eligibility for waters with a TMDL? how did you determine this	☐	☒
	Have you determined if there is a TMDL for turbidity or sediment?	☒	☐
	If YES, have you listed measures taken to comply with requirements?	☐	☐
	Are contacts with state or federal TMDL authorities summarized in this section and documented in Appendix D? but should be addessed in 7.2	☒	☐ OK
Endangered Species (3.3, 5.7)			
	Have you determined whether there are endangered/threatened species or critical habitat on or near the project area and described how that determination was made?	☒	☐

	Have you determined whether species or critical habitats will be affected by storm water discharge, and listed them?	☒	☐
	If YES, have you listed measures taken for compliance with protection?	☒	☐
Historic Properties (5.11.3)			
	Have you indicated whether there are historic or tribal preservation sites on or near the project area, and how that determination was made?	☐	☐
Applicable Federal, State, Tribal, or Local Requirements (4.13)			
	Have you determined whether there are there other applicable federal, state, tribal, or local requirements to be implemented at the site?	☒	☐
	Section 3: Control Measures		
Best Management Practices (BMPs)			
	Have you described appropriate control measures (BMPs) for each major activity that will take place at the construction site, including sequence; maintenance and inspection procedures; cleaning, repair, or replacement protocols, thresholds and schedules; and operator responsible?	☐	☐
	Does the site map indicate location of BMPs?	☒	☐
	Have you included design specifications and details for structural BMPs in Appendix B?	☒	☐
	Have you described areas that will be disturbed for each phase of construction and methods intended to protect areas not to be disturbed?	☒	☐
	Have you identified natural features of the site and how those features will be protected?	☒	☐
	Have you described how topsoil will be preserved? should be in 11.1	☐	☒
	Have you described how you will maintain natural buffer areas to protect stream crossings or waters of the U.S. within or immediately adjacent to construction site, if applicable?	☒	☐
	Have you identified and described the BMPs you will use to control storm water discharges and flow rates, including BMP, installation schedule, maintenance and inspection, and responsible staff?	☒	☐
	Have you identified steep slopes present at the site and what measures you will use to control them, including BMP installation schedule, maintenance and inspection, and responsible staff, if applicable?	☒	☐
	Have you identified storm drain inlets present at the site and what measures you will use to control them, including BMP installation schedule, maintenance and inspection, and responsible staff, if applicable?	☒	☐
	Have you identified water bodies present at the site and what measures you will use to control them, including BMP installation schedule, maintenance and inspection, and responsible staff, if applicable?	☒	☐

	Have you identified down-slope sediment controls needed at the site, including BMP installation schedule, maintenance and inspection, and responsible staff, if applicable?	☒	☐	
	Have you determined where vehicles will enter and exit the site, procedures to remove accumulated sediment from vehicles before exiting the site (vehicle tracking), and stabilization, dust-generation minimization, and off-site vehicle tracking control practices?	☒	☐	
	Have you identified soil-stockpile locations and measures to control sediment loss from them, including BMP installation schedule, maintenance and inspection, and responsible staff, if applicable? Have you indicated stockpile locations on the site map?	☒	☐	
	Have you identified whether a sediment basin is required, and described the measures you will use to control them, including BMP installation schedule, maintenance and inspection, and responsible staff, if applicable? Have you appended the detailed design information in Appendix B, including calculated volume and approximate size? Are sediment basins located on your site map?	☒	☐	
	Have you determined whether dewatering will be necessary?	☒	☐	
	If YES, have you described dewatering practices and ensure they comply with ADEC guidelines, including BMP installation schedule, maintenance and inspection, and responsible staff?	☐	☐	N/A
	Have you determined what control measures you will use to minimize on-site erosion and sedimentation, and discharge of pollutants, including BMP installation schedule, maintenance and inspection, and responsible staff?	☒	☐	
	Have you described your final stabilization plan, including sequence of installation?	☐	☐	
	Have you indicated whether treatment chemicals will be used to reduce erosion?	☒	☐	
	If YES, have you ensured you meet ACGP Section 4.5 and provided the required information, including chemicals to be used, procedures for use, training of staff, and application and physical control measures?	☐	☐	N/A
	Have you included documentation of training, application procedures, and control measures in the appropriate appendix? training for chemicals N/A	☐	☐	
	Have you determined whether an ATS will be used, received approval from the ADEC, and described the ATS process?	☒	☐	
Good Housekeeping Measures (4.7)				
	Have you described all measures you will use to minimize pollutant discharge, including responsible staff, and design, installation, implementation, and maintenance plans, for the following activities:			
	Vehicle and equipment washing	☒	☐	
	Fueling and maintenance areas	☒	☐	
	Applicator/Container washout	☒	☐	
	Staging and material storage OK	☐	☐	
	Fertilizer or pesticide use and storage	☒	☐	

	Storage, handling, and disposal of construction waste	☒	☐	
Spill Notification (4.8)				
	Have you described your plan for notifying the appropriate authorities of any leak, spill, or release of hazardous substance per ACGP Section 4.8?	☒	☐	
Waste Materials (5.3.7)				
	Have you described what waste (hazardous, non-hazardous, and construction debris) and construction materials will be stored on-site, control measures, handling and disposal procedures?	☒	☐	
Section 4: Inspection, Monitoring, and recordkeeping				
Inspections (5.4, 6.0)				
	Have you described:			
	Person responsible for inspections	☒	☐	
	Frequency of inspections	☒	☐	
	Justification for reduced frequency, if applicable	☒	☐	
	Documentation of repairs and maintenance	☒	☐	
	Winter shutdown, if applicable	☐	☐	N/A
	Do you have a clear inspection form/checklist for inspections attached to the SWPPP?	☒	☐	
	Have you described corrective action plan and log, which should include action(s) taken, date, and person completing the work.	☐	☐	
Monitoring Plan (if applicable) (5.5, 7.0)				
	Do you need a monitoring plan?	☐	☒	
	If YES, have you developed a monitoring plan, including schedules, checklist, and corrective action procedures?	☐	☐	N/A
Post-Authorization Records (5.8)				
	Have you included all the required documents in Appendix F?	☐	☒	
	Have you included all employee training records in the appropriate appendix?	☐	☐	

App N OK

Summary Comments, SLI/NEC 16/14/2012 ((Revised Version))

RJ Scrudato TAPP

Suqi Estuary

The Suqi Drainage continues to contribute a range of contaminants from the MOC and upgradient regions of the NEC. It is evident from the monitoring data that POLs are migrating in the surface and groundwater from the upgradient regions of the MOC. It is also likely other contaminants including PCBs, mirex, DDE, HCB and trace metals, including mercury, are migrating toward the north from the MOC and southern regions of the NEC into the Suqi surface drainage which will continue to deposit contaminants within the Suqi Estuary.

Comment noted. Suqi estuary sediments have low levels of contaminants and require no cleanup.

Sediment cores collected within the Estuary have verified that the Suqi Estuary has elevated concentrations of PCBs within the upper 10 cm of the sediments. Clearly, if there are PCB-impacted sediments, there is likely dissolved PCBs in the estuary waters. The analytical procedure utilized to characterize PCBs by Bristol (COE) is not sensitive enough to detect the lower PCB congeners and are therefore not accurate estimates of the dissolved phase PCB concentrations.

Comment noted. Suqi estuary sediments and waters have low levels of contaminants and require no cleanup.

Mercury, DDT, mirex, HCB have also been detected within the upper 10 cm of the Suqi Estuary sediments and based on Cs data, represent deposition of the near surface 10 cm during the time of military occupancy at the NEC.

Comment noted. Suqi estuary sediments have low levels of contaminants and require no cleanup.

The Suqi Estuary waters are seasonally occupied by a range of fish species including Sticklebacks, Dolly Varden and others and the elevated organic and inorganic contaminants in the Suqi Estuary sediments will continue to serve as a source of contaminants not only the POLs and other contaminants from the groundwater and surface waters of the MOC , but also from the contaminants in the Suqi Estuary that functions as a contaminant filtration system affected by the organic rich sediments.

Comment noted. Water monitoring will be performed in the Site 28 Drainage Basin, as well as from the existing wells at the MOC. Additional wells will be installed down gradient of the MOC when remediation efforts are near completion. Suqi estuary sediments have low levels of contaminants and require no cleanup.

When the mouth of the Estuary opens, the contaminated sediments and waters are discharged to the Bering Sea thereby providing a continuing source of contaminants to the near shore waters. Dredging the Estuary and removal of the contaminated sediments should be considered to avoid continuation of the contaminant migrations to the Bering Sea.

Comment noted. Suqi estuary sediments have low levels of contaminants and require no cleanup in the approved Decision Document. Dredging the sediments here would be very expensive and little would be gained.

MNA of the MOC Groundwater

The MOC surface water and groundwater migrates to the north at the NEC. The use of MNA relies heavily on the geochemical characteristics, microbiology, dilution, temperature and available nutrients to reduce the concentrations of the POLs and the historical data from the monitoring wells suggests that MNA is not effective within all areas of the MOC subsurface.

It is too early to tell how well natural attenuation will work at the MOC. Contaminant levels will be monitored, and opinions on when contamination might fall below cleanup levels will be estimated as the cleanup project advances.

Bristol failed to effectively conduct a pilot scale demonstration of in situ chemical oxidation within the lower reaches of the MOC. As mentioned in earlier correspondence about the in situ failure by Bering focused on the attempt to utilize the in situ remedial process in an inappropriate location due to the abundance of peat deposits that “consumed” the introduced hydrogen peroxide. Fentons Reagent was destined to failure within the northern sectors of the MOC and the process failed due to the poor selection of the site to conduct the pilot scale demonstration and prior to receiving data from the bench scale study that was completed after the pilot demonstration.

