Phase IV Remedial Investigation
Northeast Cape
St. Lawrence Island, Alaska

June 2005

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EXECUTIVE SUMMARY

This report presents the results of our 2004 Phase IV Remedial Investigation (RI) at Northeast Cape, St. Lawrence Island, Alaska. The Phase IV RI was conducted by Shannon & Wilson, Inc. under Hazardous, Toxic, and Radioactive Waste (HTRW) Contract DACA85-03-D-0003, Task Order 0006. Northeast Cape is the site of a former military installation on St. Lawrence Island, which operated from the 1950's to 1972. The project was conducted in general accordance with Shannon & Wilson's August 2004 document, "Work Plan, Phase IV Remedial Investigation Northeast Cape, St. Lawrence Island, Alaska."

The Phase IV RI tasks were to prepare work plans and implement the field investigation and sample analysis program, and prepare this RI data report on the results of the field activities as specified in the US Army Corps of Engineers' (USACE) 30 January and 15 July, 2004 statement of work (SOW) documents. The Phase IV RI program was developed to address data gaps identified in previous investigations and refine estimates of impacted soil volumes. The 2004 Phase IV RI data may also be used with previous RI and risk assessment results to develop site-specific cleanup goals, determine possible remedial alternatives, and support a feasibility study.

The Phase IV RI consisted of data collection from fifteen discrete sites within the Northeast Cape installation. At each site, field and analytical samples were collected to document the presence, magnitude, and distribution of target constituents of potential concern (COPCs) in the surface soil, subsurface soil, sediment, surface water, and/or groundwater media. At selected sites where petroleum hydrocarbons were detected, samples were further tested to evaluate relative contributions from potential anthropogenic sources (fuel releases) and biogenic sources (peat and other naturally-occurring hydrocarbons). In addition, background samples were collected outside the installation boundary from 18 surface soil, 10 sediment, and 10 surface water locations.

The field activities conducted at each site are listed in Table ES-1, along with the number of analytical samples from each target media. As indicated in the table, the Phase IV RI included drilling 21 borings, and installing seven monitoring wells and five well points. Subsurface soil samples were collected from 86 discrete locations, surface soil samples were collected from 74 locations, and sediment samples were collected from 20 locations. Water samples included 14 surface water samples and 25 groundwater samples. In addition, Quality Control/Quality Assurance (QC/QA) replicate samples were collected from 18 soil sample locations and five

water sample locations. Note that these totals do not include field screening samples that were not submitted for laboratory analysis.

The Phase IV RI scope does not include identifying applicable or relevant and appropriate requirements or assessing the sites' regulatory status, however, the chemical data are compared to state of Alaska cleanup criteria in 18 AAC 70 and 75 to provide a conceptual context for the intended data uses. COPCs exceeding the most stringent Alaska Department of Environmental Conservation (ADEC) cleanup levels for soil and/or groundwater were measured at 11 of the 15 Northeast Cape sites investigated. COPCs that exceed ADEC cleanup levels for soil and sediment include gasoline range organics (GRO), diesel range organics (DRO), residual range organics (RRO), arsenic, chromium and polychlorinated biphenyls (PCBs). Compounds encountered in surface water or groundwater that exceed ADEC cleanup levels are GRO, DRO, RRO, benzene, arsenic, barium, chromium and lead.

