REMOVAL ACTION WORK PLAN

Revision 1 (Final)

Bethel BIA HQ and
Bethel Airport – Infantry Area
NALEMP Sites Bethel, Alaska

Cooperative Agreement No. NALEMP-FY17-09

February 2018

Prepared for:

Orutsararmiut Native Council
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ACRONYMS AND ABBREVIATIONS

′	minutes
″	seconds
°	degrees
°F	degrees Fahrenheit
ACD	Alaska Community Database
ANCSA	Alaska Native Claims Settlement Act
BD	building debris
BIA	Bureau of Indian Affairs
BNC	Bethel Native Corporation
Bristol	Bristol Environmental Remediation Services, LLC
CA	Cooperative Agreement
CAA	Civil Aeronautics Authority
CESQG	conditionally exempt small quantity generator
CFR	Code of Federal Regulations
CON/HTRW	containerized hazardous, toxic, and radioactive waste
DoD	U.S. Department of Defense
DR	debris removal
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FUDS	Formerly Used Defense Site
GPS	Global Positioning System
HQ	headquarters
HTRW	hazardous, toxic, and radioactive waste
NALEMP	Native American Lands Environmental Mitigation Program
North Wind	North Wind, Inc.
ONC	Orutsararmiut Native Council
PM	Project Manager
SA	site assessment
SOW	Scope of Work
SPIP	Strategic Project Implementation Plan

ACRONYMS AND ABBREVIATIONS (continued)

USACE	US Army Corps of Engineers
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
WP	Work Plan
WRCC	Western Regional Climate Center

APPROVALS

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

Mary Matthias
ONC NALEMP Coordinator

3-1-2018
Date

Tyler Ellingboe
Bristol Project Manager

1 March 2018
Date

1.0 INTRODUCTION

Bristol Environmental Remediation Services, LLC (Bristol), has prepared this *Removal Action Work Plan* (WP), under the direction of the Orutsararmiut Native Council (ONC), in accordance with the Notice to Proceed received on January 3, 2018. The scope of work (SOW) is being funded by the U.S. Department of Defense (DoD) under the Native American Lands Environmental Mitigation Program (NALEMP). NALEMP is administered by the US Army Corps of Engineers (USACE) for the DoD through Cooperative Agreements (CAs) with federally recognized tribes. This work is being performed under CA No. NALEMP-FY17-09.

The purpose of this WP is to establish field procedures for the performance of military surface debris removal action activities scoped for the Bethel Bureau of Indian Affairs (BIA) Headquarters (HQ) and Bethel Airport – Infantry Area sites, which are located on land owned by the Bethel Native Corporation (BNC) in Bethel, Alaska.

This WP will be submitted to the USACE Alaska District for review, comment, and approval. Responses to USACE comments on the Draft WP will be included in Appendix A of the Final WP.

1.1 ORGANIZATION OF THE WORK PLAN

This WP is divided into the following six sections:

- **Section 1.0 – Introduction** introduces the project, provides a brief summary of the NALEMP program, and provides the organizational layout of this WP.
- **Section 2.0 – Site Description and History** details general site location and climate, ecology and geology, tribal history, DoD sites of potential contamination, land ownership, and land use.
- **Section 3.0 – Objectives and Scope of Work** presents the project objectives and SOW. This section also outlines project organization, responsibilities, and includes the proposed project schedule.

- **Section 4.0 – Removal Action Activities** discusses site-specific military surface debris removal activities planned for the Bethel BIA HQ and Bethel Airport – Infantry Area sites.
- **Section 5.0 – Reporting** describes the project reporting efforts that will be conducted to document the field effort.
- **Section 6.0 – References** lists all references used in the preparation of this WP.

2.0 SITE DESCRIPTION AND HISTORY

The following section includes discussion of site location and climate, ecology and geology, tribal history, DoD sites of potential environmental contamination, site assessments (SAs), previous environmental site work and activities performed to date, land ownership, land use, and site regulatory status.

2.1 LOCATION AND CLIMATE

Bethel is located near the mouth of the Kuskokwim River, 40 miles inland from the Bering Sea (Figure 1). Bethel lies in the Yukon Delta National Wildlife Refuge, 400 air miles west of Anchorage, at approximately 60.7922 North Latitude and -161.75583 West Longitude. The area encompasses 43.8 square miles of land and 5.1 square miles of water. Bethel is accessible only by air and river (North Wind, Inc. [North Wind], 2015). The population of Bethel is approximately 6,378 as of the 2016 U.S. Census Annual Estimates of the Resident Population (*Alaska Community Database [ACD*], accessed July 2017 [ACD, 2017]).

Bethel falls within the western transitional climate zone, characterized by tundra interspersed with boreal forests. The average temperatures for Bethel range from a high of 62.6 degrees Fahrenheit (°F) in July to a low of -8°F in January. The average total precipitation has been documented as 17.4 inches. The average total snowfall has been documented as 55.7 inches. (Western Regional Climate Center [WRCC, 2016]).

2.2 ECOLOGY AND GEOLOGY

The topography of the Bethel area can generally be described as flat with surrounding water, swamps, and wetlands. The primary vegetation type is wet tundra with grasses, numerous shrubs, bushes, and some trees. The low-growing tundra shrub thickets consist of dense growths of alder, willows, and resin birch, primarily along the Kuskokwim River. Moist tundra is also present consisting of sedges, scattered willows, and dwarf birches

(Dorava and Hogan, 1995). The area is home to animals such as moose, caribou, brown bear, red fox, gray wolf, and a variety of furbearers and rodents (U.S. Fish & Wildlife Service [USFWS], Yukon Delta National Wildlife Refuge website accessed January 2017, [USFWS, 2014]).

Bedrock exposures in the Bethel area consist mainly of volcanic and sedimentary rocks and lie southeast of the city of Bethel near the Kuskokwim and Kilbuck Mountains (Dorava and Hogan, 1995). However, little data is available detailing the depth to bedrock in the Bethel area (North Wind, 2015).

2.3 TRIBAL HISTORY

Bethel was first established by the semi-nomadic Yup'ik Eskimos, who called the village "Mumtrekhlogamute," meaning "Smokehouse People". There were 41 people in Bethel during the 1880 U.S. Census. At that time, it was the Alaska Commercial Company Trading Post. The community was moved to its present location due to erosion at the prior site. A post office was opened in 1905. Before long, Bethel was serving as a trading, transportation, and distribution center for the region, which attracted Natives from surrounding villages. The traditional Yup'ik Eskimo practices and language remain predominant in the area. Subsistence activities and commercial fishing are major contributors to residents' livelihoods (ACD, 2017).

2.4 DOD SITES OF POTENTIAL CONTAMINATION

The military buildup in Alaska that was part of, and subsequent to World War II, resulted in several strategic military sites being built in the Bethel area. These military sites were active for almost 20 years, resulting in numerous adversely impacted sites associated with various military infrastructure. As a result of these activities, several sites in the Bethel area were identified as having adverse tribal economic, social, and/or cultural welfare effects. In addition to being a safety hazard, these sites are believed to have caused adverse

impacts to the environment, and are potential risks to public health. Specific sites and impacts of concern to the ONC are discussed below.

2.4.1 Bethel BIA HQ

The Bethel BIA HQ site is located approximately three miles west of the City of Bethel and the Kuskokwim River. The approximate point location is 60 degrees (°) 46 minutes (′) 42.74 seconds (″) north latitude, 161° 52′ 52.23” west longitude (Figure 2). The U.S. Air Force (USAF) used the site for the Bethel Air Force Station and a White Alice station from 1950 to 1979. The BIA used a portion of the site for their Bethel headquarters; however, the area they used is not eligible for NALEMP because that land is now owned by the USFWS and part of the Yukon Delta National Wildlife Refuge. Although there has been remedial work performed by the USAF, USFWS, and the USACE on the 45-acre parcel owned by the USFWS, no work has been performed on the rest of the site owned by BNC. There is approximately 500 cubic yards of surface debris in the southwest quadrant of the 275 acres of the original BIA withdrawal (Figure 2). The surface debris consists of lumber, roofing materials, scattered 55-gallon drums (mostly empty), and miscellaneous metallic debris such as pipes and fencing (DoD, 2017).

2.4.2 Bethel Airport

The Bethel Airport site is located 1 mile southeast of the City of Bethel across the Kuskokwim River. The approximate point location for the site is 60° 44′ 51.79″ north latitude and 161° 42′ 00.16″ west longitude. The Army used the airfield to service transient aircraft during World War II. The installation consisted of 289 buildings, a 3.5 mile power distribution system, a 1.1 mile water system, and a 0.9 mile sewer system. Subsequent to Army use, the Civil Aeronautics Authority (CAA) operated the Bethel Airport as a commercial airport. The area of CAA operations was restricted to the airfield terminal area; most of the Army facilities were never used by CAA. The USAF used the property as an Aircraft Control and Warning Site from 1951 to 1955. The USAF built additional

improvements such as antenna towers, underground fuel pipeline, and overhead electric distribution line and sewer system (DoD, 2017).

The Federal Aviation Administration (FAA) continued commercial use of the airfield during Air Force use. Based on a historical photograph analysis by the Army Geospatial Center and a Preliminary Assessment prepared by the Rock Island District for the Bethel Airport Formerly Used Defense Site (FUDS) project, the CAA/FAA operations were restricted to the terminal area adjacent to the airfield. Impacts in the terminal area are not eligible for NALEMP because they are not of DoD origin. The remainder of the site was used solely by the army and USAF, and the impacts there are of DoD origin (DoD, 2017).

In 1995, approximately 3,000 asphalt-filled drums were removed from the bank of the Kuskokwim River at the former Bethel Airport by the USACE under the FUDS program. Also under the FUDS program, the USACE filled several open wells, mechanics pits, and an exposed underground storage tank, as well as removed barbed wire, under a building debris/debris removal (BD/DR) project at the former Bethel Airport in 1998. The USACE is currently conducting a remedial investigation at the Bethel Airport site under the FUDS program to determine if contamination is present in the soil or groundwater there (DoD, 2017).

There are approximately 500 cubic yards of surface debris consisting of Quonset hut frames, vehicle bodies and parts, 55-gallon drums (mostly empty), and concrete foundations, on approximately 100 acres within the Bethel Airport site that comprises the former Infantry Area (Figure 3) (DoD, 2017).

2.5 SITE ASSESSMENTS

The first phase of the NALEMP process is a discovery report written by either the tribe, public, USACE, or Office of the Deputy Undersecretary of Defense detailing reported potential impacts. SAs are the second phase of the NALEMP process. SAs consist of three

steps. Step I consists of performing records research, completion of a technical report summarizing research findings, and when possible, making a determination on NALEMP eligibility. Step II includes conducting a site visit and assessing the property. Step III consists of completion of a Draft Site Assessment Report, which describes findings of the record research and the site visit.

The Bethel BIA HQ and Bethel Airport – Infantry Area sites have had Step III SAs, and have been determined to be NALEMP-eligible.

Additional information on sites of documented and/or potential impacts has been entered into the Native American Management System for Environmental Impacts website (https://namsei.com) by the ONC. The provided information was accessed by Bristol during the preparation of the *2017 Strategic Project Implementation Plan (SPIP)* (Bristol, 2017).

2.6 PREVIOUS TRIBE-PERFORMED ENVIRONMENTAL SITE WORK TO DATE

To date, the ONC and the BNC have not performed any cleanup or debris removal activities at the sites presented in this WP; however, it should be noted that the ONC is currently scoped and funded to perform surface debris removal at the Bethel BIA HQ Site and the Bethel Airport - Infantry Area Site under the FY17 CA. The FY17 CA was awarded on 20 June 2017, and the period of performance is 29 September 2017 through 27 September 2019. The FY17 CA includes the removal of up to 500 cubic yards of surface debris from the Bethel BIA HQ as well as the removal of up to 500 cubic yards of surface debris from the Bethel Airport – Infantry Area Site.

2.7 ACTIVITIES PERFORMED TO DATE

The Bethel BIA HQ and Bethel Airport sites have an extensive remedial history including SAs, Site Investigations, and RAs including BD/DR. Various hazardous, toxic, and radioactive waste (HTRW) and containerized HTRW (CON/HTRW) projects have also

been performed at the BIA HQ and Bethel Airport sites. Appendix B provides summaries of previous SA, site investigations, BD/DR, HTRW, and CON/HTRW historical information of the Bethel BIA HQ and Bethel Airport Sites.

2.8 LAND OWNERSHIP

ONC is a Federally Recognized Tribe, and is also on the list of Native entities within the State of Alaska.

The sites of concern listed in the *2017 SPIP* (Bristol, 2017) are located on either Alaska Native Claims Settlement Act (ANCSA) lands or Native allotments. Table A-1 in Appendix A of the *2017 SPIP* (Bristol, 2017) lists all of the ONC NALEMP sites of concern as well as the current landowner. ANCSA lands are those held by the BNC. Lands held by BNC are privately owned by the Tribe. The BNC is the current owner of the Bethel BIA HQ and Bethel Airport – Infantry Area sites.

2.9 LAND USE

The Bethel NALEMP sites of concern identified in the WP were used by local tribal members for subsistence food gathering and hunting purposes prior to DoD use. All of the sites identified are currently being used for traditional cultural activities such as subsistence food gathering, the gathering of herbs and medicines, hunting, fishing, food preparation and winter storage, wildlife habitat, residential, and/or for recreational purposes.

2.10 SITE REGULATORY STATUS

The ONC site does not currently generate hazardous waste and would currently be considered a conditionally exempt small quantity generator (CESQG) under Resource Conservation Recovery Act regulations. Planned field activities may generate small volumes of regulated waste materials. If non-exempt hazardous waste materials are generated in volumes that exceed the CESQG limit of 100 kilograms (220 pounds) during

any one calendar month, then the ONC will become either a small or large quantity generator based on the volume of hazardous waste generated. If the CESQG limit of hazardous waste generated at the site is exceeded, then a unique U.S. Environmental Protection Agency (EPA) identification number will be required prior to the shipping of any hazardous waste off site.

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3.0 OBJECTIVES AND SCOPE

The objective of the project is to perform a limited removal action to remove approximately 500 cubic yards of surface debris per site from the Bethel BIA HQ and Bethel Airport – Infantry Area. The surface debris was identified during the 2017 field effort, and as identified in the *SPIP, Revision 2 (Final)* (Bristol, 2017) that was prepared for ONC. The Bethel BIA HQ and Bethel Airport – Infantry Area sites are shown on Figure 1. The tasks listed in the current SOW are intended to address the items and quantities anticipated based on current site knowledge. SOW task descriptions are listed in Table 3-1.