Comment noted. The pilot scale demonstration effectively revealed that in-situ chemox is not a good remedy for the northern portion of the MOC. While it is true that bench scale studies should be performed prior to field testing, the economics of a remote site chemox remedy, where the field season cannot exceed three months/year, does not afford such a relaxed approach. In this case, two seasons of remediation were accomplished in one season. Whereas only one season might have been necessary if the bench scale test had been done first, an abundance of information was accomplished. A whole year (season) of information could have been gained by the aggressive approach; foresight is not 20/20.

In situ remediation utilizing Fentons Reagent (FR) processes can work in the southern regions of the MOC where the subsurface sediments and soils are not inter-bedded with peat. The FR would prove to be highly effective in reducing the POL contaminants within the southern regions of the MOC away from the peat deposits. The presence of ferrous iron in the impacted groundwater of the upper regions of the MOC provides an ideal condition to effectively degrade the COCs and not to rely on dilution and dispersion to the lower reaches including migration to the Suqi Estuary. Use of hydrogen peroxide in the southern regions of the MOC would also provide oxygen to the groundwater thereby enhancing aerobic biodegradation of the POLs.

Comment noted. The southern regions of the MOC have contaminant levels that do not require cleanup. Therefore, it does not make sense at this juncture to perform remediation there.

Site 7.

How is it known that the capping of Site 7 resulted in preventing contaminants, including PCBs, from moving off site into the adjacent wetlands since all of the wetland monitoring wells have been removed. What action was undertaken to remediate the PCBs identified in the wetlands immediately west and bordered by the Cargo road?

The water samples collected around Site 7 have shown some petroleum contamination in the residual organics range, but little else. Sediment samples have been below cleanup levels except for one PCB sample. Almost all of the soil samples have been below cleanup levels. Prior to capping the landfill, several areas of stained soil were removed. Debris that could have been a source for additional contamination was excavated from the landfill. Now that the landfill has a proper cap, it is logical to assume that contaminant effluent will not increase. At the 5-year review, we will sample the wetland ponds as a means of assessing contaminant migration.

Over the years there has been a great deal of work conducted at the NEC to remove COCs. What is troubling is the almost unilateral decisions made by the COE and contractors on whether the implemented processes have been effective since the outcomes have not been monitored to effectively determine whether the COCs are still a source problem within the remediated areas. Is Site 7 not a continuing source of contaminants to the surrounding wetlands? Without monitoring, it is not known.

Most of the contaminated sites at Northeast Cape have been cleaned up so that no monitoring is necessary. Since contamination at Site 7 was mostly below cleanup levels, the remedy was to eliminate further sources of contamination. Monitoring is generally done at areas that exhibit considerable contamination that is impractical to remediate. At the 5-year review, we intend to sample the wetland ponds as a means of assessing contaminant migration.

I am concerned that NEC sites have been remediated primarily by excavating the impacted soils and sediments and hauling them away to another waste management facility. Did the excavation and removal affect the common goal of removing as much of the contaminants as possible?? Without effective monitoring, it is not possible to determine final outcome. Effective monitoring is required to assess long and short term exposures.

Excavation and removal of soil from contaminated sites has generally proven effective at attaining the goal of removing soil contaminated above State of Alaska Cleanup Levels. Our goal is not to remove as much of the contaminants as possible.

Comments of 6/12/2012

Sampled nine MOC wells and data are summarized for three (3) wells?? Were physical data collected –pH, temperature, redox? Other chemical parameters including TOC, COD, suspended solids, others?? What were the contaminant concentrations in the other six wells?

This is the Work Plan for upcoming work. The intent here was to give a quick glimpse of the biggest concern for groundwater at the MOC. The Remedial Action Reports offer a full review on the findings of previous monitoring activity. The plan is to continue taking monitoring samples from the wells existing at the MOC. We will need to place additional wells once the contaminated soil has been excavated to full extent. No wells currently exist where the water is expected to be the most contaminated because those areas are currently targeted for excavation.

The presence of methane and ferrous iron indicate anaerobic conditions exist in the sampled wells. What was the physical and chemical data in the other six wells? Did all of the wells have elevated methane, ferrous iron?? If so, anaerobic conditions exist in portions of the MOC groundwater -- not optimal for degrading non-chlorinated compounds.

Comment noted. All the information regarding the 9 monitoring wells at the MOC is included in the 2011 HTRW Final Report Appendix E in Tables 3 and 4.

Table 3 shows the MNA parameters and temperature, spec. conductance, pH, ORP, DO and methane for all 9 wells in 2010 and 2011. Table 4 displays the 2011 analytical results (total & dissolved metals, total & dissolved Hg, PCBs, BTEX, PAHs, GRO, DRO and RRO) for all 9 wells

Alaska Community Action on Toxics
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Anchorage, Alaska 99503
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www.akaction.org

Comments of Alaska Community Action on Toxics
on the Northeast Cape HTRW Remedial Actions Work Plan – May 2012
Vi Waghiyi and Pam Miller, RAB Members
July 1, 2012

Thank you for the opportunity to provide comments on the NEC HTRW Remedial Actions Work Plan. We appreciate your careful consideration and response to these comments.

Overview comments:

We are concerned that short- and long-term monitoring plans and provisions are not sufficient to assess the effectiveness of planned removal actions and the planned monitored natural attention (MNA). It is important to have a long-term monitoring plan in place prior to completion of the remedial actions. Natural attenuation is a passive process and will likely take decades. We are concerned that MNA does not adequately protect the health and environment of the people and wildlife of St. Lawrence Island and that these areas will continue to be a source of contamination into the Suqi River estuary and near-shore environment of the Bering Sea. We would like to see additional active removal of contaminated areas of the MOC, drainage basin, estuary, and Site 8 to prevent further contamination downgradient of these sites. Monitoring is not sufficient to determine the efficacy of remedial actions at Site 7 and whether that site is a continuing source of contaminants downgradient of the site.
Comment noted and in part is discussed in the responses to specific comments below.

Further examination and use of the *in situ* chemical oxidation technique should be given in areas of the MOC as recommended by Dr. Scrudato. This method may also be effective in reducing POL and other contaminants in groundwater.
Comment noted and in part is discussed in the responses to specific comments below.

We think that it is necessary to ensure that there is a complete network of monitoring wells installed for the long-term throughout the NE Cape FUD site. These should be located downgradient from the major contaminated areas. Provisions should also be made to collect sediment cores throughout the Suqi River drainage and estuary—and ensure sufficient spatial coverage and over time—to evaluate the effectiveness of remedial actions.
Many sites were cleaned up to ADEC-approved Cleanup Levels and therefore do not require monitoring. USACE will develop a table showing what sites will be monitored and their likely review schedule. The table should be completed by the next RAB meeting in Nov or December.

Specific comments:

Page 2—confirmation soil sampling following the removal action at Site 28 should be required and not an "optional task."

Optional tasks within a contract may or may not be exercised due to a variety of variables including whether or not sufficient funds are available. Confirmation soil samples will be collected following the Phase 1 Sediment Removal at Site 28 based on ADEC input and will be subject to available funding.

Page 2—multi increment (MI) soil sampling for POL at the present refueling area should be required and not an "optional task."

This optional task will not be practical this season because the contractor will not remove the present refueling area at the end of this construction season. The contractor plans to over-winter equipment, which includes the present refueling area, for use during the 2013 construction season. As a result, this option will not be exercised at this time. This sampling will be included in the contract for next construction season when the contractor will likely remove the present refueling area.

Page 2—additional details are needed to describe the scope of the removal and disposal of dangerous debris, drums, and poles from tundra areas.

Additional details are provided in Section 4.0 Field Activities

Page 10—section 2.9, sentence 2. This sentence should read: "There are **no longer** any permanent residents…"

Bristol will make this correction to the text

Page 10—Section 2.10, sentence 1. This sentence should read: "Savoonga is a traditional **St. Lawrence Island** [not Siberian] **Yupik** village…"

Bristol will make this correction to the text

Page 10—Section 2.10, sentence 4. This sentence should read: "Subsistence and **commercial** fishing for halibut…"

Bristol will make this correction to the text

Page 13—bullet point 1: why is the limit set of 2,000 tons of PCS? How was this determined? What if the amount of contaminated soil exceeds this limit?

Funding determines the tonnage of POL- and PCB-contaminated soil that can be removed during each construction season. If residual contaminated soil exists at the end of a construction season and available funding has been exhausted for the current fiscal year, additional funding for additional contaminated soil removal will be attained the following year.

Page 13—bullet point 2: why is the limit of 2,600 tons of PCB-contaminated soil from Site 13 and 31 set at this level? How was this determined? What if the amount of contaminated soil exceeds this limit?

Please see the response above.

Page 13—bullet point 8: why is the limit set of 1 ton of drums, 50 g of drum liquids, and 50 tons of contaminated soil at the MOC, site 10? How was this determined? What if the amount of contaminated material/soil exceeds this limit?
The extent of the buried drums, drum liquids, and associated contaminated soil at Site 10 is currently unknown. Data gathered during removal this construction season will be used to determine whether or not further future removal is necessary.

Page 13—why aren't the options at the bottom of the page "exercised"? The additional excavation and removal will likely be necessary and should not be optional. Confirmation sampling at Site 28 should also not be optional.
Optional tasks within a contract may or may not be exercised due to a variety of variables including whether or not sufficient funds are available. Confirmation soil samples will be collected following the Phase 1 Sediment Removal at Site 28 based on ADEC input and are subject to available funding this season. Options not exercised on a given contract are typically funded the following season.

Page 14—the Bristol "study" of *in situ* chemical oxidation failed for reasons described by Dr. Scrudato. The method itself is inherently sound and should be used in appropriate areas to remediate POL and PCB contamination.
The in situ chemical oxidation proved ineffective due to the high peat content at the northern edge of the MOC pad area where the primary diesel fuel spills occurred. We have yet to identify large areas with high levels of fuel contamination that don't have peat. Chemical oxidation is not a recommended remedial technique for PCB contamination.

Page 14, Section 3.2.1 para 3 sentence 1. We disagree that the main contaminant of concern at the MOC is DRO. There are also source areas of PCBs, chlorinated pesticides, solvents, and heavy metals. The presence of DRO likely will enhance the mobility of these other contaminants. The DRO and source areas of the other contaminants must be removed. Natural attenuation is not sufficient to protect health and the environment.
Granted, we have determined that significant PCBs exist at the MOC, specifically Site 13; see discussion for Site 13. Contaminants above the State-approved cleanup levels are the contaminants of concern for this project. We are confident that the other contaminants you've mentioned will likely be cleaned up by association.

Page 16, 17—we are not convinced that natural attenuation is progressing sufficiently. Chemical oxidation with methods described by Dr. Scrudato should be used in order to enhance aerobic degradation.
Please see the response above.

Page 17, Section 3.2.2.—Site 13. We need additional evidence to ensure that the removal action will be sufficient to eliminate PCB sources to the Suqi River drainage and Bering Sea.
Section 3 contains site descriptions. More detail regarding field activities is provided in Section 4. Confirmation soil samples will be collected following ongoing PCB-soil excavation at the

MOC. This has been the practice following removal of PCB-contaminated soil during past construction seasons. Confirmation sample results will be included in the Removal Action Report that follows this construction season, which is consistent with the past.

Page 17 and 18, Section 3.2.3.—Site 31. Analyses indicate PCB contamination remains “at a number of locations throughout the excavation.” All PCB contaminated soils should be removed.
Excavation and off-island disposal of PCB-contaminated soil is ongoing at Sites 31 and 13. Our intent is to remove all PCB-contaminated soil above the State-approved cleanup levels.

Page 18, Section 3.2.4—Site 21. We would like to have additional evidence that removal of 100 tons of arsenic contaminated soil will be sufficient to protect health and the environment.
Confirmation soil samples will be collected following excavation of the 100 tons of arsenic-contaminated soil this construction season. Contaminated soil will be excavated up to 2 feet below groundwater in accordance with ADEC requirements. If confirmation samples indicate residual arsenic-contaminated soil exists following excavation of the planned 100 tons, then additional excavation and removal may be planned for next construction season.

Page 19, 20, Section 3.2.5—Site 8. We are concerned that MNA is not sufficient or timely and would like to see removal of contaminated source areas here to prevent downgradient contamination.
2011 sampling results at Site 8 indicated no contaminant concentrations above cleanup levels. Site 8 will be sampled again in 2012 and the results presented in the 2012 Removal Action Report. Continuation or termination of MNA at Site 8 will be discussed with ADEC based on results for samples collected in 2010, 2011, and 2012.

Page 21, 22, Section 3.2.6—Site 28. Corps contractors have not tested for all of the contaminants of concern—should include chlorinated pesticides, PCBS, metals, solvents, and PAHs. [reference to page 13] We are not convinced that removal of 140 bank yards of contaminated sediment is adequate to protect downgradient areas, health and environment. What is the justification for this amount?
COPCs and COCs were determined during the planning stage of the RI/FS phase of the project and are reflected in the proposed plan and decision document prepared for this FUDS.

140 bank cubic yards is a measurable quantity and was considered suitable for the Phase 1 Sediment Removal at Site 28. The purpose of the Phase 1 Sediment Removal at Site 28 is to test various methods of accessing areas for removal of contaminated sediment to determine the most effective and last invasive method(s). It is not anticipated the 140 bank cubic yards of sediment will remove all identified sediment in Site 28. As a result, future sediment removal phases may be necessary.

Page 21—concern that the piping that has not been removed may continue to be a health and safety hazard. All of the pipe should be removed rather than just capped.

The capped pipe was believed to be a drain pipe that originated at Building 110, which was the Heat and Electric Power Building. Removal and disposal of the manhole, the sediment that had accumulated in the manhole, and 63-feet of associated pipe was completed in 2010. The remainder of the pipe was plugged with bentonite and a steel cap was welded over the pipe opening to seal it. The section of pipe that remains in the ground does not pose any known environmental hazard.

Page 59—we are concerned that natural attenuation is not sufficient to protect health and the environment. We also think that the proposed monitoring is not sufficient to assess the long-term effectiveness of the remedial actions. A three-year time span for monitoring is not sufficient. Monitoring should be required for the long term as natural attenuation will take much longer.
USACE intends to develop a table showing what sites will be monitored and their likely review schedule. The table should be completed by the next RAB meeting in Nov or December. USACE intends to structure the monitoring requirements in accordance with ADEC requirements.

Page 59—monitoring wells that are in the footprint of the excavation should be re-installed to assess the effectiveness of the removal actions.
USACE plans to install additional wells at the MOC following completion of soil removal.

Electronic Document Submittal
MED Document Review Checklist

Project Name:	Northeast Cape				
Document Title:	Work Plan, Rev 0				
Document Date:	May, 2012				
Senior Technical Reviewer:					
FRMD Document #:	F10AK096903_07.04_xxxx (0509)_a	☒	Draft	☐	Final
	MED Version	☒	2011	☐	2009

Digital Signatures

Senior Reviewer (Technical):

Senior Reviewer (Document Production):

USACE Reviewer:

COSSABOOM.C.C
AREY.1249354135

Digitally signed by COSSABOOM.C.CAREY.1249354135
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=COSSABOOM.C.CAREY.1249354135
Date: 2012.06.21 14:31:17 -08'00'

Instructions:
Document compliance with the MED by electronically checking the boxes. If a box does not apply, explain in the notes sections why the box was not checked. Include the signed digital form in the root directory of the electronic deliverable and a hard copy.

Technical Review

1. Text and Tables (MED 2011 – Section 2) PM

1.1 ☐ All native files provided
1.2 ☒ All Excel tables have equations/inputs to generate calculated values, not just numbers

Notes:

Missing native files for Ap. F & H, attach. for Ap. A, figs for Ap. E; Ap. C Figs in wrong folder

2. Photos, Images and Audio/Video (MED 2011 - Section 3) EN-EE

2.1 ☐ Select photos incorporated in the report/appendix are supplied in *.jpg or *.tiff format.
2.2 ☐ All photos generated for project are submitted in *.jpg or *.tiff as Supplemental Data
2.3 ☐ Photo Log or Index is provided.
2.4 ☐ Photos are identified with Date/Month/Year, direction of view and description.
2.5 ☐ Audio/Video files provided in (*.wmv) compatible format ☒ Not Applicable

Notes:

N/A

3. Survey (MED 2011 - Sections 5) EN-EE

3.1 Survey planning documents include discussion of:
- ☐ Availability of survey control monuments for project
- ☐ Determination of whether or not OPUS solution and/or new monument is needed for project
- ☐ Survey method, equipment
- ☐ Differential correction approach
- ☐ Approach for documenting accuracy

3.2 ☐ Survey data is supplied in digital format: Excel or ASCI comma delineated

3.3 The following are provided:
- ☐ Survey Data Table
- ☐ Sketches, notes and computations
- ☐ Raw data files (including Tracklogs)
- ☐ PDOP& # of satellites during survey
- ☐ Differentially corrected data files
- ☐ Coordinate System
- ☐ Projection
- ☐ Datum
- ☐ Units of measurements (Feet/Meters)

3.4 ☐ If a monument was set, the information needed to publish the monument with NGS is provided to USACE.
☐ None Set

3.5 ☐ Sufficient information to document data quality (per Section 5.4.1) is provided. (e.g., known points measured multiple times on different days with similar result, tied to published monument, OPUS Solution, etc.)

3.6 ☐ Where existing monuments were measured as part of the survey, the published and measured locations are provided.

3.7 ☐ Professional Land Surveyor stamped and signed the work ☐ Not Required

Notes:

N/A

4. GIS (MED 2011 - Section 6) EN-GES-TI

4.1 GIS planning documents include discussion of:
- ▣ Software to be used to prepare GIS deliverables
- ☐ Spatial data file types
- ▣ Datasets
- ☐ Version of SDSFIE to be followed (e.g., 2.6 or 3.0)
- ▣ Raster data available
- ▣ Anticipated delivery method
- ☐ Anticipated deviations from MED requirements related to GIS (explain in Notes, below)

4.2 ☐ Report includes description of any deviations from MED requirements for GIS.
4.3 ☐ Required and applicable **vector** data submitted.
4.4 ☐ Required vector data fields are populated.
4.5 ☐ Coordinates (positions) are consistent with Survey Data Table.
4.6 ☐ Vector data deliverables comply with SDSFIE Version 2.6 or 3.0 (except Chemistry data).
4.7 ☐ If spreadsheet(s) are used to submit vector data, they are readily importable to GIS software.
4.8 ☐ If shapefiles are submitted for vector data, Cross-Walk table is provided to migrate to SDSFIE 3.0 feature class.

4.9 ☐ Chemistry data is submitted for GIS applications compliant with MED Section 6.2.3.
4.9.1 ☐ Valid Values (VVL) are used
4.9.2 ☐ All applicable fields are populated

4.9.3 ☐ Data consistent with Chemistry Data Deliverables in MED Section 7
4.9.4 ☐ Coordinates consistent with Survey Data Table

4.10 ☐ All **raster** data obtained during the project and used on project for figure preparation and project decision-making is delivered.
4.11 ☐ Required and applicable **metadata** is provided, per MED Table 6-5.

Notes: Include names and date of MED deviation discussions with USACE.

Only 4.1 applies.

5. Maps, Figures and Drawings (MED 2011 - Section 6.3) EN-GES-TI

Note: The terms "map", "figure", and "drawing" are used interchangeably, indicating a graphical depiction of information used in a project deliverable.

5.1 ▣ Drawing file deliverables comply with acceptable software types and versions.
5.2 ☐ Site-scale drawings were generated spatially correct (in real space).
5.3 ☐ Feature locations in drawing files are consistent with surveyed positions (X, Y, & Z).
 ☐ Survey data is included as a separate layer(s) in drawing files.
 ☐ Points (.csv) file is provided if used

5.4 ▣ Figures have a usable scale bar (scale indicated in text is not acceptable).
5.5 ▣ Figures have a North arrow.
5.6 ▣ Autodesk and Bentley (.dwg/.dgn) files include the spatial reference as a note in Model Space.
5.7 ▣ PDF files of figures provided have searchable text.
Minimum requirements:
- Text added by Contractor is searchable.
- Figure number is searchable. "Figure x"
- Sample numbers / Well numbers are searchable.