Table 3-1 SOW Task Descriptions

Task No.	Task Name and Description
1	**Project Management** – Provide overall project management, including scheduling, management of project staff, and coordination of vendors and subcontrators during the project.
2	**Planning** – Preparation and submittal of a removal action WP to guide scoped field tasks. Components of the WP will include SOW and project objectives, Site Safety and Health Plan, and removal action activities.
3	**Mobilization and Demobilization** – Mobilize and demobilize the project team, equipment, and supplies to and from the sites.
4	**Surface Debris Removal, Transportation, and Disposal (maximum quantity – 500 cubic yards per site)** – Excavate, transport, and dispose of up to 500 cubic yards of surface debris per site (Bethel BIA HQ and Bethel Airport – Infantry Area). If suspect debris or visually stained soils are encountered, ONC must contact USACE for further instructions because soil and water sampling is not being scoped for in the CA. Site work includes surface debris removal. This task also includes performance of utility locates and coordination of field activities.
5	**Reporting** – Reporting of field activities will be documented in a field logbook. Additional reporting requirements will include a removal action report. The removal action report will include, as a minimum, a description of the field activities, including site drawings, figures, and tables as appropriate; any deviations from the established WP and the reasons for the deviations; a listing of material and items disposed of during the removal activities, including waste characterization and disposal documentation; and photographs documenting site activities.

3.1 TASK 1 – PROJECT MANAGEMENT

The ONC will provide overall project management throughout the duration of the project including:

- Timely and appropriate responses to all inquiries or comments received by the USACE.
- Preparing and submitting invoices with appropriate backup documentation and providing schedule updates in a timely manner.

3.2 TASK 2 – PLANNING

Bristol will develop and submit planning documents on the ONCs behalf that describe all planned work. This WP includes a *Site Safety and Health Plan* which has been included as Appendix C. All planning documents will comply with applicable federal and state regulations and adhere to standard regulations and guidance. The ONC will:

- Coordinate with applicable federal and State of Alaska regulatory agencies prior to field activities and during the development of the WP.
- Allow a minimum of 30 days for review of draft plans.
- Attach review comments and responses to comments to the final version of the planning document (Appendix A).
- Include two bound and electronic copies (in compact disk-read only memory format) of planning documents for both draft and final submittals to ONC. In addition, electronic copies of all planning documents will be submitted to the USACE via the AMRDEC file transfer system (https://safe.amrdec.army.mil/SAFE/).

3.3 TASK 3 – MOBILIZATION AND DEMOBILIZATION

Heavy equipment will be mobilized from Bethel, Alaska, by ONC. All mobilization of personnel, equipment, and supplies to the Bethel BIA HQ site will be via the Bethel road system. Due to the difficult access to the Bethel Airport – Infantry Area site, mobilization and demobilization of heavy equipment will need to occur during the winter by transporting the equipment across the frozen Kuskokwim River. After transport to the Bethel Airport – Infantry Area, the heavy equipment will be stored on site until the summer field season begins. During the summer field season, mobilization of personnel

and supplies to the Bethel Airport – Infantry Area will be by boat or landing craft. During demobilization activities, heavy equipment will be left at the Bethel Airport – Infantry Area until it is safe to transport the equipment back across the frozen Kuskokwim River.

3.4 TASK 4 – SURFACE DEBRIS REMOVAL, TRANSPORTATION, AND DISPOSAL

ONC will properly remove, transport, and dispose of up to 500 cubic yards of nonhazardous surface debris per site from the Bethel HIA HQ and Bethel Airport – Infantry Area. Once removed, nonhazardous surface debris items will be transported from the site and properly disposed of at the Bethel Landfill (Class II). If any surface debris is deemed unacceptable at the Bethel Landfill, it will be transported from Bethel to Washington for disposal.

ONC will notify the Bristol Project Manager (PM) and the USACE PM if suspect hazardous debris (e.g., a 55-gallon drum partially filled with an unknown liquid/solid) or visually stained soils are discovered at the Bethel BIA HQ and Bethel Airport – Infantry Area sites. Contaminated soil and water sampling is not currently authorized under the current CA. The USACE may acquire additional funding, if available and warranted, otherwise, additional removal action may be funded by the DoD under a future CA.

3.5 TASK 5 – REPORTING

The ONC will prepare and submit a draft and final Removal Action Report detailing the completion of all field tasks. The report will include information related to and generated by field activities:

- A description of the field activities, including site drawings, figures, and tables as appropriate.
- Deviations from the established WP and the reasons for the deviations.
- A listing of material and items disposed of during the removal activities, including waste characterization and disposal documentation.
- Photographs documenting site activities.

- Survey data for surface debris removal area boundaries.
- Attach review comments and responses to comments to the final version of the reporting document.
- Include two bound and electronic copies (in compact disk-read only memory format) of reporting document for both draft and final submittals to ONC. In addition, electronic copies of all planning documents will be submitted to the USACE via the AMRDEC file transfer system (https://safe.amrdec.army.mil/SAFE/).

3.6 PROJECT ORGANIZATION AND RESPONSIBILITIES

The fieldwork will be coordinated and conducted by the ONC. The ONC will provide laborers, heavy equipment, and disposal methods for the surface debris removal.

The ONC NALEMP Coordinator will oversee all project work. Bristol may provide additional support to the ONC, as required or requested. Key personnel are described below.

3.6.1 Bristol Personnel

Project Manager

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

Regulatory Compliance Manager/ Transportation and Disposal Coordinator

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

3.6.2 ONC Personnel

ONC NALEMP Coordinator

The ONC NALEMP Coordinator, Mary Matthias, is responsible for ensuring that all tasks for the scope of work are achieved successfully. The ONC NALEMP Coordinator will manage the effort, and provide the necessary ONC resources to meet the project objectives and requirements.

ONC Field Representative(s)

The ONC field representative(s) will contribute their knowledge of the history of the DoD activities within the Bethel BIA HQ and Bethel Airport – Infantry Area sites. ONC field laborers and heavy equipment operators may also support surface debris removal action activities as directed by the ONC.

3.6.3 USACE Personnel

Project Manager

The USACE PM, Andrea Elconin, will be responsible for ensuring that all project requirements are met. The USACE PM will coordinate the USACE effort and ensure project compliance with the NALEMP program.

3.6.4 Subcontractor Services

The use of subcontractors will be vital to successful project completion. Below is a listing of key subcontractors and a description of the services that they will provide. Subcontractors will be used as required and will perform all work in accordance with this WP.

Local Landfill Services

The Bethel Landfill, operated by the City of Bethel, will be used for disposal of acceptable nonhazardous surface debris and/or scrap metal removed from either NALEMP site.

Long Haul Transportation

Any surface debris material that is deemed unacceptable for the Bethel Landfill will be barged by Alaska Marine Lines. The surface debris will be barged to Washington for disposal. The deadlines for the Alaska Marine Lines 2018 sailing schedule from Bethel, Alaska to Seattle, Washington, are: April 30, May 21, June 11, July 2, July 30, and September 4. The Alaska Marine Lines 2019 sailing schedule is to be determined.

3.7 SCHEDULE

The work proposed under this WP will be conducted during the 2018 and 2019 summer field seasons. Mobilization/demobilization of heavy equipment to the Bethel Airport – Infantry Area will occur during the winter months. The removal action is forecasted to occur over a four month period.

4.0 FIELD ACTIVITIES

This section discusses the removal action activities planned for the Bethel BIA HQ and Bethel Airport – Infantry Area sites. Planned field activities include:

- Mobilization and demobilization
- Pre-construction permits and notifications
- Documentation
- Site reconnaissance and brush removal
- Surface debris removal
- Debris disposal
- Global Positioning System (GPS) Survey, if needed
- Backfilling of surface excavations, if needed
- Temporary storage, transportation, and disposal of nonhazardous surface debris.

4.1 MOBILIZATION AND DEMOBILIZATION

Upon approval of all planning documents and permitting, ONC will mobilize equipment and personnel to the site. Heavy equipment expected to be utilized on site during removal action activities are anticipated to include:

- 100 series excavator
- 100 series loader
- Skid steer
- Utility Terrain Vehicle with trailer
- Crew cab trucks (2)
- Flatbed trailers (2)

The ONC will provide a Site Superintendent and a Site Safety and Health Officer, a heavy equipment operator(s), and laborers to support the surface debris removal effort. All crew members will have current 40-hour Hazardous Waste Operations and Emergency Response certificates.

Vegetation at each removal action area will be cleared using the excavator or chainsaw and slash will be neatly stacked in a suitable location adjacent to the proposed removal action area or in an area preferable to the ONC. After the removal action has been completed, each area will be regraded to match the natural topography of the site and may be revegetated with a native grass seed mixture, if warranted.

ONC will demobilize all personnel and equipment from the site at the conclusion of removal action activities.

4.2 PRE-CONSTRUCTION PERMITS AND NOTIFICATIONS

Pre-construction permits and notifications will be completed prior to mobilization to the site. Permits and notifications that may be required include, but are not limited to, land use permits, special use permits, right-of entry permits, and utility locates. Copies of all permits and notifications required for the project will be included in the removal action report.

4.2.1 Permits

Bristol does not anticipate that a land use permit will be required prior to initiating surface debris removal action activities since the scoped activities are being performed by the ONC and on land owned by the BNC. The ONC NALEMP Coordinator will ensure that rights-of-entry or permission from the property owners are obtained prior to commencing fieldwork.

Impact to the site is expected to be well under one acre and a Storm Water Pollution Prevention Plan is not required by Alaska State statute.

4.2.2 Notifications

Since only surface debris is scoped for removal, utility locates will not be necessary unless surface debris removal results in an excavation depth of greater than two feet. If it appears that the excavation will become greater than two feet deep, ONC must call the Alaska Dig

Line and request a utility location survey. The phone number for the Alaska Digline is 811, and utility locate requests for rural Alaska must be submitted ten (10) business days prior to excavation. The ONC will provide maps of the proposed excavation areas for use during the utility locate if necessary.

Utility locates often face unanticipated delays in remote Alaska communities; therefore, if it appears during site reconnaissance that an excavation of greater than two feet will be required to remove surface debris, coordination with the appropriate entities will be initiated and completed prior to the field effort.

4.3 DOCUMENTATION

Field activities will be carefully documented by ONC for all tasks. All field activities will be recorded in a Rite in the Rain all-weather field logbook. Dates, times, field personnel, and field observations will be recorded in a field logbook. Photographs will be taken and logged in the field logbook. A GPS will be used to document surface debris removal extents and other areas of interest. Photographs will be recorded in the field logbook along with any deviations from the standard operating procedures. Standard operating procedures are included as Appendix D. Documentation of field activities will be kept and will be provided in appendices to the Removal Action Report.

4.4 SITE RECONNAISSANCE AND BRUSH AND DEBRIS REMOVAL

ONC personnel will initially walk the Bethel BIA HQ and Bethel Airport – Infantry Area sites to observe and document current site conditions. Current site conditions will be documented with notes and photographs. Metal detectors will be used to locate metal on or near the surface. Following the reconnaissance of the two sites, the ONC Site Superintendent and personnel will select an area to unload/load equipment, an equipment staging area, and develop a site plan for the scoped surface debris removal action. The site reconnaissance may identify brush and/or debris that may need to be removed from the

site to facilitate and improve access for removal action activities. Staging areas with containment such as a dumpster may be created to accumulate scrap metal and military surface debris prior to offsite transport or shipment.

Approximately 500 cubic yards of nonhazardous solid surface debris is scoped for removal at each site. Brush and debris removal will be conducted by ONC personnel using equipment such as Utility Terrain Vehicle, excavator, and/or loader. If encountered, hazardous debris will be flagged and marked with a GPS. ONC will inform the Bristol and the USACE PMs regarding any suspect hazardous debris. Any warranted analytical soil or water sampling will need to be pre-authorized by the USACE PM since analytical sampling is not currently scoped in the current CA.

As required under NALEMP, only debris from past military activities will be removed and disposed. The removal and disposal of debris generated by a property-owner is outside the scope of the current CA.

Scrap metal and other nonhazardous surface debris will be staged for removal and will be hauled by ONC to the Bethel Landfill (Class II) located at the north end of Ridgecrest Drive in Bethel, Alaska. If there is nonhazardous surface debris that is deemed unacceptable by the Bethel Landfill, it will be transported to Washington for disposal.

4.5 GPS SURVEY

The horizontal location and dimensions of the surface debris removal areas and any other key site features will be marked with a handheld GPS unit that provides sub-meter accuracy after post-processing. Vertical locations will be estimated from the ground surface with a tape measure.

4.6 DEBRIS CHARACTERIZATION, TRANSPORTATION, AND DISPOSAL

The following sections discuss how nonhazardous military surface debris will be managed. Once properly containerized and characterized, waste items will be transported from the

site and properly disposed of at the Bethel Landfill. If there is nonhazardous surface debris that is deemed unacceptable by the Bethel Landfill, it will transported to Washington for disposal.

4.6.1 Waste Classification

If necessary, upon completion of waste characterization activities waste streams will be classified in accordance with *40 Code of Federal Regulations (CFR) 261* and *40 CFR 761*. In addition, waste streams will be profiled in accordance with recycling/disposal facility acceptance criteria.

4.6.2 Packaging

Waste materials will be stored in appropriate UN-approved containers, if applicable, and incompatibles will be segregated. Containers will be compatible to wastes (*49 CFR 100-177*), will be in good condition, and will be marked in accordance with *40 CFR 262*.

4.6.3 Marking and Labeling

Waste containers will be marked and labeled depending on waste composition and hazard class. All containers to be shipped off site will be marked with nonhazardous or non-regulated markers, as appropriate, prior to shipment. Information to be placed on markers will include generator information, manifest number, accumulation start date, proper U.S. Department of Transportation shipping name, and EPA identification number and waste codes, if applicable.

4.6.4 Placarding

Nonhazardous debris and waste that is shipped off site will be placarded in accordance with *49 CFR 172(F)*. All four sides of the shipping container will be placarded appropriately.