5.8 ▣ Native files are provided for all maps/figures/drawings in the deliverable (e.g.,Figure"X".mxd or Figure"X".dwg)
5.9 ▣ All files referenced by the drawing files are provided (e.g., vector and raster data files).
5.10 ▣ Relative paths are used in the drawing files for referencing other files.
5.11 ▣ All reference file links are in working order as delivered.
5.12 ▣ All special fonts, lineweights, pen settings used in producing project graphics deliverables are provided.

Notes:

We are currently unable to check 5.2, and 5.3. Spatial reference in paper space OK. Survey positions line item NA for plan doc.

6. Chemical Data (MED 2011 - Section 7) EN-GES-CIH

6.1 ☐ Sample Summary Sheet – identifies all samples collected for project
- Location ID
- Sample Depth
- Sample ID
- Date/Time collected
- Analytical Methods
- Matrix
- Container Type/Volume
- QC (TB, QA, MS/MSD…)
- Laboratory
- SDG #
- Field Preservation
- Cooler Name
- Sample Initials
- Turnaround Time

6.2 COELT – ☒ Not Applicable

- ☐ EDF files for all SDGs in Sample Summary Sheet
- ☐ 6 text files with basic format of NPDL*.txt
- ☐ EDCC 1.2 output for every SDG on the project
- ☐ EDCC 1.2 output is error free

6.3 SEDD – Required for FUDS Projects ☒ Not Applicable

- ☐ XML is required to be well formed. It must pass XML checker; open in Internet Explorer, if an error, then not well formed. (*.dtd and *.xml files must be in same sub-directory and not zipped.)
- ☐ *.xml and *.dtd is required for every SDG in Sample Summary Sheet
- ☐ Passes SEDD checker? Error Free is requirement.

6.4 Chemical Data Tables

- ☐ Analytical Results for all samples in the Sample Summary Sheet
- ☐ Chemical data tables are formatted with analytes on the left, results reported in columns, and blank space minimized
- ☐ Results exceeding Project Limits highlighted
- ☐ ND Results with LOD/LOQs above Project Limits flagged
- ☐ Tables identify the following minimum information:
  - Location ID
  - ClientSampleID
  - Date Collected
  - Matrix
  - Unit
  - Analytical Method
  - Analyte
  - Project Action Limit
  - Result (with correct significant digits)
  - LOD
  - Data Flags

6.5 Analytical Data Packages

- ☐ Digital version of every SDG identified on the Sample Summary Sheet
- ☐ Contains signed COC forms and all required Cooler Receipt Form documentation

Notes:

N/A

Document Production

7. Text and Tables (MED 2011 – Section 2) N/A

7.1 ☐ All native files provided
7.2 ☐ All Excel tables have equations/inputs to generate calculated values, not just numbers

Notes:

8. Photos, Images and Audio/Video (MED 2011 - Section 3) N/A

8.1 ☐ Select photos incorporated in the report/appendix are supplied in *.jpg or *.tiff format.
8.2 ☐ All photos generated for project are submitted in *.jpg or *.tiff as Supplemental Data
8.3 ☐ Photo Log or Index is provided.
8.4 ☐ Photos are identified with Date/Month/Year, direction of view and description.
8.5 ☐ Audio/Video files provided in (*.wmv) compatible format ☐ Not Applicable

Notes:

9. Minimum *.pdf Requirements (MED 2011 - Section 9) PM

9.1 ▣ Complete PDF of report including text, tables, figures, and appendixes/attachments. Separate disks for appendixes not allowed.
9.2 ▣ Bookmarks set for major document sections
9.3 ▣ Bookmarks set for Appendixes and their content
9.4 ☐ Document Properties are properly set
- Document title
- Authoring company
- Fast Web View (yes)
- No Security settings set
- Initial view to first page w/ bookmarks on left

9.5 ▣ All pages are correctly rotated – can read them without rotating them
9.6 ▣ PDF version of the Draft or Final Document in the directory root

TIP: Use the "Save-As" function in Adobe to add Fast View

Notes:

Document Title should be : Year - Document title - Month/Date - FRMD Number.
Title should include "Work Plan"

10. FUDS Specific Requirements (MED 2011 – Sections 8.5 & 10) PM

Draft Documents

10.1 ☐ Placeholder for FRMD/ARIMS number located on the bottom right hand corner of the document and binder cover. (e.g., F10AK999901_xx.xx_yyyy_a)
(200-1e)

10.2 ▣ PDF of entire document is provided in the F10AK*.pdf deliverable

Notes:

You've got the right numbers, but should be generic on the Draft as above.

Final Documents

10.3 ▣ Final deliverables have valid FRMD number on the binder and first page only.
(e.g. F10AK999901_03.10_0500_a) (USACE - Check number again FRMD)

10.4 ▣ Correct ARIMS number (e.g., 200-1e for admin, 200-1f for permanent)

10.5 ☐ PDF Document Properties correctly set

- Title: Year - Document Title – Month/Date - FRMD #
- Author is the company (not a person)
- Tagging is not required but fine if present.

10.6 ▣ Security – No password is required.

10.7 ▣ Content of the entire PDF is searchable (except for the Log Books, weigh tickets, and other poor quality pages). OCR must be attempted on the following commonly missed elements:

- Signature pages
- Scanned forms
- Training Certificates
- Text in ACAD/GIS

Notes:

Document Title should be : Year - Document title - Month/Date - FRMD Number.
Title should include "Work Plan"

11. CD-ROM/DVD/Hard Drive Organization, Packaging and Labeling (MED 2011 - Section 8) PM

TIP: Simplify subfolder structure and names, to avoid truncating file names when copying to USACE network.

11.1 ☐ The longest file path, including subfolder name(s), does not exceed **75 characters**.

11.2 ▣ Appropriate subdirectories are used.

11.3 ▣ A complete PDF of the deliverable and this form are in the root directory.

External CD/DVD cover includes:

11.4 ▣ Contract Number and Delivery/Task Order Number

11.5 ▣ Project name

11.6 ▣ The date on the document

11.7 ▣ The version of the submittal (clearly identifies re-submittals)

FUDS-specific requirements: ☐ Not Applicable

11.8 ▣ FUDS property/project name and number

11.9 ▣ The FRMD number of the submitted document(s) (e.g., F10AK999901_xx.xx_yyyy_0500_a)

11.10 ▣ The ARMIS number (200-1e or 200-1f)

Notes:

File names are too long; consider multiple abbreviations.

STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF SPILL PREVENTION AND RESPONSE
CONTAMINATED SITES PROGRAM

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January 6, 2012

Carey Cossaboom
USACE Alaska District (PM-C)
P.O. Box 6898
JBER, AK 99506-6898

Re: ADEC Approval of the 2011 Northeast Cape (NEC) Excavation and Site Closure Actions

Dear Mr. Cossaboom:

Thank you for providing the Alaska Department of Environmental Conservation's Contaminated Sites program (ADEC) with a copy of the draft Excavation Closure Plan which was a draft work plan addendum to the final 2011 Northeast Cape HTRW Remedial Action (RA) Work Plan. ADEC received the draft closure plan via email on September 21, 2011. Due to time restraints and the onset of increasingly inclement weather, correspondence to determine and implement an ADEC-approved excavation closure plan was conducted via email and telephone communications over a matter of a few weeks during the end of September and the beginning of October 2011.

In the summer of 2011, the Army Corps of Engineers (Corps) awarded a modification to the current contract with the current environmental contractor Bristol Environmental Remediation Services, LLC, which allowed BERS to over winter equipment and excavated contaminated materials at NEC since BERS would be continuing with the ongoing HTRW removal actions in 2012. This letter summarizes the excavation closures and other remedial actions (listed below) which were requested and/or approved by ADEC in October, 2011; and were not included/documented in the ADEC-approved final 2011 NEC RA Work Plan.

1. All 2011 PCB-contaminated Soil Excavations: ADEC requested that the Corps line all surface areas of exposed PCB excavations where contamination levels still exceeded ADEC cleanup levels, and to back fill enough clean material on the liner(s) to keep them in place and secure until the continuation of excavation work (currently planned for the spring of 2012). ADEC also approved the Corps' proposal to encircle

the edges of the open excavation areas with bulk bags filled with contaminated soil in order to form a protective perimeter intended to exclude humans and wildlife from falling into the open excavations. ADEC also approved the Corps to leave these bulk bags on site over the winter. Bags are intended for offsite disposal as soon as spring conditions allow in 2012 (also see #4 below).