4.6.5 U.S. Shipping Documents

Non-hazardous and/or non-regulated wastes shipped off site will be manifested on Bills of Lading and/or Non-Hazardous Waste Manifests. Waste stream profiles and land disposal restriction forms will also be completed and attached to manifests, as necessary. Shipping documents will be prepared and signed by ONC.

4.6.6 Transportation

Debris generated from removal action activities will be transported off site by the end of the 2018/2019 field season(s). Several trips may be needed to remove nonhazardous surface debris from either site. Waste materials will be transported by truck and/or boat from the site to their respective recycling/disposal facilities.

4.6.7 Treatment, Recycling, and Disposal

Nonhazardous surface debris that is generated and transported off site will be placed in bulk and non-bulk containers, as necessary. Nonhazardous solid wastes generated and removed from the site will be treated, recycled, and disposed of at the most appropriate disposal/recycling facility among those listed in Table 4-1.

Table 4-1 Proposed Recycling and Waste Disposal Facilities

Facility Name	Bethel Landfill (Operated by the City of Bethel)
Facility Address	North end of Ridgecrest Drive
City, State, Zip Code	Bethel, Alaska 99559
Phone	(907) 543-7711
EPA ID No.	Not Applicable
Facility Name	Alaska Marine Lines
Facility Address	5615 W. Marginal Way SW
City, State, Zip Code	Seattle, Washington 98106
Phone	1-800-326-8346
EPA ID No.	Not Applicable
Facility Name	Waste Management – Columbia Ridge Recycling and Landfill
Facility Address	18177 Cedar Springs Lane
City, State, Zip Code	Arlington, Oregon 97812
Phone	(541) 454-2030
EPA ID No.	ORD987173457
Facility Name	Chemical Waste Management of the Northwest
Facility Address	17629 Cedar Springs Lane
City, State, Zip Code	Arlington, Oregon 97812
Phone	(541) 454-2643
EPA ID No.	ORD089452353

4.6.8 Violations and Discrepancies

In the event that notices of noncompliance or notices of violations are issued to the ONC, they will do everything in their power to rectify the situation. All relevant documentation regarding the incident will be provided to the ONC, and any response will be coordinated through them until the matter is resolved.

4.6.9 Debris Tracking Requirements

To document all debris generated and managed during this project, all transportation and disposal documentation will be tracked and provided in the final Removal Action Report.

Copies of container and debris tracking forms are included in Appendix E. Documentation will include a summary of all debris generated, the quantities, and the final disposition of the debris. Copies of the following documentation may be provided, as necessary:

- United States Uniform Hazardous Waste Manifests
- Land Disposal Restriction Forms
- Non-Hazardous Waste Manifests
- Material Safety Data Sheets
- Canadian Manifests and Transit Notices
- Bills of Lading
- Certificates of Weight
- Certificates of Disposal
- Exception Reports and Discrepancy Reports, if applicable
- Waste Photographs

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

5.0 DRAFT AND FINAL REPORTING

After completion of the field work, the ONC will submit draft and final versions of the Removal Action Report to the USACE documenting the removal action activities and findings. The reports will include photographs, copies of transportation and disposal paperwork, and conclusions and recommendations.

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6.0 REFERENCES

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Dorava, Joseph M and Hogan, Eppie V. (Dorava and Hogan). (1995). *Overview of Environmental and Hydrogeologic Conditions at Bethel, Alaska.* https://pubs.usgs.gov/of/1995/0173/report.pdf. U.S. Geological Survey.

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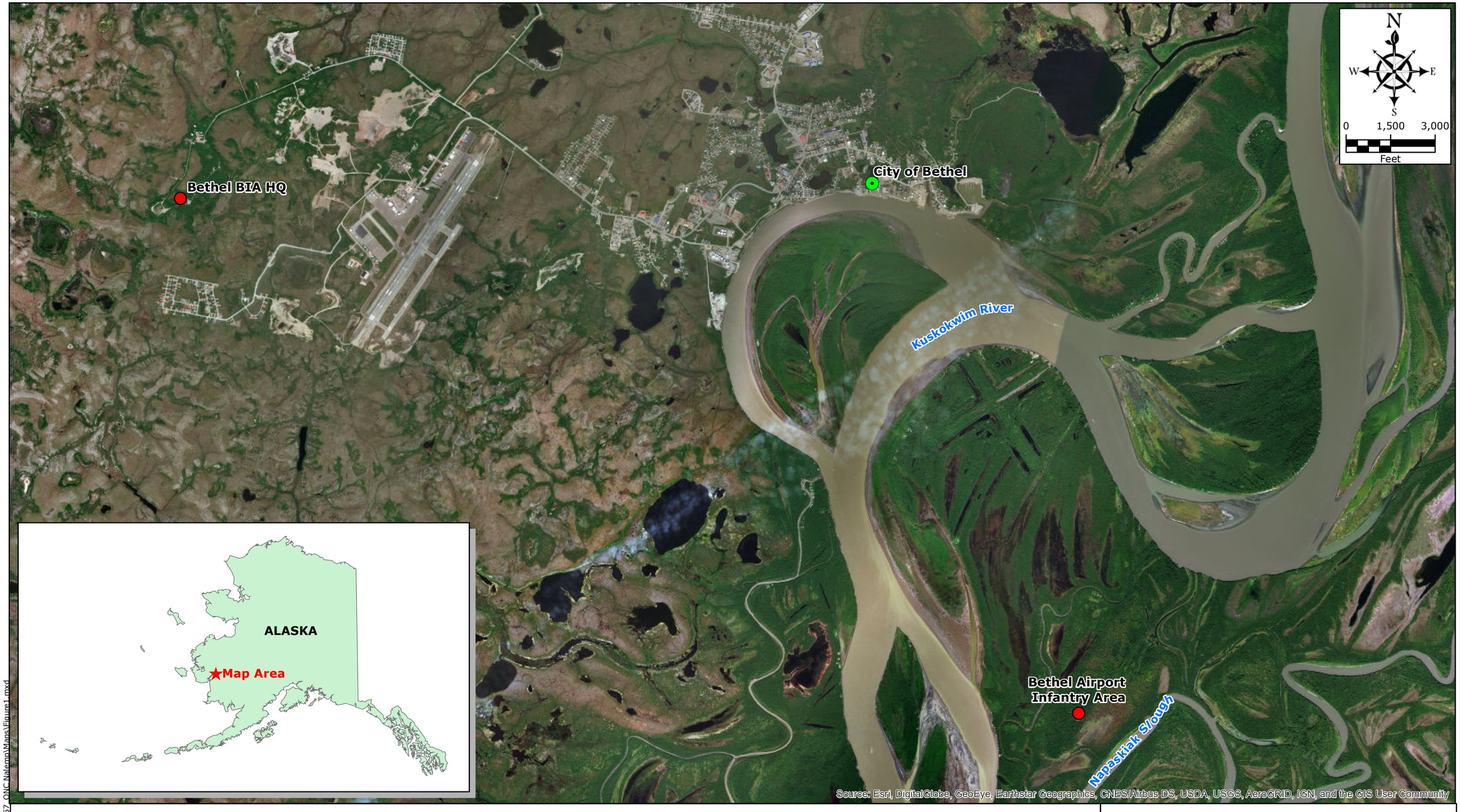
FIGURES



Legend

- Bethel
- Site Locations

FIGURE 1
BETHEL, ALASKA
ONC NALEMP ACTION REMOVAL WORK PLAN
SITE LOCATION MAP

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

DATUM:	NAD83
PROJECTION:	SP AK Z4 FT
Project No.	34180057
DATE:	2/14/2018
DWN.	AMG
SCALE	1" = 3,000
APPRVD.	TE
SHEET	1 of 1

Document Path: G:\Jobs\34180057_ONC_Nalemp\Maps\Figure1.mxd

Legend

Nonhazardous Military Surface Debris (Approximately 500 cubic yards)

FIGURE 2
BETHEL, ALASKA
BETHEL BIA HQ
SURFACE DEBRIS LOCATIONS FOR BETHEL BIA HQ

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

DATUM:	NAD83
PROJECTION:	SP AK Z4 FT
Project No.	34180057
DATE:	2/14/2018
DWN.	AMG
SCALE	1" = 500'
APPRVD.	TE
SHEET	1 of 1

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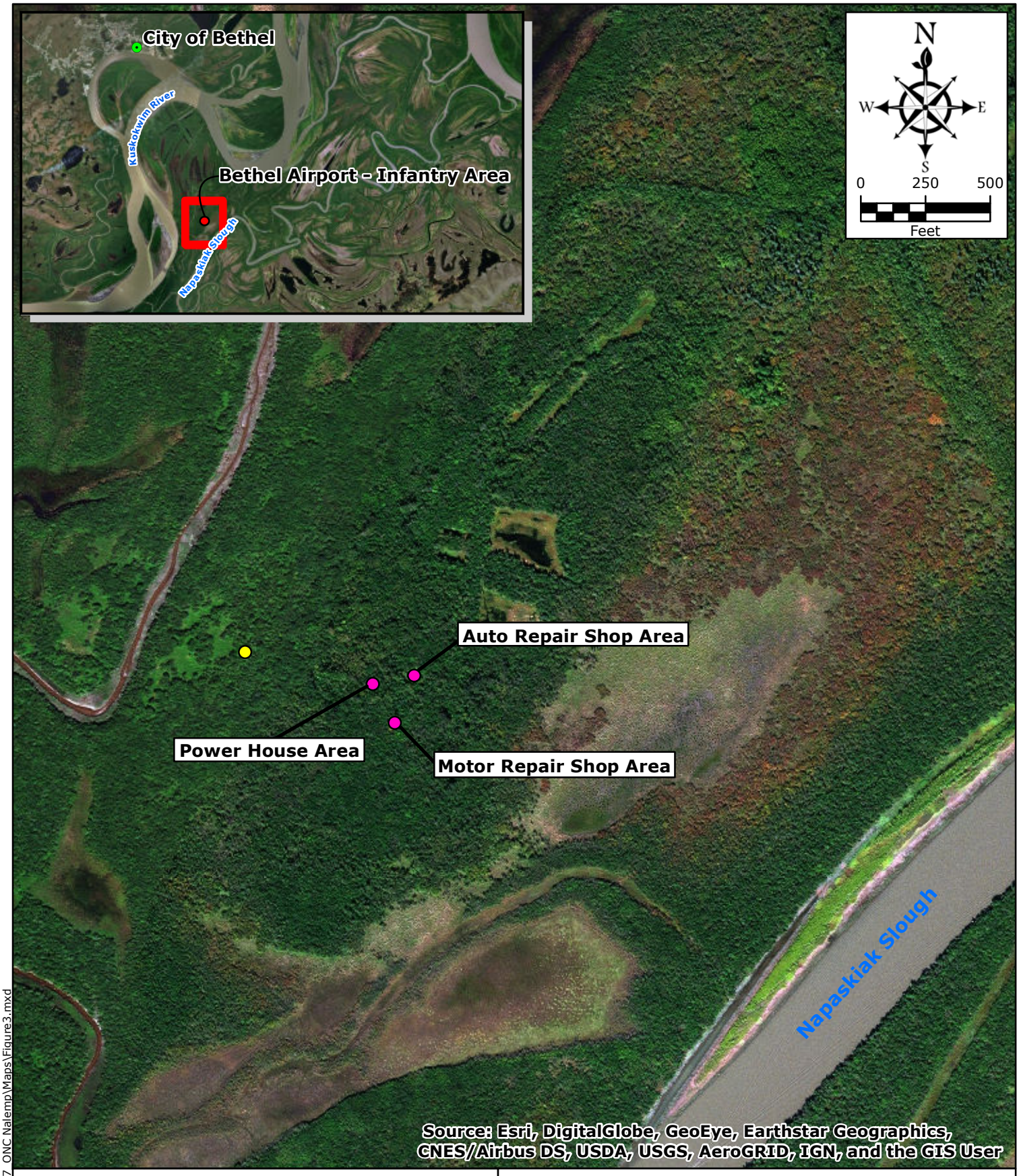

Legend

- Map Location
- Cement Pads
- Quonset Hut Frame

FIGURE 3
BETHEL, ALASKA
BETHEL AIRPORT - INFANTRY AREA
SURFACE DEBRIS LOCATIONS FOR BETHEL AIRPORT - INFANTRY AREA

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

DATUM:	NAD83
PROJECTION:	SP AK Z4 FT
Project No.	34180057
DATE:	2/14/2018
DWN.	AMG
SCALE	1' = 500'
APPRVD.	TE
SHEET	1 of 1

Document Path: G:\Jobs\34180057_ONC Nalemp\Maps\Figure3.mxd

APPENDIX A

Responses to Work Plan Comments

REVIEW COMMENTS

PROJECT: Removal Action Work Plan – NALEMP Sites Bethel, Alaska
DOCUMENT: Draft Removal Action Work Plan – February 2018

U.S. ARMY CORPS OF ENGINEERS CEPOA-EC-EE	**DATE: 09-FEB-2018** **REVIEWER: Anton Abuamsha** **PHONE: 907-753-2842**	**Action taken on comment by: Autumn M. Gould, Bristol Geologist, 19 February 2018** **PHONE: 907-743-9383 E-MAIL: agould@bristol-companies.com**

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1.	2.4.2, 2nd paragraph, 2nd sentence	"Administrationoperations" please add a space between "Administration" and "operations"	A	Abbreviated FAA and added space prior to word "operations"	A
2.	Page 10 & 26	Intentionally blank pages are only included after Sections 2 and 5. Please remove them or add them to the other sections to keep consistent.	Noted	"Intentionally blank" pages are only added in front of major sections when previous section ends on right hand page in book viewing mode. Tech editor will verify format prior to production of final document.	A
3.	Table 3-1, Task No. 4	What will constitute contaminated soil? PID screening? Stained soil?	A	"potentially contaminated soil" has been changed to "visually stained soils are encountered…." in the text in Table 3-1, Task No. 4. Also made similar change to 1st sentence of 2nd paragraph of Section 3.4.	A
4.	4.1, 3rd paragraph	Will any revegetation activities be conducted after the removal action?	A	The following sentence was added to the end of the 3rd paragraph in section 4.1, "After the removal action has been completed, each area will be regraded to match the natural topography of the site and may be revegetated with a native grass seed mixture, if warranted."	A
5.	4.2.2, last paragraph	"at the beginning of the field effort" is contradictory to "well in advance of the field effort". If possible, please find out if an excavation of greater than two feet is required prior to the start of any fieldwork.	A	The text has been changed in section 4.2.2 last paragraph to read, "Utility locates often face unanticipated delays in remote Alaska communities; therefore, if it appears during site reconnaissance that an excavation of greater than two feet will be required to remove surface debris, coordination with the appropriate entities will be initiated and completed prior to the field effort."	A
6.	Figure 1-3	Please change the scale bars to more usable unit increments (e.g. 500 feet, 2000 feet, etc.)	A	Figure 1 scale has been changed to 1" = 3000' Figure 2 scale has been changed to 1" = 500' Figure 3 scale has been changed to 1" = 500'	A
		--- END OF COMMENTS ---			

APPENDIX B

Previous Site Investigation Information

1. SITE HISTORY AND PREVIOUS INVESTIGATIONS

This appendix presents a detailed site history and previous investigation summary for the two Formerly Used Defense Sites (FUDS) investigated under this remedial investigation.

1.1 Bethel Airport FUDS (F10AK051400) and Bethel Staging Field FUDS (F10AK051200) History

On 27 October 1943, the War Department reserved approximately 216,000 acres through Public Land Order (PLO) 188 to establish the **Bethel Staging Field** (FUDS Property F10AK0512) for "military purposes". The lands were "subject to valid existing rights", including Civil Aeronautics Authority (CAA) lands established by Air Navigation Site (ANS) Withdrawal No. 113 (24 November 1937) and ANS Withdrawal No. 146 (7 April 1942).

The **Bethel Airport** (FUDS F10AK0514) consisted of 1,853.26 acres near Bethel, AK located on the south side of the Kuskokwim River within the Bethel Staging Field withdrawal. The property lies approximately 1 mile southeast of Bethel, Alaska across the Kuskokwim River and lies approximately 400 air miles west of Anchorage.

The Army acquired 1,588.26 acres on 27 October 1943 from the CAA (ANS Withdrawal No. 146) for exclusive military use as the Bethel Airfield for remote staging and servicing of aircraft during wartime activities. The CAA assumed operation of the airfield for the Army on 1 August 1944 and began using the site as a commercial airport.

The Army had completed construction of 289 buildings, a 3-1/2 mile power distribution system, a 1.1 mile water system, and a 0.9 mile sewer system by September 1943. All structures were temporary, consisting of Theatre of Operations (T/O) buildings and huts (Quonset, Pacific, Cowin, and Yakutat types). The CAA assumed operation of the Army airfield on 1 August 1944; all equipment was removed from the buildings prior to CAA occupancy. The Alaska Territorial Guard removed all T/O buildings and Yakutat huts for dismantling and construction of armories at other locations; the CAA was issued revocable permits to assume ownership of 43 buildings (USACE, 2014).

The Army determined there was no longer a military necessity for the Bethel Staging Field and rescinded PLO 188. The Army relinquished the excess Bethel Staging Field to the Department of the Interior on 06 August 1947. In addition, the Army declared the 1,588.26 acre parcel excess and relinquished the land to the CAA on 26 August 1947. The Army officially retransferred the former ANS Withdrawal No. 146 land to the CAA on 2 October 1947 (USACE, 2014).

After several years of CAA ownership, use, and jurisdiction, the Air Force acquired 1,853.26 acres from the CAA to establish the Bethel Air Force Station on 2 May 1951 for purposes of assembling supplies, ammunition storage, and other military essential needs. This acreage included the 1,588.26 acres previously used by the Army. The Air Force declared a portion of the FUDS (265 acres) excess and relinquished the land to the CAA on 30 September 1955. The 265 acres was officially retransferred to the CAA on 4 January 1956. The Air Force later relinquished the remaining 1,588.26 acres, terminated the Use Permit, and retransferred the property to the Federal Aviation Administration (FAA - successor to CAA) on 22 October 1959 (USACE, 2014).

On 22 November 1962, the FAA relinquished most of the FUDS area to the Bureau of Land Management (BLM); the remainder of Bethel Airport property was relinquished by the FAA to the BLM on 8 February 1968. The Bethel ANS Withdrawal (including the former Bethel Airport site) was subsequently made available for selection under the Alaska Native Claims Settlement Act of 18 December 1971 (Public Law 92-203).

Munitions activities at the former Bethel Airport included the deployment of anti-aircraft defenses (ten 20-mm Anti-Aircraft guns) and storage of various types of ammunition (small arms, 20-mm anti-aircraft, and bombs) on the FUDS. There were ranges, small arms or otherwise, identified during the Preliminary Assessment (USACE, 2014) research effort, although improvised small arms ranges were possible. Specific types and quantities of artillery stored at the FUDS are unknown.

Hazardous, Toxic, and Radioactive Waste (HTRW) related operations and activities conducted at the former Bethel Airport during Department of Defense (DoD) jurisdiction of the property may have caused the release of hazardous substances, pollutants, or contaminants to the environment. These operations included maintenance and repair operations for equipment, vehicles, and aircraft. Facilities also included warehousing and storage areas, as well as landfills. Operations also included carpentry, support shops, and dry-cleaning facilities (USACE, 2014).

1.1.1 Infantry Area

The Infantry area lies two miles southeast of the former airstrip at the Bethel Airport FUDS. It is a flat, low lying, area with moderate to dense alder-willow brush, a few cottonwood and spruce, and locally dense Horsetail Rush ground cover. Areas cleared in the 1940s and 1950s are now densely covered with alder. The soil is silt and fine sand typical of the Kuskokwim floodplain. The area is flooded on a near annual basis, with flotsam observed in brush 3 feet above ground level (USACE, 2007). Groundwater level reflects the flooding and is somewhat influenced by the river height, but was within 3 or 4 feet of ground surface in the water wells observed in June 1995 (USACE, 2007). The only evidence of the World War II (WW II) Army buildings is the rotting, foot-high pilings.

The Infantry Area, as used herein, includes the "ACS" and "Signal-Radio" Intelligence Areas. The 1942-1943 Army and various CAA maps differ considerably in the position of the roads and buildings (USACE, 2007). The CAA "Master Map Sheet No. 1" was found to be in closes agreement with a 1952 air photograph that showed the improvements clearly. Unfortunately, the 1952 air photograph omitted the southern 10% of the area indicated on the maps (USACE, 2007). Following deactivation in August 1944, most of the buildings were removed or demolished. A 1952 air photograph showed most of the WW II buildings as absent except for foundations and minor debris; however, the sites of the former buildings/facilities were clearly shown (USACE, 2007). Several of the 17 buildings observed in the 1952 air photograph appeared to be of post WW II origin (USACE, 2007).

From June 1951 through September 1955, 265 acres of the Infantry areas were under U.S. Air Force jurisdiction under an exclusive use permit from CAA. An air photograph from September 1952 shows the former Army Infantry Area in active use with 17 buildings (USACE, 2007).

The Infantry area was inventoried in May and June 1995. Most of the WW II Army buildings were gone, with only the rotting pilings present. Concrete foundations were found from four Corwin Warehouses and from two vehicle repair buildings, all of which were overgrown with moss and herbaceous vegetation (25% to 90%). The skeletal frames from six erect and two dismantled Quonset huts were found. The extremely thick and tall alders frustrated search for other Quonset huts shown on the 1952 air photograph (USACE, 2007).

At the Power Plant, a pair of 10-foot × 5-foot × 16-inch thick concrete engine mountings were observed. West of the road to the north of the four Corwin foundations was a 5-foot concrete mass believed to have been an antenna tower base (USACE, 2007).

The Auto Repair building contained two mechanics pits in the concrete floor which was observed in 1995. The 4.5-foot deep (17 × 2.5 foot) concrete pits contained a foot of water when visited in late June 1995. The water observed in the pits did not contain a sheen. The two pits were backfilled with clean soil during the 1997/1998 BD/DR removal action (USACE, 2007).

A barbed wire fence was observed to the north of the Infantry area. The wire was removed during the 1997/1998 BD/DR removal action. The wire was identified as an enclosure around the Quartermaster Warehouse and company administration and supply buildings (USACE, 2007).

Four water wells were found along the waterline trench at the southern part of the Infantry Loop Road. Near the site of the Enlisted Men's latrine "inside" the Loop road was a complex of three hand-dug wells with 5 feet square openings. They were cribbed to 2 to 3 feet above ground level. When visited in 1995, water depth was 41 inches below ground level. Two of the wells had total depths of about 8 to 9 feet and 6 to 7 feet below ground level. The two wells were backfilled during the 1997/1998 BD/DR removal action (USACE, 2007). A third well was of similar construction but had a "pipe" made of welded drums extending to 8 feet above ground level, which precluded hazardous access. The fourth well was located to the south of the Infantry Loop Road, near the Mess Hall. The opening of that well contained a 39-inch tall, 4-foot-sleeved to 6-foot diameter "pipe" made from welded drums that effectively prevents human access. Water depth was 26 inches below ground level in June 1995. A fifth well is located adjacent to the fourth well, which was backfilled (USACE, 2007).

An open, water-filled, 12 × 25-foot cribbed pit was observed on the water line trench in close proximity to the Mess Hall well. CAA maps from 1943 identify this as a "septic tank". In June 1995, it was observed and did not contain odor. The water was also sheen-free. Mosquito larva and frogs were present (USACE, 2007).

At the site of the Power Plant, located inside the Infantry Loop, was a 6-foot diameter, 8 to 10-foot long underground storage tank (UST) (USACE, 2007). The tank had been cut open and was water filled in 1995. There was no sheen on the water. Mosquito larva and frogs were present. The ground around the UST was unstained (USACE, 2007). The UST was filled with clean soil during the 1997-1998 BD/DR removal action.

1.1.2 Previous Investigations at Bethel Airport FUDS (F10AK051400)

The former Bethel Airport entered the USACE FUDS program in 1993 with the signing of the Findings and Determination of Eligibility. A Building Demolition (BD)/Debris Removal (DR) project (F10AK051401), CON/HTRW project (F10AK051402), and HTRW project (F10AK051403) were authorized by Headquarters USACE on 13 June 1994. A second CON/HTRW project (F10AK051404) was authorized on 18 October 1994 as an IRA (USACE, 2014).

1994 BD/BR and CON/HTRW

Property visits conducted by USACE in 1985 and 1992 identified several BD/DR concerns remaining at the former Bethel Airport FUDS. The remains of the original buildings and equipment remained throughout the site, posing a danger to any person or wildlife in the vicinity. Subsequently, in June 1994, Headquarters USACE approved FUDS Project F10AK051401 for BD/DR. The objective of the project was to make the area safe for people and wildlife.

The following planned BD/DR remedial action objectives were successfully met:

- The open well in the Air Corps Area was filled;

- The open well and open septic system in the Hospital Area was filled;

- The two mechanic pits, exposed UST, and two open wells in the Infantry Area were filled; and

- The barbwire was removed from the Infantry Area and properly disposed.

Fill material came from the Bethel borrow area and was transported by helicopter. The barbwire and empty sacks from the soil transport were disposed of at the Bethel city landfill. USACE completed a remedial action in 1998 at the former Bethel Airport.

Property visits conducted by USACE in 1985 and 1992 identified several thousand 55-gallon drums located along the bank of the Kuskokwim River at the Northern boundary of the site. These drums were falling into the river creating a safety hazard to local boaters and an environmental hazard to the area. Headquarters USACE approved FUDS Project F10AK051402 for CON/HTRW remediation in June 1994. The objective of the project was to remove the environmental threat from the area.

The drums of asphalt had been part of a shipment of approximately 3,000 drums of asphalt received for repaving the airfield. The drums arrived on site around the time the airfield was transferred to the CAA.

The remedial action objectives for this project were to remove approximately 5,000 asphalt drums from the bank near the former airfield to prevent additional downgradient impacts. Initially, the goal was to recycle the asphalt into a usable product for paving (USACE, 2014).

Approximately 5,050 drums filled with asphalt; 2,000 cubic yards (CYs) of asphalt contaminated soil; and 500 CYs of site debris were removed from the Kuskokwim River shore in 1994 and stockpiled at the former Bethel airfield. All stockpiled waste was removed and disposed of at the Roosevelt Regional Landfill in Washington by the end of 1995.

USACE property visits found evidence of contamination nearby abandoned equipment and in the vicinity of the thousands of deteriorated 55-gallon drums discarded along the banks of the Kuskokwim River. Other potential areas of contamination considered were vehicle or aircraft maintenance shops, paint shops, and generator buildings. In June 1994, Headquarters USACE approved FUDS Project F10AK051403 for a HTRW investigation.

The project objective was to perform a detailed site investigation, delineate the extent of contamination if present, develop a remediation strategy, and implement the remediation project which is being done.

On 18 October 1994, Headquarters USACE approved a removal action (RA) associated with the CON/HTRW project F10AK051402. USACE property visits had identified several 55-gallon drums of asphalt partially buried in the sand and leaking onto the beach of the Kuskokwim River along the northern boundary of the FUDS.

The river ice breakup from the winter of 1993-94 likely liberated the fugitive asphalt drums and carried them downstream to an area used for local subsistence netting of salmon and other waterfowl activities. Approximately twenty-five 55-gallon drums of asphalt and contaminated sand were removed, overpacked, and staged for removal. The drums removed during the IRA had broken free of the bank and had washed downstream of the former drum cache site, posing a risk to boaters as well as the environment. The IRA was successfully completed in June 1994.

The petroleum, oil, and lubricants (POL) operations at the former Bethel Airport included aboveground storage tanks (ASTs), USTs, drums, and an asphalt plant. The POL operations at the former Bethel Airport could have potentially released HTRW to the environment during DoD jurisdiction of the property.

One UST and one AST were located in the Infantry Area of the former Bethel Airport property. The UST was located at the power plant site inside the Infantry Loop (which is being investigated under this work plan).

During the 1997-1998 BD/DR removal action, the UST was filled. The AST (which is being investigated under this Work Plan) is noted on 1942 historical maps but is not visible on 1943 aerial imagery. The tank is first observed in 1948 aerial imagery, and thus was constructed between 1943 and 1948. The AST was not located during the USACE property visits in the 1990s (USACE, 2014).

1.1.3 Previous Investigations at Bethel Airport Field FUDS AST

Previous investigations at the AST located within the Bethel Airport AST have not been conducted. The AST was mentioned in a 2014 Preliminary Assessment (PA) report by the USACE. The AST was not found during the 1995 Site Inspection performed by the USACE (USACE, 2007). The location was provided by the USACE in the 2014 PA and is based on a 1942 aerial photograph.