2. All 2011 POL-contaminated Soil Excavations: ADEC approved the Corps to place curtain liners at the interface of POL-contaminated soil that remains above the site-specific cleanup level of 9,200 mg/Kg DRO and to backfill the extent the excavation area with clean material (below the cleanup level of 9,200 mg/Kg DRO.
3. All Staged/Stored Bulk Bags at Northeast Cape: ADEC requests that surface soils within all footprint areas of bulk bags (not staged/stored on a concrete pad over the winter of 2011/2012), be sampled for the subject contaminants after removal in the spring of 2012 in the same manner as the Cargo Beach sampling in item 7 below. All observed breaches to bulk bags and/or releases of contents will require further cleanup and confirmation sampling to ensure that no contamination above the ADEC and/or site-specific cleanup levels are left behind.
4. Site G1/H1: ADEC approved the Corps to replace the material (spoils) generated from digging test pits at these sites back into the excavation based on the assertion that no contaminated soil was encountered during excavation of the test pits. ADEC did not concur with nor approve the recommendation that no further excavation occur in this area in the future due to the perched groundwater that was encountered during excavation of the test pits. More information and consideration regarding the hydrology and other dynamics at these sites is required for the purpose of determining the best path forward.
5. Bulk Bags Not Shipped Offsite in 2011: ADEC approved the Corps to stage roughly 400 super sacks (bulk bags) containing either POL- or PCB-contaminated soil at NEC due to the fact that logistics, time constraints, and inclement weather did not allow for all bulk bags to be shipped offsite in the 2011 season. ADEC requested that all bags be labeled and placarded to clearly identify and warn people traveling through the site of the bags' contents.
6. Landowner Concurrence With ADEC-approved 2011 Site Closure Actions: ADEC requested that the Corps inform the landowners in writing of the 2011 site closure actions stated above to determine whether or not they had any objections or concerns to the proposed actions 1-4 above; and that upon confirmation from the Corps of the landowners' approval, ADEC approved the Corps implementing the site closure actions.
7. Cargo Beach (CB) Sampling: ADEC requested as part of the 2011 Work Plan that the Corps conduct post-season characterization sampling of the entire footprint(s) of any area(s) at the CB where contaminated materials were staged, loaded, or off loaded during the 2011 as well as

all future field seasons. Due to the large volume of staged contaminated soil being overwintered at NEC, for which offsite disposal is planned in the spring of 2012, ADEC approved the Corps to postpone the sampling of CB until the loading for offsite disposal is completed in the spring of 2012. ADEC continues to provide input to the Corps on the ongoing development of the draft sampling and analysis plan for CB.

8. Future Reports, Work Plans, Technical Memorandums and Other Documents: The final 2011 NEC Work Plan (submitted to ADEC in September 2011 post contract modification) stated that a final removal action report would be submitted in 2013 with no reference to other work plans or reports. ADEC requests that draft and final documents for all ongoing and future site work at NEC continue to be submitted to ADEC such that ADEC has the opportunity to review, comment, and approve the subject documents prior to any work, changes to work plans, and/or final reporting being implemented.
9. ADEC and the Corps discussed the issues outlined in this letter on Nov. 29, 2011 after the NEC RAB meeting in Savoonga, AK. ADEC informed the Corps that it would not require separate draft and final addendums to the 2011 work plan for the excavation and site closure activities. Instead, it was agreed that this letter would serve as ADEC's formal summarized approval of the 2011 site excavation and closure activities, and that all of the 2011 site work and activities, including all of the excavation and site closure actions would be documented in adequate detail in the draft 2011 NEC Removal Action Report.
10. ADEC requests that this letter be inserted in both the pending draft 2011 NEC RA Report as well as the draft 2012 NEC RA Work and Sampling and Analysis Plans.

Please contact me at 907.269.3053 or curtis.dunkin@alaska.gov if you have any questions regarding this letter.

Sincerely,

Curtis Dunkin

Curtis Dunkin
Environmental Program Specialist

Cc: Molly Welker – BERS – (via email)

Alaska Department of Environmental Conservation (ADEC)
Contaminated Sites Program
Document Reviewed: Draft May 2012 Northeast Cape Removal Action Work Plan
Commenter: Curtis Dunkin-ADEC **Date Submitted:** July 2, 2012 ADEC responses to RTCs noted in red; resubmitted on July 6, 2012 after a comment resolution telephone discussion w/ USACE project manager C. Cossaboom; ADEC responses to additional RTCs on July 11, 2012

Comment#	Page #	Section	ADEC Comment	Response
1.			**Comments on draft 2012 NEC Work Plan Narrative**	
2.	1	Introduction	Bullets outlining the scope of work in this and other sections need to include site 28 sediment sampling and characterization, site 21 surface water sampling, backfilling of excavations where contaminant concentrations remain above ADEC cleanup level(s), off site removal of overwintered sacks containing contaminated soil, miscellaneous correlation sampling, and all other major activities planned for the 2012 RA. RTC in the right column is ADEC-Accepted; however, the tasks which are not scoped for 2012 still require ADEC review and approval prior to implementing therefore the work plan should state addendums to the work plan will be submitted at a later date.	Additional Scope of Work bullet points have been added (e.g., Site 28 & 21). Items not currently part of Scope of Work that will be completed in 2012 will be noted in the final report (e.g., correlation sampling; overwintering of bulk bags). Bristol will plan to make addendums to the Work Plan when additional options and tasks -are funded by the USACE. The addendums will be submitted to the ADEC for approval (7/10/12)**ADEC-Accepted (7-11-12)**
3.	8	2.5	Last paragraph of this section, replace the uses of 'this stream' with 'the Suqitughneq River' or 'the Suqi' or 'this river' for clarity – or are the references to another stream(s) other than the Suqi River?	The text has been changed to "Suqitughneq River". ADEC-Accepted
4.	9	2.8	Rephrase the sentence 'More than 1,000 reindeer…' to state 'A population of approximately 1000 reindeer inhabit the island.'	The text has been changed in accordance with the comment ADEC-Accepted
5.	10	2.8	Add the sand hill crane to avian species known to inhabit the island.	Sandhill Crane was added to avian species ADEC-Accepted

6.	10	2.9	Responses to previous ADEC inquiries re: whether or not Gambell residents inhabit NEC have been that only Savoonga residents are known to visit and temporarily inhabit the NEC area.	There are fewer residents of Gambell coming by NE Cape in the summer, but with snow machines, they all travel far in the winter. They also tend to gather at their own hunting camps. The fish camp at NE Cape is a rest stop. ADEC-Accepted; state this in the narrative
7.	11	2.11	Is Sivuqaq, Inc. associated specifically with Gambell, and are they Gambell Native and Savoonga Corporations or the Native Village of Gambell and NVS?	Sivuqaq, Inc. is the village corporation associated with Gambell. Kukulget, Inc. is the village corporation associated with Savoonga. ADEC-Accepted; state this in the narrative
8.	13	3.0	States that 2,600 tons are scoped for PCB-contaminated soil removal, but later references in the work plan state otherwise (Tables 4-3 and 4-4 page 61). Same comment re: conflicting references to the scoped PCS volumes to be removed throughout the document. See comment #1 above re: other planned 2012 activities.	Text and tables have been corrected and updated through Modification P00001 (27-June-2012) ADEC-Accepted
9.	16	Table 3-1	Insert a footnote for the reference to 'cleanup level' that states 'ADEC Table C Groundwater Cleanup Level'.	Row heading in Table 3-1 has been changed to "ADEC Table C….." ADEC-Accepted

10.	20	3.2.5	References to 'Kg', K should be capitalized (also elsewhere in document). Last sentence of this section needs to better define the conditions under which 'no petrogenic sheen was observed'. Was any sheen and/or odors (biogenic or petrogenic) observed at this site? Have either sheen(s) or odor(s) been previously observed at this site; whether sediments and/or water were or were not disturbed? ADEC-Accepted RTC in right column re: addition to the text; however the current work plan and future documents should also include an explanation in the narrative re: the fuel odor that continues to be '…evident when a person walks across the vegetative mat…' as stated on page 59 of the QAPP.	Bristol uses the proper scientific abbreviation for Kilogram, which is kg. ADEC-Accepted The following text has been added: "There is no record of any biogenic or petrogenic sheen at this location and none were observed during the sample collection. Sediments were not disturbed during the collection of surface water samples." The statement will be added….This vegetation does not appear stressed, though petroleum odor is evident when a person walks across the vegetative mat (7/10/12) **ADEC-Accepted (7-11-12)**
11.	21	3.2.6	Last paragraph on this page, insert '…of 1.5 mg/L.' at the end of the sentence starting w/ 'DRO was detected at…'.	Text has been changed accordingly ADEC-Accepted
12.	22	3.2.6	Include soil samples in the first sentence on this page (soil and sediment samples were collected in 2011). State that contaminant exceedances were observed in sediment and soil samples.	Text has been adjusted accordingly ADEC-Accepted
13.	23	4.0	See comment #1 above.	See response #1 ADEC-Accepted
14.	36	4.2	Clarify why there are two task orders for POL-contaminated soil. See comment #13 above re: conflicting references re: scoped volumes and weights.	Volumes of soil have been updated ADEC-Accepted

15.	37	4.2/Figure 4	Do the polygons for the site 13 excavation as depicted in Figure 4 represent the excavation footprint to date (post 2011 removal activities) or do they represent what is planned/anticipated for 2012? Per the 2011 report and recent discussion at the May 16, 2012 technical planning meeting, ADEC's understanding is that the site 13 excavation has not yet entered any POL plumes; only that the NW corner was approaching plume A2. Figure 4 also depicts the site 13 excavation with encroachments on the B1 and B2 plumes. The 'proposed excavation area' depiction in Figure 4 should be clarified in the legend whether this represents the original estimated boundary of the plume or the proposed area of work for 2012. These issues need to be clarified in all associated figures and narrative sections where applicable. Last sentence of third paragraph on this page needs to be rephrased; PCBs are the driving contaminant of concern in regards to waste disposal requirements therefore soils contaminated with both POL and PCBs above cleanup levels must be screened, removed, and disposed of based on PCB concentrations. Also state for clarification that once confirmation samples indicate that PCB concentrations in remaining soils are below the cleanup level, that remaining POL-contaminated soils adjacent to the PCB site will be screened, removed, and disposed of based on POL criteria only. Last paragraph of page 37, more discussion is required re: the status of and any planned 2012 work associated w/ plume J1A. RTC in the right column re: figure revisions is ADEC-Accepted; please provide ADEC with copies of the revised figures for review and approval prior to submitting a revised copy of the work plan. Note: ADEC also submitted separate comments on just the work plan figures which should also be addressed and submitted to ADEC for review and approval prior to submitting a revised copy of the work plan.	All figures have been updated to better indicate existing vs. proposed excavation areas. Text has been added detailing the nature of PCBs vs. POL soils at Site 13 ADEC-Accepted As discussed during the NE Cape UFP-QAPP meeting, there are no plans to reopen the excavation at J1A. The remaining contamination is in wetland/tundra areas off of the pad. ADEC-Accepted; state this in the work plan for clarity; the only reference to J1A in the narrative is 'excavation was initiated in 2011'. Text will be clarified to state that at this time there are no plans to reopen and excavate more soil at J1A. **ADEC-Accepted (7-11-12)** Revised figures sent to ADEC on 7/9/12 and revisions to figures suggested by ADEC will be incorporated into the next revision of the figures (7/10/12). **ADEC-Accepted (7-11-12)**