1.2 Bethel BIA Headquarters FUDS (F10AK0510) History

The Bethel BIA 18-acre parcel is located 4 miles west of the City of Bethel, Alaska and the Kuskokwim River. The Bethel BIA 18-acre parcel is primarily located south of the Composite Building 413 (located on the 27-acre parcel) of the Bethel BIA Headquarters, also known as the Bethel BIA Administrative Site. The Bethel BIA Headquarters is a FUDS with principle cleanup responsibility resting with the U.S. Army Corps of Engineers FUDS program. The site is listed on the FUDS inventory with FUDS ID: F10AK0510 and Federal Facility ID: AK09799F699900. The Bethel BIA Headquarters FUDS currently consists of two parcels of land, referred to as the *27-Acre parcel* and the *18-Acre parcel* (18.42 acres actual), which were pared down over the years from a 275-acre parcel withdrawn in 1966 (PLO 3956) from the Department of Defense (USACE, 2017). Both parcels are managed by the U.S. Fish and Wildlife Service (USFWS) as part of the *Yukon Delta National Wildlife Refuge* (YDNWR) and have differing environmental issues, responsible parties for cleanup, and future land status plans (USFWS, 2009).

The USAF first developed the site in 1957 and constructed facilities as part of the White Alice Communication System (WACS). The WACS facilities included a 60,000-square foot Composite Building (Building 413), numerous support structures, and a Radio Relay Station (RRS) located about 2,500 feet southwest of the Composite Building. The Composite Building was later used by the BIA from the early 1960s to the mid1980s as their Bethel Administrative Headquarters. Use of the site by the BIA ended in 1990 and the site has remained vacant since. The condition of the abandoned facilities has continued to deteriorate over the years. The central portion of the Composite Building was destroyed by fire in August 2001. Un-burnt portions of the structure, now exposed to the elements have deteriorated significantly and, along with other derelict structures on the property, pose a physical hazard (USFWS, 2009).

Environmental contaminants of concerns at the 18-acre parcel have included petroleum, oil, and lubricants (POLs), polychlorinated biphenyls (PCBs), and pesticides. The primary sources of contamination at the 18-acre parcel include two former drum storage and handling areas impacted by surface spills. In addition to POL contamination, up to 12.0 milligrams per liter (mg/L) PCB was detected in groundwater from monitoring wells installed in 1991 (USFWS, 2010).

1.2.1 Previous Investigations at Bethel BIA Headquarters FUDS (F10AK0510)

A number of environmental investigations, assessments, and cleanup actions have been conducted at the 18-acre BIA Administrative Site and adjacent areas over the years. Those relevant to ongoing environmental concerns at the 18-acre parcel are discussed below.

The Pit 3 area is located in the southeast portion of the 18-acre parcel, and is primarily vegetated with willows and alders. A north-south oriented dirt road runs along the west side of where most of the known contamination exists. Vegetation has significantly encroached on the road, and covers much of the debris area. POL-stained and asphalt-covered surface soils and groundwater impacted with PCBs were first documented in the early 1990s (USFWS, 2010).

The former uses of the area are not well understood; however, it is believed to be used as a borrow source for construction of the Composite Building and later used for drum storage while the areas was occupied by BIA.

Little documentation of environmental sampling exists; however, a 1992 PA of the BIA site recommended the removal of approximately 1,900 CY of contaminated soil, based on visual surface staining, bore hole and test pit sampling and the presence of benzene and total petroleum hydrocarbons soil contamination above the ADEC cleanup levels (USFWS, 2010).

The Drum Storage area was initially used as a construction camp during the construction of the Composite Building 413, and later used to store drums. Like Pit 3, past sampling efforts are not well documented but a 1991 PA recommended the removal of approximately 900 CY of contaminated soil. The Drum Storage area includes the collapsed building (Water Building) and monitoring well MW63, and is littered with building and miscellaneous debris.

1991 and 1992 PA

The 1991 PA conducted by the USAF 11th Civil Engineering Operations Squadron Operating Engineers in 1992 included the investigation of three pit areas used as a borrow source and drum storage areas. One of these pits (Pit 3) and a drum storage area falls within the southeast leg of the 18-acre parcel referred to in the PA as "Site 3" of the 125-acre BIA parcel (USFWS, 2009).

Previously, during the 1989-1990 field seasons, the USAF razed the RRS facility, and "retrograded" approximately 700 drums of asphalt and oil products to Elmendorf AFB for disposal. Approximately half of the drums had reportedly been recovered from Pit 3/drum storage areas. A terrain conductivity survey was conducted during the PA to help identify areas where drums, tanks, and other debris may have been buried and to help in choosing drillhole/monitoring well locations (USFWS, 2009).

Pit 3

The 1992 PA Report has the following description of Pit 3/Drum Storage Area: "No liners or containment structures were found in these areas. This area now exhibits POL surface staining in an area approximately 40 feet in diameter and also contains a collapsed wooden building, engine parts, sheet metal, old wooden crates, dog houses, an empty 4,000-gallon fuel tank, and discarded electrical wire. Pit 3 at one time appears to have been used as a borrow source. Inside the pit is an area of POL stained soil and asphalt. The source of the contamination is from the leaking drums previously stored in this area. The area measures approximately 150 feet × 60 feet and is located approximately 900 feet south east of Building 413. No containment structures were used at this site" (USFWS, 2009).

During the PA a large, visibly stained area was observed at Pit 3, which covered approximately 9,000 square feet (sf) of ground surface. Five test borings/monitoring wells were installed in the Pit 3 area (AFMW-58 through AFMW-62). TPH and benzene contamination was found in most of the soil samples collected. Benzene soil results exceeding ADEC cleanup levels were found at Borings RRS-61 and RRS-62 at depth between 7 to 22 feet below ground surface (bgs) with concentrations ranging between 0.552 and 0.668 mg/kg. Groundwater samples from the wells contained up to 59 mg/L TPH and 1.36 mg/L benzene. Groundwater from MWRRS-58 reportedly contained 12.0 mg/L PCB as Aroclor1260. The PA assigned an ADEC non-UST Soil Cleanup Level Matrix Score of 33 to MWRRS-58 and recommended the removal of approximately 1,900 CY of contaminated soil (USFWS, 2009).

Drum Storage Area

Five soil borings and one monitoring well were installed at the drum storage area as part of the 1991 PA. TPH was detected in all five borings with a maximum concentration of 100 mg/kg. Benzene exceeded cleanup levels in soil samples from four borings with concentrations ranging between 0.88 and 5.50 mg/kg at depths between 3 and 12 feet bgs. A groundwater sample from MWRRS-63 yielded results of 3.98 mg/kg TPH and 1.536 mg/L PCB as Aroclor 1260; however, text in the same PA report lists this PCB result as 0.082 mg/kg. The PA assigned an ADEC non-UST Soil Cleanup Level Matrix Score of 35 to the area and recommended the removal of approximately 900 CY of contaminated soil (USFWS, 2009).

1994-Follow-Up Monitoring

The 1994 soil removal conducted by the USAF 611th Civil Engineering Squadron in 1994 focused on the 27-acre parcel and did not include impacted soils at the Pit 3 and drum storage areas on the 18-acre parcel. Continued groundwater monitoring of six monitoring wells at the Pit 3 and Drum Storage areas was performed (or attempted) by EMCON with sampling events in September 1995, June 1996, September 1998, June 1999, September 1999, and August 2000 (USFWS, 2009). DRO was generally detected during each event but only exceeded the cleanup level in AFMW-63 in June 1996 with 1.7 mg/L (USFWS, 2009).

Many of the DRO detections were considered suspect possibly being due to biogenic interference. BTEX results were all ND during all sampling events. Well AFMW-58 did not include DRO analysis in June 1996 due to insufficient water. The September 1998, June and September 1999, and August 2000 events only included one well (AFMW-63) that was sampled for DRO, GRO, BTEX, and semivolatile organic compounds (SVOCs), as all five wells at Pit 3 were dry. While PCB and pesticide analysis were performed on groundwater samples from five other wells at the BIA site (those located outside the 18-acre site; AFMW-15, 19, 23, 53 and 54) in August 2000, the sample from the Drum Storage Area (AFMW-63) was not (USFWS, 2009). Inexplicably, none of the sampling events included PCBs in the analysis for the 18-acre parcel wells. Groundwater sample results are presented in the EMCON reports only on figures (no tables) which are marginally readable in the scanned PDF reports that are available in the AR. Also, the laboratory ID assigned to the sample from AFMW-63 was not provided so that the results could not be cross-checked in the laboratory reports (USFWS, 2009).

Apparently groundwater monitoring was discontinued at the Pit 3 and Drum Storage areas after August 2000, possibly due to lack of groundwater and/or generally low results for DRO. No explanation was given in the EMCON reports as to why the PCB concern was not followed up during the limited continued groundwater monitoring that was performed (USFWS, 2009).

2008 Preliminary Assessment and 2009 Site Investigation (USFWS, 2009 and 2010)

The USFWS hired Bethel Services, Inc. (Bethel) to perform a PA of the 18- and 27-acre BIA Sites in 2008. As part of the PA, Bethel conducted a comprehensive literature review of all available documents relating to the site assessments and environmental remediation activities that pertained to the BIA sites. The PA identified potential data gaps in the site information (USFWS, 2009).

The Site Investigation (SI) for the Bethel BIA site 18-acre parcel was performed for the USFWS in 2009 (USFWS, 2010).

For the 2009 SI, the Drum Storage area was loosely defined area that occupies the central portion of the 18-acre parcel in the vicinity of Monitoring Well (MW) 63, and extended a few hundred feet to the north and west.

The 2009 SI included the following tasks:

- Extensive brush clearing to access the areas of investigation;
- Surface and subsurface soil/sediment sampling for PCB and pesticides at the Former Southwest Sewage Discharge Site;
- Test-pitting and surface/shallow soil sampling in two areas of historic surface spills: Pit 3 and Drum Storage Area;
- Identification of debris and evaluation of debris extent and associated hazards in the vicinity of Pit 3 and the Drum Storage Area;
- Materials sampling associated with debris hazards;

Results of the 2009 SI included the following:

- Pit 3 Area contained contamination exceeding the ADEC soil cleanup levels for RRO and DRO with a volume estimation of 600 to 1,200 cubic feet. Figure 1-4 in the Work Plan shows the results from the Pit 3 SI.
- One sample from the Pit 3 (TP1) area contained trichloroethylene (TCE) and methylene chloride above the ADEC cleanup level. The TCE level was 27.8 J µg/kg and the methylene chloride result was 44.2 J µg/kg.
- Three areas in the Drum Storage Area containing DRO contamination exceeding the ADEC cleanup level with a volume estimation of 50 to 80 CY. Figure 1-5 in the Work Plan shows the results from the Drum Storage Area SI. The maximum DRO result in the Drum Storage Area was 1,810 milligrams per kilogram (mg/kg).
- The Southwest Sewage Discharge Site investigation found PCB concentrations at a level not considered an exposure risk (less than the ADEC cleanup level). One soil sample contained pesticide dieldrin at 26.2 µg/kg, which is above the cleanup level of 7.6 µg/kg.
- PCBs were analyzed in many of the samples collected at the Pit 3 and Drum Storage areas and the results were less than the cleanup level of 1.0 mg/kg for all samples.
- An attempt to sample the monitoring wells at the 18-acre site was unsuccessful due to all wells being dry.

Site Assessment

Site Assessor: Portage Environemtnal, Inc.

Assessment Start Date: 05/15/1997

Assessment Complete Date: 05/18/1997

Assessment Comments: Site Assessment completed under NALEMP by Portage in 1997. SAR completed in 1997 also.

Data Source: Other

Ordnance Risk: Unknown

RAC Score: None

Ordnance Risk Accessibility: Improbable

Ordnance Risk Comments: THE USACE performed an OEW assessmet at the BIA facility of June 3, 1995. The sites were determined to have a RAC score of 0, indicating no OEW Risk.

Data Source: Other

Ordnance Type:

Health Risk: Actual

PA Score: 28 Spilled diesel fuel contaminated large area underlying the area of the tanks.

PAE Score: 0 N/A

RRA Score: N/A N/A

Health Risk Accessibility: Frequent

Health Risk Comments: Old BIA school housed large tank farm of heating oil / diesel. Large spill occurred contaminating large area. A removal action was performed on this site in the late 1980 s. The site was re-opened in 1993 because an additional FUDS eligible project was discovered on the 18 acres that had been transferred to USFWS. This project consists of preparing documentation to meet current guidance and to remove petroleum, oil, and lubricant drums and associated contaminated soil.

Data Source: Other

Media Type: Soil Mitigated: No LTM: No

BD/DR Risk: Actual

BDDR Risk Level: N/A

BD/DR Risk Accessibility: Frequent

BD/DR Risk Comments: Petroleum, oil, and lubricant drums are located on the site. In an email dated 20150701; Andrea Elconin, USACE, confirmed: BD/DR impacts exist that will not be addressed by FUDS.

Data Source: Other Update

Types: Drums Mitigated: No LTM: No

Comments

Comment: In an email dated 20150701; Andrea Elconin, USACE, confirmed: BD/DR impacts exist that will not be addressed by FUDS.
Follow Up Comment: NAMSEI staff corroborated with email dated 20150701. NAMSEI Site Assessment BD/DR Risk Comment data was updated accordingly.

Site Assessment

Site Assessor: Portage Environmental, Inc.

Assessment Start Date: 05/15/1997

Assessment Complete Date: 05/18/1997

Assessment Comments: See 1997 SAR for specifics relating to this site. Pat Seccomb conducted the site assessment for this site.

Data Source: Other

Ordnance Risk: Unknown

RAC Score: None

Ordnance Risk Accessibility: Improbable

Ordnance Risk Comments: The USACE performed a OEW assessment of the Bethel Airport on September 29, 1992. The sites were determined to have a RAC score of 0, indicating no OEW Risk.

Data Source: Other

Ordnance Type:

Health Risk: Actual

PA Score: 21 The bulk of the materials are containerized posing little risk.

PAE Score: N/A

RRA Score: N/A N/A

Health Risk Accessibility: Frequent

Health Risk Comments: Metal debris, hazardous structures and an abandoned asphalt plant still exists at the site. USACE plans no further action at this site.