16.	38	4.2	Second to last paragraph on this page, state the purpose of surface water sampling. More detailed information should be stated re: how long before, when during, and how long after excavation activities occur/have occurred. Re: clarification questions in comment #15 above related to depictions of excavation footprints and proposed excavation areas in Figure 4 (and other Figures) are the I plumes proposed to be excavated in 2012? If so, then more sampling locations need to be proposed that are further down gradient of the currently depicted locations prior to and in situ of the excavation reaching the depicted 'ponding' area(s). More frequent monitoring and sampling of the down gradient surface waters is necessary during excavation activities associated with the MOC plumes. Narrative needs to include more discussion re: the response plan in the event contaminant migration is observed. Re: the discussion of time constraints and end of field season, more discussion is necessary re: the potential risks (contaminant migration, erosion, etc.) associated with over wintering an open excavation near areas with shallow groundwater and/or surface waters (specifically the site 28 drainage) and how those risks will be mitigated. RTC in the right column does not adequately address ADEC's comments. Note: after a comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012, ADEC's concerns were in large part addressed by clarifying that no excavation activities would occur in the I plume in 2012. However, more frequent sampling of the surface waters down gradient of the MOC should be implemented and the work plan should state mitigation procedures in the event contaminant migration is observed. C. Cossaboom (7/6/12) note: Some excavation may occur on the I Plume as indicated in the Bristol RTC. The majority of the I Plume is in wetland area that is not currently slated for excavation.	Text has been added ADEC-Accepted Additional text has been added to further clarify approximate timing. ADEC-Accepted Please see response to #15, additionally, no further excavation of I plume is anticipated with the exception of the small portion remaining on the pad (I1 area) that will not affect the locations of water sample collection points. (no change in text) ADEC-Accepted; clarify in the narrative that the majority of the 'I' plume is in the wetland drainage and is proposed to not be excavated to avoid adverse impacts. This will be clarified in the Work Plan **ADEC-Accepted (7-11-12)** Mitigation procedures will be expanded in the Work Plan to include visual monitoring of increased turbidity and/or effluent that shows up downgradient at the time of the MOC excavation The USACE has agreed to collect additional samples to determine the impact of the effluent to the wetlands (7/10/12). **ADEC-Accepted (7-11-12)**
17.		4.2	This section needs to discuss how G and H plumes will be further investigated to determine whether or not the suspected perched water table, as observed in 2011, is seasonal or year-round	The following information will be added to the Work Plan: In 2011 when excavation began

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			and how contamination associated with these plumes will be addressed (either removal and/or further characterization and monitoring). RTC in the right column does not adequately address ADEC's comments. Note: after a comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012, ADEC and the Corps concurred that further investigation of suspected perched water tables will be necessary. The current work plan section 4.2 nor the QAPP discuss how this issue will be addressed, and instead insinuate that the G&H plumes will be readdressed the same way they were in 2011, except in 2012 to 2ft below the water table. C. Cossaboom (7/6/12) note: May need clarification yet; Work Plans need to state how sampling will proceed where water table prevents further excavation. **ADEC appreciates the 7-10-12 RTC in the right column being added to the narrative and QAPP of the draft work plan; however, the RTC does not address the further investigation requested by ADEC as well as the 7-6-12 request by the USACE above (determine extent and status of suspected perched groundwater, a sampling plan in the event water table is encountered prior to contamination which includes sampling the groundwater and soil above the contaminated horizon(s) as well as digging to the depth of contamination to collect characterization samples, etc.). (7-11-12)**	on the G and H plumes, relatively shallow groundwater infiltrated the excavations. The excavation at the H plume showed groundwater at approximately 5.2 feet bgs. Two UVOST points were installed within the H plume area in 2010, 10NC27 UV-110 and 10NC27 UV-111. UV-110 indicated that DRO contamination exceeding cleanup levels begins at 7.5 feet bgs (based on a 9.2 percent Laser-Induced Fluorescence [LIF] response), and UV-111 did not show indications of contaminants that exceeded cleanup levels until a depth of approximately 10.5 feet was reached. Groundwater infiltrated the excavation at approximately 5 feet bgs in the H plume near UVOST location 10NC27 UV-110. Since the top of the contaminated zone of soil is located approximately 2.5 feet below groundwater in this area, no soil was removed. Likewise at 10NC27 UV-111 (also located within the H plume), the contaminated zone of soil was in excess of 2 feet below groundwater. One

				UVOST point was installed within the G1 plume (10NC27 UV-108) and indicated a contaminated zone located approximately 11 feet bgs. Excavations in and near plume G1 were infiltrated with groundwater at approximately 7 feet bgs. Since the contaminated zone of soil is in excess of 2 feet below groundwater in plume G1, no soil was removed from this location. The depth to contamination in the G2 plume is 8 feet bgs, and excavations encountered groundwater at approximately 7 feet bgs. UVOST locations 10NC27 UV-93 and UV-94 are located within the G2 plume and show a depth to contamination of 8 feet and 9 feet bgs, respectively. No soil was excavated from this area in 2011, but excavation may be possible in 2012 if groundwater conditions are similar or if the groundwater table is lower. (7/10/12). **See Left Column Previous Page (7-11-12)** Based on the Comment Resolution Teleconference Meeting with ADEC and USACE (7/13/12)

				Bristol will collect a sidewall sample above the groundwater and floor samples 2' below the water table if we encounter groundwater in the G&H plumes. These confirmation samples will be collected if groundwater is encountered during the excavation and it is at a level above the targeted contamination layers shown by the UVOST logs in these plumes. These confirmation samples will also be collected if Bristol is able to excavate the contaminated layers in these plumes. No groundwater samples will be collected. A groundwater monitoring network will be installed at the MOC when the soil removal tasks are completed. Bristol will also provide more information on the 12' deep test pit that was dug to determine if we will encounter shallow groundwater again in this area in 2012. A GPS location will be provided and Bristol will document if groundwater fills this test pit, if sheen is observed, and if any odor is detected.

18.	46	4.4	The excavation area of site 21 where contamination exceeding cleanup levels remains at 2 feet below the water table will need to be backfilled with clean material to achieve protectiveness. Confirmation soil samples need to be collected to determine what residual contamination is left in place below 2 feet of the water table. ADEC also requests further investigation of this site (in addition to the ADEC-requested 2012 surface water and confirmation sampling of the contaminated soil/sediment which is left in place 2 feet below the water table) in order to determine whether or not down gradient migration of As is occurring. Future monitoring and/or institutional controls for this site may be necessary. RTC in the right column does not adequately address ADEC's comments. Note: after a comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012, ADEC and the Corps concur that residual contamination left in place two ft. below the water table needs to be sampled and characterized in order to determine further action required to achieve protectiveness at this site. Backfilling should occur after it is confirmed that all contamination down to two feet below the water table has been removed to contaminant concentrations below cleanup level. **ADEC-Accepted (7-11-12); Confirmation samples should be collected as requested in 2012 in the same manner they were collected in 2011 (and this should be detailed in associated sections of the narrative and QAPP of the work plan. ADEC acknowledges the challenges that may be associated with backfilling this site and will discuss further w/ the Corps after review of the 2012 RA report.**	According to the USACE backfilling of Site 21 may occur in the future after the sampling results are evaluated from the confirmation samples collected in 2012. Backfilling Site 21 will require a road/pad be constructed out to the site to allow for a heavy rock truck to reach the site with the clean borrow pit material. In 2011 at Site 21, the confirmation samples were taken from beneath the water table and were collected from the excavator bucket. The excavator pulled up soil from beneath the water, drained the water from the bucket, moved the bucket near the sampler and the sampler took the sample from the bucket. In 2012 contaminated soil will be excavated up to 2 feet below groundwater in accordance with ADEC requirements (7/10/12) **See left column (7-11-12)** Based on the Comment Resolution Meeting with ADEC and USACE on 7/13/12 Bristol will collect floor confirmation samples in the Site 21 excavation area. The backfilling of Site 21 will be delayed until the 2012 confirmation samples are summarized and evaluated.

19.	47	4.5	A sample should also be collected from a location where vegetation is vigorous and does not appear to be stressed. What is meant by 'acknowledged?' RTC in the right column does not adequately address ADEC's comment. Note: after a comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012, ADEC and the Corps concur that two samples should be conducted in locations where vegetation appears to be vigorous and healthy. ADEC's rationale for this is in the event that contaminants are detected at low levels in 'stressed vegetation areas' but not exceeding cleanup levels, that any detections in soil sample results from 'non-stressed vegetation' locations could provide a correlation. ADEC understands that conditions might be such that the project team could observe no discernible differences in vegetative vigor associated with the site.	Comment acknowledged. Bristol will modify the Work Plan to include the information in this comment related to collecting 2 samples where the vegetation is vigorous and does not appear stressed (7/10/12). **ADEC-Accepted (7-11-12)**
20.	48	4.6	The stated definition of sediment needs to be changed to '…naturally occurring mineral and organic material found at the base…'. Organic material needs to be defined as not including actively growing vegetation or the vegetative mat. State that the mineral material atop the vegetative mat will be considered soil (in addition to not being considered sediment). Re: RTC in the right column - Note: after a comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012, ADEC and the Corps concur that ADEC's requested definition revision of sediment will be utilized. Sediment will be defined as: all loose mineral and organic material that is not actively growing vegetation or part of the vegetative mat. ADEC's rationale is that significant contaminant concentrations in loose organic sediment could be overlooked if only 'mineral' sediment is addressed for characterization and removal.	The definition of sediment was specifically called out in Bristol's SOW from USACE; therefore the USACE will have to agree to this additional information for the definition of sediment. The Work Plan will be modified to include the definition of sediment as suggested in this comment (7/10/12) **ADEC-Accepted (7-11-12)**

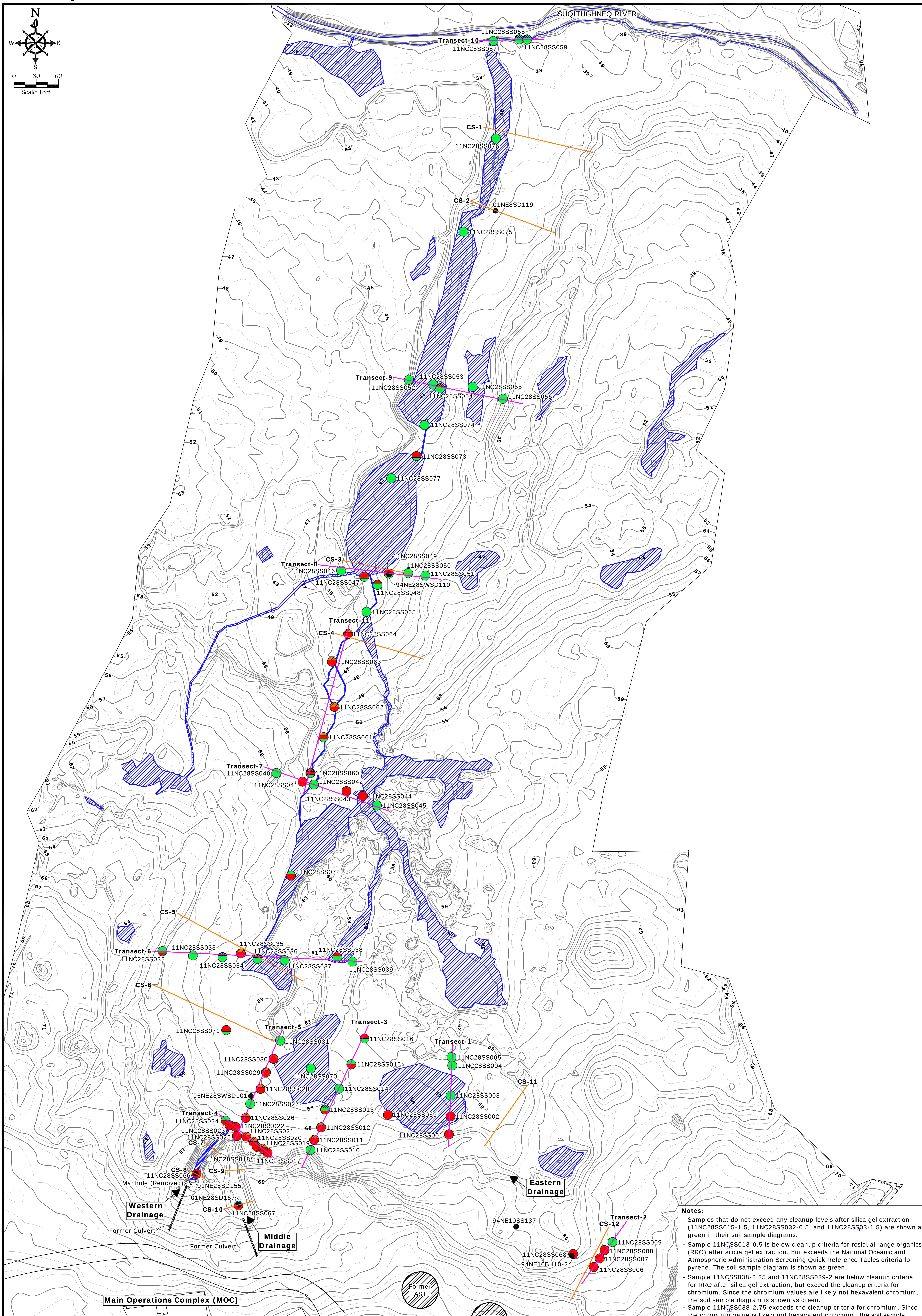
21.		4.6	State the number/ration of silica gel cleanup samples that are proposed. It should be discussed in the narrative that the referenced 'historically contaminated locations' were part of transect sample lines which were conducted to characterize sediment in general areas throughout the drainage, and not to thoroughly characterize all of the sediment within the drainage. It needs to also state that the proposed 54 sediment samples collected at the proposed sampling intervals (stream and pond) may not be sufficient to adequately characterize all the sediment throughout the drainage. Pond sample densities and locations should be based on two criteria: 1) the surface area of the pond and 2) the amount of sediment within the pond's surface area (as determined from the mapping results) – not just three samples per pond. RTCs in the right column pertaining to all of ADEC's comments in this section - Note: after a comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012, ADEC and the Corps concur that the Site 28 mapping, sampling, and removal action should be done in three separate stages in the 2012 season, which should build upon each other to approve the effectiveness of the remedial effort. ADEC tentatively approved the mapping effort for site 28 to be implemented by the field team on July 6, 2012 via email to the project team and that the mapping effort incorporate the agreed upon definition of sediment as discussed in comment #20 above. ADEC requests that addendums to the work plan be submitted to the project team for review and ADEC approval for the sediment sampling effort (after the results of the mapping effort are made available to the project team for review via a technical memorandum); and similarly an addendum to the work plan be submitted for the phase I sediment removal after the sediment sample results are made available to the project team for review via a technical memorandum. **ADEC Accepted; however, ADEC requests that the mapping results be provided to the project team for review to allow for inputs to the decisions for determining the sediment sampling locations due to the many unknowns (i.e. concentrations of sediment and their locations, proximity of larger concentrations of sediment to areas known to be contaminated, etc.). (7-11-12)**	Text has been changed to include frequency of silica gel cleanup samples ADEC-Accepted; state the frequency. Frequency will be stated (7/10/12). **ADEC-Accepted (7-11-12)** The following text has been added: "Transect lines were placed to include areas of historical contamination and were analyzed to gain a general understanding of the potential contaminants throughout the drainage and did not result in a full characterization of the drainage system." The number of samples and locations will be determined after the sediment mapping is completed. At least 54 samples will be collected. All mapping and sample results will be sent to ADEC for approval prior to the sediment removal task which will be described in an addendum to the Work Plan and in the addendum to the Site 28 Technical Memorandum. Please note that at this time the current SOW & Bristol's plan is to perform mapping and sediment sampling prior to production of the technical memorandum addendum. (7/10/12) **See Left Column (7-11-12)**

				Based on the Comment Resolution Meeting on 7/13/12 with USACE and ADEC Bristol has been approved to collect sediment samples to characterize the sediment that will allow Bristol to provide a map of the sediment areas and sample results to the ADEC and USACE prior to the Phase 1 Sediment Removal effort.
22.		4.7	ADEC will submit comments within the week of July 2, 2012 on section 4.7 and 4.7.1 and related activities. ADEC has numerous comments and questions on the activities and methods proposed in this work plan.	Acknowledged Please see RTC # 21 above re: Site 28 Drainage Remedial Actions **ADEC-Accepted (7-11-12)**
23.	54	4.8.1	The DUs should be sampled at 50 incremental units. The northern boundary of the Cargo Beach sampling effort should encompass the entire area that has been previously used as a staging/transport area. No sampling depth is stated. State the COC's based on historical activity at the site and the laboratory analysis analytes.	Text changed to read "approximately 50 incremental units…." As well as sample depth. Northern boundary definition encompasses the entire area that has been previously used as a staging/transport area ADEC-Accepted; state the sampling depth and COCs
24.	55	4.8.2	Same as comment # 54 re: No sampling depth, COCs, proposed sample analytes, etc.	See #23 response ADEC-Accepted; state the sampling depth and COCs
25.	56	4.8.3	Same as comments # 54 and 55 above.	See #23 response ADEC-Accepted; state the sampling depth and COCs

26.	56	4.9		Has previous site characterization confirmed that POL contaminants are the only COC's? If so state and reference this. If not, other COCs should be screened and sampled for both characterization and confirmation. Is there a maximum volume of contaminated soil scoped for this site in 2012? RTCs in the right column - Note: after a comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012, ADEC and the Corps concur that because of the unknowns, regardless of what drums and/or stained soil are/are not observed and/or removed from the site, because no previous investigation has occurred, the entirety of what is considered/agreed to be the footprint of site 10 requires soil characterization sampling for the full suite of contaminants. Further characterization and subsequent confirmation samples will be required if contamination is discovered and removal activities are required. Since ICs are not proposed for this site at this time, it is not acceptable to only sample any drum liquids for just POL and metals and to remove any stained soil; and for that to be the basis for determining future actions. C. Cossaboom (7/6/12) note: The drums found in 2011 were at the boundary of Sites 10 and 11. The Corps agrees that soil should be tested in this area where drums are discovered and excavated, for a full suite of potential contaminants. Site 10 has had previous investigation. There are no current plans to re-investigate the entirety of Site 10.	An area of surface soil contamination was documented in 1994 along the western edge of the gravel pad at the Site 10 Buried Drums site. The maximum concentration of DRO was 26,500 mg/kg. Additional surface soil samples were collected in 1996 and the maximum DRO was 17,000 mg/kg. Soil borings were completed in 2004 and demonstrated that subsurface soils are not significantly impacted; the maximum DRO result was 619 mg/kg. The extent of the buried drums, drum liquids, and associated contaminated soil at Site 10 is currently unknown. Data gathered during removal this construction season will be used to determine whether or not further removal is necessary in the future. The maximum volume of contaminated soil removal scoped for this site in 2012 is 50 tons. Soil confirmation samples will be collected and analyzed for a full suite of potential contaminants (GRO/BTEX; DRO/RRO; PAHS, PCBs, and metals) (7/10/12) **ADEC-Accepted; all of this info should be included in the narrative and QAPP of the work plan (7-11-12)**