Data Source: Other

Media Type: Soil Mitigated: No LTM: No Soil Mitigated: No LTM: No

BD/DR Risk: Actual

BDDR Risk Level: Medium

BD/DR Risk Accessibility: Frequent

BD/DR Risk Comments: Metal Debris, hazardous structures and an abandoned asphalt plant sill exist at the site and the USACE plans no further action for this site. In an email dated 20150701; Andrea Elconin, USACE, confirmed: BD/DR impacts exist that will not be addressed by FUDS.

Data Source: Other Update

Types: Concrete Pads or Foundations Mitigated: No LTM: No Drums Mitigated: No LTM: No Scrap Metal (misc.) Mitigated: No LTM: No

Comments

Comment: In an email dated 20150701; Andrea Elconin, USACE, confirmed: BD/DR impacts exist that will not be addressed by FUDS.
Follow Up Comment: NAMSEI staff corroborated with email dated 20150701. NAMSEI Site Assessment BD/DR Risk Comment data was updated accordingly.

APPENDIX C

Site Safety and Health Plan

REMOVAL ACTION WORK PLAN

Bethel BIA HQ and Bethel Airport NALEMP Sites
Bethel, Alaska

APPENDIX C
SITE SAFETY AND HEALTH PLAN

Revision 1 (Final)

February 2018

Prepared for:

Orutsaramiut Native Council
P.O. Box 927
Bethel, AK 99559

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
BIA	Bureau of Indian Affairs
BNC	Bethel Native Corporation
Bristol	Bristol Environmental Remediation Services, LLC
CFR	Code of Federal Regulations
cy	cubic yards
HAZWOPER	Hazardous Waste Operations and Emergency Response
HQ	Headquarters
JHA	Job Hazard Analysis
NALEMP	Native American Lands Environmental Mitigation Program
ONC	Orutsaramiut Native Council
OSHA	Occupational Safety & Health Administration
PPE	personal protective equipment
ROPS	rollover protection system
SDS	Safety Data Sheet
SS	Site Superintendent
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan

1.0 INTRODUCTION

This Site Safety and Health Plan (SSHP) has been prepared by Bristol Environmental Remediation Services, LLC (Bristol), as a control mechanism for the work to be performed during a planned removal action to be conducted at the Bethel Bureau of Indian Affairs (BIA) Headquarters (HQ) and Bethel Airport – Infantry Area in Bethel, Alaska.

The work will be performed by the Orutsaramiut Native Council (ONC) under the Native American Lands Environmental Mitigation Program (NALEMP). The ONC NALEMP Coordinator and their appointed personnel will be performing the planned Removal Action. ONC personnel will remove and containerize nonhazardous surface debris from two sites that were identified during a 2017 site investigation. All identified work will be taking place on land owned and controlled by the Bethel Native Corporation (BNC).

All field personnel are required to read and understand the SSHP. Personnel assigned field tasks for this project must agree to abide by the SSHP by signing the Certificate of Worker/Visitor Acknowledgement Form. All visitors will be required to sign the Safety Compliance Agreement Form.

Safety and health guidelines and requirements are based on a review of available information concerning hazards expected to exist at the work site. The SSHP identifies health and safety procedures and equipment required to minimize the potential for deleterious occupational exposures and injuries. The SSHP may be modified by the Bristol Project Manager and the Site Safety and Health Officer (SSHO)/Field Manager, should additional information concerning potential hazards be obtained.

The purpose of the SSHP is to address chemical, biological, and physical hazards likely to be encountered at the project sites during field activities. This SSHP is based on the requirements of *Title 29 Code of Federal Regulations (CFR), Part 1910.120 (29 CFR 1910.120)* and *29 CFR 1926.65*.

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2.0 GENERAL ACTIVITIES

Site activities will consist of the following:

- Work plan preparation;
- Mobilization to and demobilization from the Bethel BIA HQ and Bethel Airport sites;
- Brush and/or debris removal to improve access to the sites;
- Remove and containerize up to 500 cubic yards (cy) per site of nonhazardous military surface debris identified during the 2017 site investigation, including transport and disposal;
- Reporting.

2.1 ORGANIZATION AND RESPONSIBILITIES

Project organization and key personnel responsibilities under this plan are described below.

2.1.1 Project Management

2.1.1.1 Bristol Project Manager

The Bristol Project Manager's (PM) primary function is to work with the ONC NALEMP Coordinator to ensure that all technical, financial, and scheduling objectives of the project are achieved successfully.

2.1.1.2 ONC NALEMP Coordinator

The ONC NALEMP Coordinator will be responsible for supplying all field investigation equipment and ONC personnel, oversee all site reconnaissance and investigation activities, and will provide and supervise all ONC personnel. The ONC NALEMP Coordinator will also provide additional workers and equipment necessary to perform removal activity, as required.

2.1.1.3 ONC Site Superintendent

The ONC Site Superintendent (SS) is primarily responsible for implementing the safety program at the project on a daily basis. The SS has direct control of the crews. This means they also have the most direct control of the safety program in the field. The importance of the SS's safety efforts cannot be overstated.

2.1.1.4 ONC Site Safety and Health Officer

The SSHO will be responsible for field implementation of the SSHP. The SSHO's responsibilities include communicating site requirements to personnel, field observation and monitoring of safety conditions, consultation with the Health and Safety Manager regarding appropriate changes to the SSHP, and implementation of plan requirements and contingencies in response to changing field conditions. This individual will be responsible for the implementation and verification of compliance with the SSHP. The SSHO has the authority to stop work when it is determined that injury is likely to occur because of existing work conditions.

2.1.2 Additional Site Personnel

All site personnel, including subcontractors, are responsible for following safety and health rules and regulations, following respective company policies, and adhering to the SSHP. Site workers will be instructed to immediately report unsafe conditions, accidents, exposures, and injuries to the SSHO. A morning safety briefing will be held daily and each site worker will sign a Daily Safety Meeting Sheet (Attachment 1).

Site-specific hazard communication training will be held at the start of the project. Site workers are responsible for reading, understanding, and signing the SSHP.

2.1.2.1 Subcontractors

The SSHO is responsible for providing subcontractors with information on expected hazards and SSHPs. Subcontractors are required to conform to the minimum requirements

of the SSHP. Subcontractors may use additional health and safety measures at their discretion. Training, medical surveillance, and personal protective equipment (PPE) used by the subcontractor will be provided by the subcontractor. Upon request, documentation of subcontractor training and medical surveillance will be provided by the subcontractor and retained on file by the ONC.

2.1.2.2 Visitors

During the course of field activities, visitors may come to the site. All visitors will be required to comply with applicable portions of this SSHP, check in with the 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 and emergency procedures associated with the site. All visitors must sign the Certificate of Worker/Visitor Acknowledgment form after the briefing.

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3.0 HAZARD ASSESSMENT

Potential hazards inherent to site activities are identified for developing and describing strategies for job safety. This section describes the types of hazards that may be encountered, and the controls that will be used to control or eliminate those hazards.

3.1 CHEMICAL HAZARDS

Chemical hazards anticipated on this project include possible exposure to lead, metals, petroleum products (gasoline or diesel), petroleum vapors, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). The primary routes of entry are through inhalation, skin absorption, or through ingestion, if proper personal hygiene protocols are not followed. The primary route of entry of the petroleum vapors is through inhalation. Safety Data Sheets (SDS) for the identified chemical hazards will be provided to the site workers to review during site-specific hazard communication training.

Health effects from identified chemical hazards vary from acute to chronic, based on tabulated data from Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health. Proper PPE should provide adequate protection against onsite chemical hazards.

Decontamination procedures will be performed to protect people both on and off site, and to minimize the spread of petroleum contamination.

3.1.1 Equipment Decontamination

Decontamination of large equipment, if required, will involve brushing and sweeping off the equipment, followed by a soap wash and rinse or pressure wash, if obvious staining is present. Hand tools and other items may remain in contaminated areas until the task is complete. Full decontamination of tools and equipment may or may not be necessary until the project is completed, depending on the sequence of work activities. The SSHO will establish exclusion zones and contamination-reduction zones, as needed. Subcontractors,

as well as ONC operators, are responsible for decontamination of equipment and will perform decontamination to the satisfaction of the SSHO.

Safety procedures related to pressure washing include:

- Never point a pressure washer at yourself or others;
- Never attempt to push or move objects with spray from the washer;
- Wear eye, ear, and/or full face protection;
- Utilize rubber-soled shoes and rubber gloves.

3.1.2 Personnel Decontamination

Level D PPE, at a minimum, will always be worn. Should site conditions require personnel to come into contact with contaminated materials, the SSHO will determine if higher levels of PPE will be required. Decontamination methods for equipment and personnel will be monitored by the SSHO to determine their effectiveness. Full-body protection with inner and outer suits, gloves, boots, and respiratory protection is not anticipated for any operations during the site reconnaissance and investigation. Decontamination operations will require that site personnel minimize contact with cleaning solutions by wearing eye protection, rubber gloves, and splash suits, as appropriate. If full-body PPE is required for some site operations, the sequence of clothing removal will be as follows:

1. Brush or scrape gross contaminants off boots.
2. Wash and rinse outer boot.
3. Wash and rinse outer glove.
4. Remove, wash, and rinse suit.
5. Remove outer boot.
6. Remove outer glove.
7. Remove suit.
8. Remove inner glove.
9. Perform personal shower and clothing change.

If gross contamination results from an unexpected release of a hazardous material, decontamination will involve the immediate removal of contaminants that may have contacted skin or eyes, or breached outer clothing.

3.2 PHYSICAL HAZARDS

The potential physical hazards associated with this project include: unstable footing conditions, movement of surface debris and of heavy equipment, underground utilities, noise, and adverse weather. Physical Agent Data Sheets (PADS) are included as Attachment 2.

3.2.1 Unstable Footing Conditions

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

- Uneven terrain;
- Slippery soil and rocks; and
- Standing water.

3.2.2 Movement of Containers

ONC will be loading nonhazardous surface debris into containers that will be transferred off site. Dumpsters and other containers may also be on site for the purpose of containerizing nonhazardous materials found or generated during the field effort.

The potential hazards related to these activities include the following:

- Overexertion during lifting and moving – surface debris will be moved by heavy equipment; if drums are present they may be manipulated into and out of place for movement by heavy equipment;
- Pinching or mashing of fingers or toes during movement.

Workers will be instructed in proper lifting techniques to minimize risk of back injury or other strains/sprains. Heavy lifting will be performed on level ground, by two-man teams,

or in some instances, special lifting/transport equipment (power tailgate, drum caddy, etc.) may be used. Heavy lifting and movement will be performed by heavy equipment whenever possible. Personnel will move clear of containers prior to lifting/moving using the heavy equipment.

3.2.3 Heavy Equipment and Vehicle Operation

Heavy equipment will be used on this project. There is a potential for workers to be struck by these vehicles, or to be injured by contact with exposed mechanical parts. In addition, there is a risk of vehicle accidents and of fire during refueling. To control these hazards, regulated work areas will be established around each job site, and safe distances will be maintained between workers and mechanical equipment.

All equipment and vehicles brought to the job site will be inspected for structural integrity, cleanliness, operational performance, and proper functioning of safety devices in accordance with the manufacturers' specifications before being 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 manufacturer.

3.2.4 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 they will be using. Equipment operators may also be required to be certified to operate certain types of OSHA-regulated vehicles, such as forklifts.

3.2.5 Equipment and Vehicle Safe Work Practices

Operators, drivers, and passengers must wear seat belts at all times. Operators must wear complete Level D PPE at all times, except that hard hats may be removed (but immediately accessible) when the operator is within a fully functional rollover protection

system (ROPS). The operator must immediately don his or her hard hat upon leaving ROPS. Drivers and operators must have a valid driver's license and 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 the vehicle. Under no circumstance will personnel ride on fenders, running boards, or vehicle tops; in buckets; 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 types 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:

1. Make eye contact with the operator (and spotter).
2. Signal the operator to cease heavy equipment activity, if applicable.
3. Approach the equipment operator and inform the operator of intentions.

Prior to 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 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.

3.2.6 Underground Utilities

Prior to any investigation or earthmoving activity, underground utilities will be located and marked by competent persons. Although the sites are undeveloped, the ONC NALEMP Coordinator will call the Alaska DIGLINE (1-800-478-3121) to schedule a utility locate for both sites at least 10 days prior to subcontractor mobilization to the site. This process will verify that no underground utilities are present near excavation or soil boring locations. Extreme care will be used when excavating or drilling near underground utility lines.

All lines will be considered to be energized or active until physically disconnected or de-energized by a responsible authority. No ONC personnel will disconnect or tamper with any utility line. The local utility company will be contacted to resolve any questions about utility line status.

3.2.7 Thermal Stress

Because all planned work activities will be conducted outside, there is a risk that site workers could develop cold stress or heat stress, depending on the time of year in which field activities are performed. The likelihood of 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. The SSHO, for example, may 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.

3.2.8 Wind Exposure

In windy conditions it is important to prevent heat loss from as many areas of the body as possible. Exposed limbs and head are major areas of heat loss. The trunk and the head should be warm enough so that the brain is able to command the blood vessels in the hands and feet to open up and keep the extremities warm.

3.2.9 Noise

All heavy equipment can produce hazardous noise levels in excess of 85 decibels. The SSHO will determine when potential noise exposure is hazardous, and protective measures should be taken. However, whenever heavy equipment is operating, site workers and equipment operators will use hearing protection. The primary hazard associated with noise exposure is hearing loss, which is easily preventable with proper precautions and use of PPE.

3.3 BIOLOGICAL HAZARDS

3.3.1 Bear Safety

Bears may be present at the work sites and field personnel should be aware of the potential risks posed by these animals. While bear encounters are relatively unusual, and most encounters end peacefully with the bear retreating from the area, they do occur. Field personnel should be alert to signs of bear activity and the potential presence of bears in the area during performance of fieldwork. The following bear-related issues should be considered:

- Bears are attracted by food odors, and are typically most active early and late in the day.
- Bears often frequent stream areas, especially when salmon are present.

- Bears will occasionally rise up on their hind legs to get a better look at a person. This usually is not indicative of a charge.
- A lowered head, sideways glances, baring of teeth, and/or huffing and barking, on the other hand, are indications of an unhappy bear, and may precede aggressive actions.
- If a bear is observed feeding on a carcass in the vicinity of a site, work will be postponed at that site until feeding has been completed.

If a bear encounter does occur, depending on the type of bear and the situation, your actions can reduce the likelihood of an unpleasant outcome. If the bear is a black bear, or a young brown bear, it may be effective to make noise and wave your arms to drive the bear off. An air horn can often be used effectively for this purpose. However, this could also increase the bear's anxiety level and increase the danger to yourself. Generally, it is best to back away from the bear slowly, if possible. Do not turn your back on the bear, and never run from a bear, as this may provoke instinctive aggression.

If the bear acts aggressively, and it appears that a charge may be imminent, mentally prepare yourself to take defensive action. Equipment may be used to shield yourself from the bear, or to defend yourself from the bear if the need arises. When and if a bear charges, make an attempt to stand still. While this may sound difficult, the charge may be a bluff, and in any case, running from a charging bear would be ineffective. If the charging bear makes contact with you, drop to the ground and roll into a ball with your arms wrapped around your head and neck. Use any equipment available to shield yourself, especially your head and neck, from the bear. If the bear is a black bear, it may be effective to fight back aggressively. If the bear is a brown bear, it is probably best to remain as still as possible until the bear leaves.

4.0 SITE CONTROL

4.1 WORK ZONES

Work zones will be established for each investigation area. Work zones may be demarcated by barricades, orange cones, or barrier tape, as appropriate. Emergency exit routes from the work area will be determined upon arrival at the site.

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5.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment will be provided when hazard control methods are determined to be impractical or inadequate to protect the worker. By providing for the proper selection, training, use, and maintenance of PPE, worker exposure to hazardous agents can be minimized. The site hazards specific to this project regarding PPE are those associated with physical conditions related to the type of project.

5.1 LEVEL D PPE

All site work will initially be conducted in Level D PPE. Level D PPE includes:

- Hard hats – Hard hats will comply with *American National Standards Institute (ANSI) Z89.1-1969*;
- Safety boots – Steel-toe boots are required and steel shank boots are recommended. Footwear will comply with *ANSI Z41.1-1967*;
- Hearing protection as required;
- Eye protection such as safety glasses or goggles;
- Latex/neoprene/nitrile or leather gloves; and
- Cotton or chemical/fluid-resistant coveralls and safety vests.

If site conditions change or new information becomes available, the SSHO will modify PPE requirements to address the change in site conditions. If a PPE upgrade is required, workers will be responsible for inspecting their PPE for cracks, holes, and proper fit. If any abnormalities are found, the worker shall report the defect to the SSHO. Workers also need to be aware of the limitations of provided PPE. Table 1 provides known PPE limitations for the PPE selected:

Table 1 PPE Limitations

PPE Items	Limitations
Hard Hat	Hard hats should not be painted, nor have holes drilled into them. These are considered damaged and damaged hard hats cannot protect properly. In addition, hard hats should be worn in the manner in which they were designed—not turned around backwards (bill of hard hat always faces forward).
Safety-Toe Footwear	The steel-toe shield can cause cold feet in cool weather. Heavy wool socks are helpful.
Hearing Protection	Earplugs and muffs have to be inserted or cover the ears as specified by manufacturer, or they will not protect to their maximum capability.
Eye Protection	Safety glasses may restrict the workers field of vision.
Gloves	Gloves wear out and/or get ripped and torn. Gloves also reduce finger dexterity. Daily inspections should be completed and gloves replaced if they are determined not to be in good condition.
Protective Clothing (Coveralls and Safety Vests)	Coveralls are not complete chemical barriers and will not prevent skin punctures or cuts. Coveralls also are subject to tearing, fluid absorption, and retaining body heat.

6.0 HAZARD COMMUNICATION PROGRAM *(29 CFR 1910.1200)*

The Hazard Communication Manager will be the SSHO. The Hazard Communication Program will be conducted in accordance with federal regulations. A variety of communications systems will be used for onsite and offsite communication. These include telephones, cellular telephones, hand signals, and posting of information.

Before starting field operations, the ONC SSHO will coordinate with the ONC NALEMP Coordinator to establish a reliable method of communication for emergency operations. If needed, satellite telephones, walkie-talkies, etc., should be made available for use on site.

In case of a site emergency, workers are to remove themselves from danger, inform fellow workers, make a quick assessment of conditions, and contact the SSHO. The SSHO will contact emergency personnel required to handle the emergency condition.

6.1 HAND SIGNALS

Basic hand signals to be used on site are as follows:

Signal		Meaning
Hands On Throat	=	Out of Air / Can't Breathe
Thumb Up	=	I'm OK / I Understand
Thumb Down	=	No / Negative
Forward Crossed Wave	=	Problem / Needs Help
Grip Wrist	=	Exit Immediately

6.2 POSTING EMERGENCY INFORMATION

Emergency phone numbers will be placed in the vehicle of the SSHO. The following information will be posted:

- Emergency telephone numbers for Fire Department, Police Department, and Emergency Medical Personnel;
- Name and telephone number of the SSHO.

6.3 SAFETY AND HEALTH BRIEFINGS

Safety and health briefings will be provided to workers on a task-by-task basis to address specific operations and activities, as well as daily Toolbox Safety Meetings at the start of each shift. Safety briefings will be documented as to content, date, and attendance.

7.0 TRAINING

All site workers shall be qualified to perform their designated duties, based on their experience, education, and training. Enforcement and continuous reinforcement will be implemented through daily safety meetings, and one-on-one discussion.

7.1 INITIAL AND REFRESHER TRAINING

The OSHA Regulation *29 CFR 1910.120* describes training requirements for persons working at hazardous sites. This regulation clearly identifies the level of training to be provided. Documentation of such training will be available on site. All site workers are required to complete Hazardous Waste Operations and Emergency Response (HAZWOPER) training and refresher classes, as required.

7.2 SUPERVISORS

Worker supervisors shall have an additional eight hours of health and safety training commensurate with their duties, as per *29 CFR 1910.120(e)(4)*.

7.3 PROJECT-SPECIFIC TRAINING

Project-specific training will include:

- Cardiopulmonary resuscitation/first aid (at least one person on site);
- 40-hour HAZWOPER or current eight-hour refresher.

7.4 HAZARD COMMUNICATION TRAINING

SDSs will be available to workers for each hazardous agent they might encounter. Safety briefings will include a review and location of the SDS. Any known hazardous materials that might expose the worker will be discussed prior to beginning work. SDSs will be maintained at the ONC NALEMP office.

As part of the site-specific training, the following topics will be addressed.

- The information in the SSHP;
- Communication of physical or chemical properties of any known hazards;

- Hazard communication for materials brought onto the site that were not covered at the time of start-up;
- Use, limitations, and proper fit of PPE;
- The proper donning and doffing of PPE;
- Emergency procedures, including spill prevention and response;
- Bloodborne pathogens briefing.

7.5 TRAINING DOCUMENTATION

All applicable training documents and certifications will be maintained at the ONC NALEMP office and archived after project completion.

7.6 VISITORS

Visitors are not anticipated to be involved on this project. However, if bystanders are present, they will be required to stay outside of all work zones and away from site equipment.

8.0 RECORDKEEPING AND REPORTING

Health and safety records will be maintained at the ONC office to fulfill all OSHA, workers' compensation, and insurance recordkeeping requirements.

8.1 INJURY AND ILLNESS RECORDKEEPING AND REPORTING REQUIREMENTS

OSHA No. 300 - Log and Summary of Occupational Injury and Illness: The ONC will maintain this log at the ONC corporate office. Each recorded injury or illness is entered in the log within six days after notice that a recorded case has occurred (*29 CFR 1904.2*).

Incident Report Form: A copy of this report (or insurance claim report) must be available within seven days after receiving notice that a recorded case has occurred (*29 CFR 1904.4*).

OSHA Fatality and Multiple Injury Notification: The nearest OSHA office must be contacted within eight hours of being notified of an occupational fatality or multiple injuries (*29 CFR 1904.8*).

8.2 SITE SAFETY INSPECTIONS AND LOGS

Site safety inspections will be documented in the project log that will be maintained on site for the duration of the operation. This documentation will include safety inspections, work summaries, safety meetings, and incident investigations, etc.

(Intentionally blank)

9.0 MEDICAL SURVEILLANCE

The ONC will comply fully with *29 CFR 1910.120 (f)(6)* and *29 CFR 1926.65 (f)(6)* at all times.

9.1 MEDICAL PROGRAMS

The medical program administered by the ONC should include provisions and procedures for:

- Pre-employment/exit physicals as required;
- Ongoing medical surveillance;
- Hearing tests;
- Vision tests.

The specific requirements for this project include all of the above. These tests will be completed before the worker begins working on site. The occupational physician performing the physical examination is given a list of known hazards and contaminants on the site prior to fit-for-work examination and testing.

9.2 EMERGENCY MEDICAL SURVEILLANCE

Emergency medical surveillance must be provided within 72 hours of:

- A worker being exposed to hazardous material during an emergency;
- A worker exhibiting signs and symptoms of exposure;
- A worker losing consciousness.

Any worker who receives emergency medical surveillance will not be allowed to work at the site until a physician has issued a certificate of medical fitness.

Emergency decontamination will be initiated by personnel on site as needed.

(Intentionally blank)

10.0 EMERGENCY PROCEDURES

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

10.1 MEDICAL EMERGENCIES

First-aid kits will be made available at the site to treat injured workers requiring medical attention. Consistent with the site-specific briefing on bloodborne pathogens, care will be taken to guard against blood or other bodily fluids being transferred to another worker. Gloves and other barriers will be used.

If the medical emergency is beyond the capability of the first-aid providers, emergency medical services will be contacted by calling "911." ONC site workers will be briefed on the buddy system and the importance to call for help and stay safe.

For urgent care, or if the emergency requires transportation of a worker to medical facilities by site personnel, specific directions and facility contacts are included in Attachment 3.

10.2 FIRE RESPONSE

To report a fire, call "911." The call numbers for the fire department will be verified with tribal contacts upon arrival. ONC employees and subcontractors are not required to obtain training in firefighting.

10.3 ENVIRONMENTAL EMERGENCIES

The Site Superintendent and SSHO will assess environmental emergencies, such as leaks or spills. The tribal contact will contact the appropriate agency or authorities, as necessary. Appropriate spill response kits will be maintained on site, as necessary.

10.4 EMERGENCY INFORMATION

Emergency information will be posted at the site and will include:

Organization/Personnel	Phone Number
Fire Department	911
Police Department	911
ONC NALEMP Coordinator – Mary Matthias	(907) 543-2608 / (907) 545-3399
ONC Site Superintendent – To be determined (TBD)	(907) 543-2608
ONC SSHO – TBD	(907) 543-2608
Hospital – Bethel (Yukon-Kuskokwim Health Corp.)	(907) 543-6000
Bethel Family Clinic	(907) 543-3773
Bristol Project Manager – Tyler Ellingboe	(907) 563-0013 / (907) 230-2757

Notes:

NALEMP	=	Native American Lands Environmental Mitigation Program
ONC	=	Orutsaramiut Native Council
SSHO	=	Site Safety and Health Officer
TBD	=	to be determined

10.5 SPILL PREVENTION PROGRAM

In the event a spill is detected on site, the steps and procedures listed below must be taken to protect the health and safety of nearby persons. Workers will be expected to:

- Evacuate the area and contact the appropriate emergency response agency;
- The Response Team will initiate the emergency response plan;
- Swiftly transport any victims to the nearest medical facility for observation.

10.6 RELEASE REPORTING AND NOTIFICATION

All spills will be immediately reported to the SSHO for purposes of completing reports, and for contacting the necessary agencies. Any Regulatory Agency contacts are to be made through the ONC NALEMP Coordinator.

10.7 EVALUATING EMERGENCY PREPAREDNESS

The SSHO will contact the ONC NALEMP Coordinator in case of any emergency, and will comply with all directions given. Debriefings after any incident will include summaries from participants as to changes needed and overall critique of the plan. Changes, reviews, and updates made to the plan may result from actual field conditions, or because of changing conditions. The Incident Report Form is included in Attachment 4.

10.8 ADVERSE WEATHER

In case of adverse weather, the SSHO will determine if work can continue without sacrificing the health and safety of field workers. Some of the items to be considered prior to determining if work should continue are:

- Extreme heat, or cold, and wind;
- Heavy precipitation;
- Limited visibility;
- Electrical storms;
- Potential for accidents.

(Intentionally blank)

11.0 FIELD TEAM REVIEW

Each Field Team member shall sign this section after site-specific training is completed, and before being permitted to work on site.

I have read and reviewed the Site Safety and Health Plan and understand the information presented. I will comply with the provisions contained therein.

Project Site:		
Signature	**Print Name**	**Date**

(Intentionally blank)

ATTACHMENT 1

Daily Safety Meeting Sheet

DAILY SAFETY MEETING SHEET

Each crew member must sign and date the following form to document attendance at the safety meeting.