27.	57-59	4.10	Surface water and soil samples should be collected in the order beginning with the most down gradient (LDU) in an upgradient direction towards the UDU.	Noted and text added ADEC-Accepted
28.	59	4.12	Narrative should state that ADEC has requested that any abandoned/demolished monitoring wells will be reinstalled as soon as site conditions allow.	USACE plans to install additional wells at the MOC following completion of soil removal ADEC-Accepted; state this in the narrative
29.	60	4.13	Corps of Engineers confirmed to ADEC that the holes remaining after stump removal are not backfilled with new material, rather the soil and material that comes out of the hole when removing the stump is put back in the hole. Narrative should briefly state this.	Text added accordingly ADEC-Accepted
30.	62	4.15	Include addendums and technical memorandums.	Addendums and memorandums are mentioned in the last paragraph of 4.15 ADEC-Accepted
31.	69	5.2.4	The names and qualifications of the two laboratory analysts for the field lab should be included.	Names and qualifications will be added ADEC-Accepted
32.	73	7.0	State the 2012 reporting deliverables and target dates.	Additional deliverable dates have been added. ADEC-Accepted
33.			**End of ADEC Comments on NEC Work Plan Narrative (except for sections 4.7 and 4.71 of the work plan narrative, which along with and ADEC comments on the work plan figures and UFP-QAPP will be submitted separately) within the week of July 2, 2012. Note: many of ADEC's remaining comments which pertain to the QAPP portion of the work plan have been addressed as a result of the comment resolution telephone discussion w/ the Corps project manager C. Cossaboom on July 6, 2012. ADEC will submit any remaining comments that are not addressed via ongoing resolution of these and other comments and responses to RTCs already submitted if necessary prior to finalizing the work plan.**	

User: NPEACOCK Jan 30, 2012 - 11:53am
Drawing: O:\JOBS\34110008 2011 NE CAPE\ACAD-ENVIRO\FIGURES-OCT2011\34110008-FIG6-OCT11.DWG - Layout: 34110008-FIG6-OCT11
Xrefs: None - Images: None



Notes:
- Samples that do not exceed any cleanup levels after silica gel extraction (11NC28SS015-1.5, 11NC28SS032-0.5, and 11NC28SS03-1.5) are shown as green in their soil sample diagrams.
- Sample 11NCSS013-0.5 is below cleanup criteria for residual range organics (RRO) after silicia gel extraction, but exceeds the National Oceanic and Atmospheric Administration Screening Quick Reference Tables criteria for pyrene. The soil sample diagram is shown as green.
- Sample 11NCSS038-2.25 and 11NC28SS039-2 are below cleanup criteria for RRO after silica gel extraction, but exceed the cleanup criteria for chromium. Since the chromium values are likely not hexavalent chromium, the soil sample diagram is shown as green.
- Sample 11NCSS038-2.75 exceeds the cleanup criteria for chromium. Since the chromium value is likely not hexavalent chromium, the soil sample diagram is shown as green.

Legend

- historical sample location
- surface water
- Transect-1 — 2011 transect location and identification
- CS-1 — 2001 historical transect location and identification
- no soil analytes detected above cleanup levels
- no sediment analytes detected above cleanup levels
- soil exceeding cleanup level of one or more analytes
- sediment exceeding cleanup level of one or more analytes
- sediment non-detect result exceeds cleanup level for one or more analytes
- ponded water
- secondary contours
- primary contours
- 11NC28SS067 — sample identification
- AST — above ground storage tank

Soil Sample Diagram:
- Shallow sample depth
- Middle sample depth
- Deep sample depth

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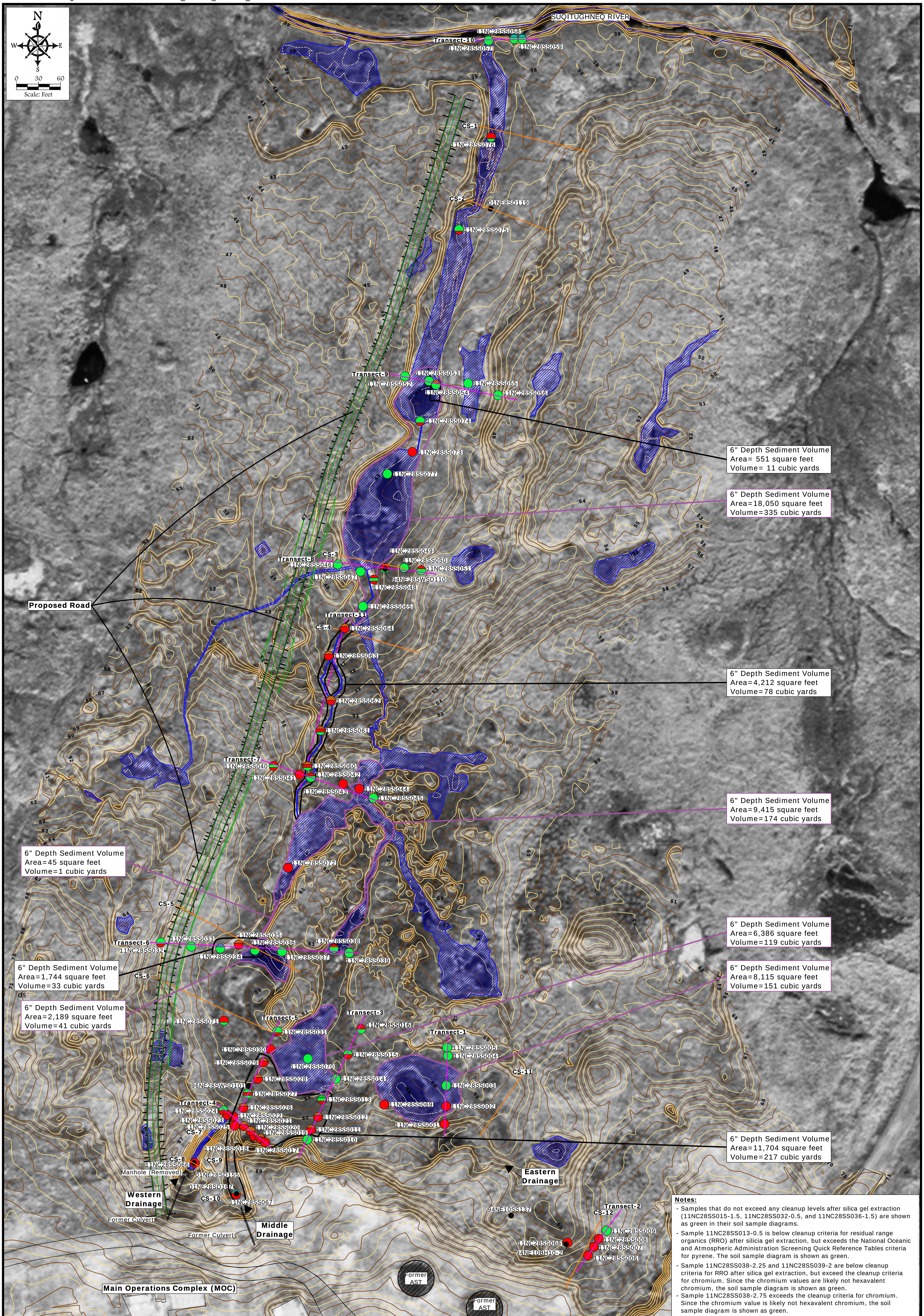
Project No. 34110008

FIGURE 6
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NE CAPE HTRW REMEDIAL ACTIONS
FUEL CONSTITUENTS EXCEEDING CLEANUP LEVELS

SCALE: 1" = 60'	DESIGNED:	CHECKED: MW	DRAWN: MTG	DATE: 10/11/11

User: MGARCIA Feb 28, 2012 - 3:35pm
Drawing: O:\JOBS\34110008 2011 NE CAPE\ACAD-ENVIRO\FIGURES-OCT2011\34110008-FIG17-OCT11.DWG - Layout: 34110008-FIG17-OCT11
Xrefs: None - Images: EASTCAPE-STLAWRENCE_ORTHO_MOSAIC_AK83-9F.TIF



Notes:

- Samples that do not exceed any cleanup levels after silica gel extraction (11NC28SS015-1.5, 11NC28SS032-0.5, and 11NC28SS036-1.5) are shown as green in their soil sample diagrams.
- Sample 11NC28SS013-0.5 is below cleanup criteria for residual range organics (RRO) after silicia gel extraction, but exceeds the National Oceanic and Atmospheric Administration Screening Quick Reference Tables criteria for pyrene. The soil sample diagram is shown as green.
- Sample 11NC28SS038-2.25 and 11NC28SS039-2 are below cleanup criteria for RRO after silica gel extraction, but exceed the cleanup criteria for chromium. Since the chromium values are likely not hexavalent chromium, the soil sample diagram is shown as green.
- Sample 11NC28SS038-2.75 exceeds the cleanup criteria for chromium. Since the chromium value is likely not hexavalent chromium, the soil sample diagram is shown as green.

Legend

- historical sample location
- surface water
- Transect-1 — 2011 transect location and identification
- CS-1 — 2001 historical transect location and identification
- no soil analytes detected above cleanup levels
- no sediment analytes detected above cleanup levels
- soil exceeding cleanup level of one or more analytes
- sediment exceeding cleanup level of one or more analytes
- sediment non-detect result exceeds cleanup level for one or more analytes
- ponded water
- secondary contours
- primary contours
- 11NC28SS067 — sample identification
- AST — above ground storage tank

Soil Sample Diagram:

- Shallow sample depth
- Middle sample depth
- Deep sample depth

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FIGURE 17
NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA
NE CAPE HTRW REMEDIAL ACTIONS
SITE 28 POTENTIAL SEDIMENT REMOVAL AREAS, ESTIMATED VOLUMES, AND POTENTIAL ROAD LOCATION

SCALE: 1" = 60'	DESIGNED:	CHECKED: MW	DRAWN: MTG	DATE: 10/11/11