Project Site:		
Signature	**Print Name**	**Date**

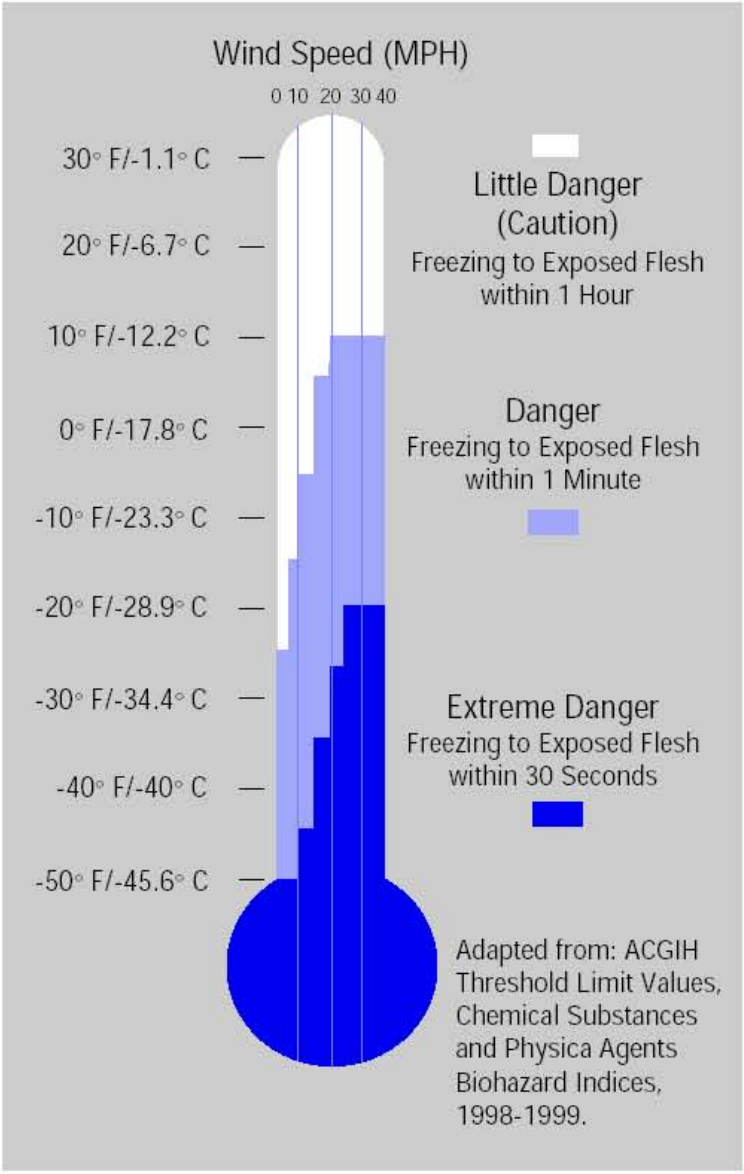
ATTACHMENT 2

Physical Agent Data Sheets

THE COLD STRESS EQUATION

LOW TEMPERATURE + WIND SPEED + WETNESS = INJURIES & ILLNESS

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



OSHA 3156
1998

FROST BITE

What Happens to the Body:

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

What Should Be Done: (land temperatures)

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

HYPOTHERMIA - (Medical Emergency)

What Happens to the Body:

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

What Should Be Done: (land temperatures)

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

What Should Be Done: (water temperatures)

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

How to Protect Workers

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

Workers Are at Increased Risk When…

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

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 should not 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 3

Emergency Contact Information

Minor emergency medical care is available from the Yukon-Kuskokwim Health Corporation, in Bethel, Alaska, or from the Bethel Family Clinic. Major medical emergency care is available from Providence Medical Center in Anchorage, Alaska.

EMERGENCY SERVICES AND CONTACTS:

Contact information for emergency medical services, police departments, and fire departments, as well as directions to the nearest hospital is provided below.

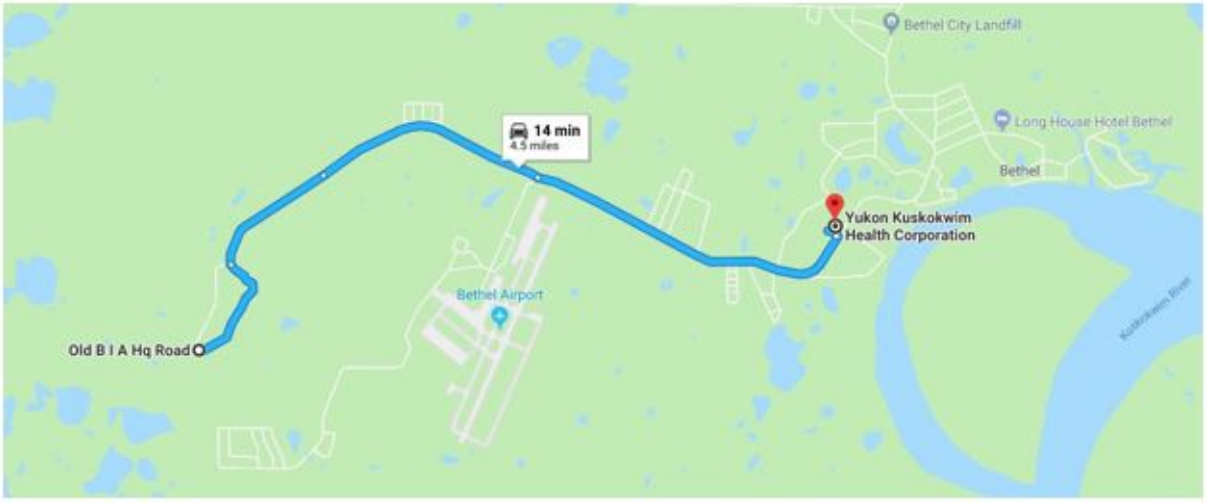
Organization/Personnel	Phone Number
Ambulance	911
Bethel Fire Department	911 / (907) 543-2131
Police Department	911
Hospital – Bethel (Yukon-Kuskokwim Health Corp.) 528 Chief Eddie Hoffman Hwy. Bethel, Alaska 99559	(907) 543-6000
Bethel Family Clinic 631 Main St. Bethel, Alaska 99559	(907) 543-3773
Hospital – Anchorage (Providence Medical Center)	(907) 562-2211
Poison Control Center	(800) 233-3360
National Response Center	(800) 424-8802
Centers for Disease Control and Prevention	Day (404) 329-3311 Night (404) 329-3644

OTHER EMERGENCY CONTACTS:

Bristol Project Manager (Tyler Ellingboe)	(907) 563-0013 / (907) 230-2757
Bristol Anchorage Office	(907) 563-0013
ONC NALEMP Coordinator (Mary Matthias)	(907) 543-2608 / (907) 545-3399
ONC Site Superintendent - TBD	(907) 543-2608
ONC SSHO - TBD	(907) 543-2608

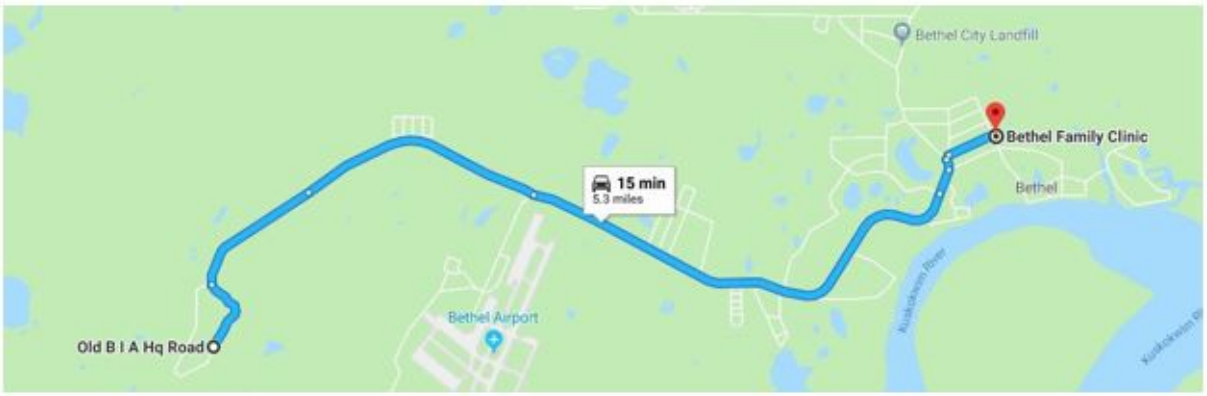
Notes:

NALEMP = Native American Lands Environmental Mitigation Program
ONC = Orutsararmiut Native Council
SSHO = Site Safety and Health Officer
TBD = to be determined



Directions from Bethel BIA HQ to Yukon Kuskokwim Health Corporation – Hospital

Head northeast on Old BIA HQ Road toward BIA Road. Slight right and continue on BIA Road. Slight left onto Chief Eddie Hoffman Highway for 1.8 miles. The Yukon Kuskokwim Health Corporation will be on the left.

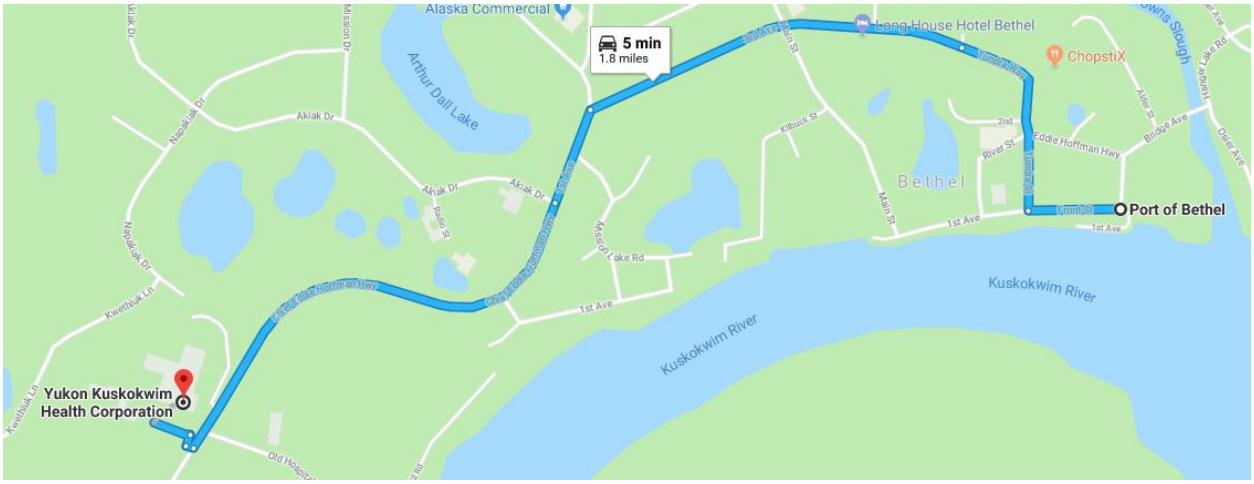


Directions from Bethel BIA HQ to Bethel Family Clinic

Head northeast on Old BIA HQ Road toward BIA Road. Slight right and continue on BIA Road. Slight left onto Chief Eddie Hoffman Highway. Continue onto 1st Avenue/State Highway. Slight left onto Ridgecrest Drive. Turn right onto Willow Street. Turn right onto 4th Avenue. Turn right at the 1st cross street onto Main Street. The Bethel Family Clinic will be on the right.

Directions from Bethel Airport – Infantry Area to the Port of Bethel (By boat)

Travel approximately 0.35 miles southeast from the Infantry Area to the Boat Landing Area. From the boat landing area, travel south by boat down the Napaskiak Slough. Once the Napaskiak Slough meets the Kuskokwim River turn right. Head north up the Kuskokwim River for approximately 6.5 miles to the Port of Bethel.



Directions from the Port of Bethel to the Hospital - Yukon Kuskokwim Health Corporation (By car / truck)

From the Port of Bethel travel west on Front Street toward Tundra Street. Turn right on Tundra Street. Continue onto 3rd Avenue for 0.5 miles. 3rd Avenue turns left and becomes Chief Eddie Hoffman Highway. Continue on Chief Eddie Hoffman Highway for 0.7 miles. The hospital (Yukon Kuskokwim Health Corporation) will be on the right.

ATTACHMENT 4

Incident Report Form

Bristol Incident Report Form

Report date: _____

Type of Incident	Description
☐ Injury or Illness	Includes cases of First Aid or greater
☐ Motor vehicle	Was anyone injured? (Y/N) (If yes fill out Injury/Illness section below)
☐ Fire	Any fire, including incipient stage, must be reported
☐ Property Damage	Was there more than $2,000 in property damage (Y/N)
☐ Spill	Any spill of liquid (e.g., fuel, hydraulic fluid) to the ground surface or water that exceeds SWPPP, EPP or contract requirements
☐ Near Miss	An event where an incident could have occurred. *Report any near miss incident as per the potential for damage/injury*

Reporting Log (include date and time)

Notification to	Date & Time
Supervisor	
SSHO (if project incident) or NA	
Axiom (injury only)	
Company manager	
Corporate Health & Safety	
Client (if applicable) or NA	

Only members of Bristol's Corporate Health and Safety Department shall notify external regulatory authorities.

General Information

Company: _____ Job number (if applicable): _____

Supervisor or Site Superintendent Name: _____

Date of Incident: _____ Time of Incident: _____ Person Completing Worksheet: _____

Location Information

Exact Location of Incident: _____ Project/Facility Name: _____

State: _____ City: _____

Person Involved *If injury/illness incident employee who was injured or ill. If Motor Vehicle, Fire, Property Damage or Spill incident employee who caused or was involved in incident*

Does this person have an injury/illness? (Y/N) (If yes fill in additional information in Injury/Illness section below

Last Name: _____

First Name: _____

Middle Initial: ___ Age: _____ Gender: _____

Time Started Work: _____ Job Title: _____

Date Hired: _____ Employer: _____

Incident Information

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."

Witnesses *include names of witnesses (Name/Phone #)*

Complete for Injury and Illness Incidents

Additional Information from Injured/Ill Person

Date of Birth

Street Address

City State Zip

Physical Description of Injury or Illness

Type of injury Body part

Extent of injury (from where to where

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*.

Physician or Health Care Professional Information

Name of physician or health care professional

Name of facility of treatment

Facility street address

City State Zip

Was employee treated in an emergency room? (Y/N)

Was employee hospitalized overnight as an in-patient? (Y/N)

Please attach a release form for return to work if applicable

Physician's comments or notes

Did employee refuse medical attention beyond first aid? (Y/N) If Yes, explain

Signatures

Name (person completing report) Title

Signature (person completing report) Date

Name (employee)

Signature (employee) Date

Submit completed form to ***#Incident Reporting and Investigation***

APPENDIX D

Standard Operating Procedures

INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

STANDARD OPERATING PROCEDURE

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: If appropriate, hazardous 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 – 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.
- 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.

FIELD DOCUMENTATION
STANDARD OPERATING PROCEDURE

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.

EXCAVATION AND TRENCHING

STANDARD OPERATING PROCEDURE

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. A more conservative guideline should be followed 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.
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 ONC 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

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.

GENERAL BACKFILL AND COMPACTION

STANDARD OPERATING PROCEDURE

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.

TRIMBLE GEOXH® GLOBAL POSITIONING SYSTEMS STANDARD OPERATING PROCEDURE

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®. GPS Units are utilized 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 ONC team, its subcontractors and/or clients. Resulting data are often used in Geographic Information System (GIS) software for digital mapping purposes. In some instances, ONC 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.

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 ONC'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 –** 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 –** 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. 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.

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. ONC 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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APPENDIX E

Forms

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

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REMEDIATION SERVICES, LLC

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