TABLE ES-1 - 2004 PHASE IV REMEDIAL INVESTIGATION SAMPLE COLLECTION SUMMARY

SITE	Soil Borings	Monitoring Wells/ Well Points	Sample Locations (LOCID)			Total Analytical Samples* (excluding QA/QC replicates)		Notes
			Surface or Near Surface Soil	Sediment	Surface Water	Soil & Sediment	Surface Water & Groundwater	
SITE 1 - BURN SITE SOUTHEAST OF AIRSTRIP	-	-	01SS101-1 01SS102-1 01SS103-1 01SS104-1	-	-	4	0	
SITE 3 - FUEL LINE CORRIDOR AND PUMPHOUSE	03B1 03B2 03B3	03WP5 03WP6	-	03SD107 03SD108	-	8	4	Groundwater samples collected from 2 new well points and 2 existing well points
SITE 6 - CARGO BEACH DRUM FIELD	06B1 06B2 06B3 06B4 06B5	06WP5 06WP6 06WP7	-	-	-	12	4	Groundwater samples collected from 3 new well points and 1 existing well point
SITE 7 - CARGO BEACH ROAD LANDFILL	-	-	07SS101-1/07SS101-4 07SS103-2/07SS103-3 07SS108-1 07SS109-1 07SS1110-1 07SS111-1 07SS112-1 07SS113-1 07SS114-1 07SS115-1	-	-	12	0	
SITE 8 - POL SPILL SITE	-	-	-	08SD102 08SD103	08SW101	2	1	
SITE 10 - BURIED DRUMS	10B1 10B2	-	-	-	-	6	0	
SITE 11 - FUEL STORAGE TANKS	-	-	-	-	-	0	2	Groundwater samples collected from existing monitoring wells

KEY	DESCRIPTION
*	Samples shown are for chemical analyses only; samples collected for field screening and/or geotechnical purposes are not listed
LOCID	Location Identification: "01SS101-1" signifies Site 1 Surface Sample 101 collected at 1 foot below ground surface
-	No samples collected for Phase IV RI

TABLE ES-1 - 2004 PHASE IV REMEDIAL INVESTIGATION SAMPLE COLLECTION SUMMARY

SITE	Soil Borings	Monitoring Wells/ Well Points	Sample Locations (LOCID)			Total Analytical Samples* (excluding QA/QC replicates)		Notes
			Surface or Near Surface Soil	Sediment	Surface Water	Soil & Sediment	Surface Water & Groundwater	
SITE 13 - ELECTRICAL POWER BUILDING								
Near Transformer Pad #13-1	-	-	13SS105-1/13SS105-4 13SS106-1 13SS107-1/13SS107-4 13SS108-1 13SS109-1 13SS110-1/13SS110-4 13SS111-1 13SS112-1/13SS112-4 13SS113-1/13SS113-4 13SS114-1	-	-	15	0	
Near Transformer Pad #13-2	-		13SS132-1 13SS133-1 13SS134-1 13SS135-3	-	-	5	0	
North of Building 110	-	-	13SS115-1/13SS115-3 13SS116-1/13SS116-3 13SS117-1 13SS118-1 13SS119-1/13SS119-4	-	-	8	0	
MAIN OPERATIONS COMPLEX	13B1 19B1	17MW1 18MW1 20MW1	(88SS101-1) (88SS102-1) (Geotechnical)	-	-	16	11	Groundwater samples collected from 3 new monitoring wells and 8 existing monitoring wells
SITE 14 - EMERGENCY POWER/OPERATIONS BUILDING	-	-	14SS101-1/14SS101-2 14SS102-1/14SS102-2	-	-	4	0	
SITE 16 - PAINT AND DOPE STORAGE BLDG.	-	-	-	-	-	-	-	Insufficient water level for sampling 3 existing wells
SITE 22 - WATER STORAGE BUILDING	22B1	22MW2 22MW3	-	-	-	13	2	
SITE 26 - FORMER CONSTRUCTION CAMP	26MW2	26MW1 26MW3	-	-	-	0	2	Well 26MW2 not installed

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			Surface or Near Surface Soil	Sediment	Surface Water	Soil & Sediment	Surface Water & Groundwater	
SITE 29 - SUQITUGHNEQ RIVER & ESTUARY	-	-	-	29SD104 29SD105 29SD106 29SD107 29SD108 29SD109	29SW101 29SW102 29SW103	6	3	
SITE 31 - WHITE ALICE SITE								
AST Farm	31B1 31B2	-	-	-	-	4	0	
Fuel Pipe Corridor	-	-	31SB105-3 31SB106-3 31SB107-3 31SB108-4 31SB109-4	-	-	5	0	
Suspected AST Drainage Area			31SB110-1			1	0	
Area North of ASTs	-	-	31SS111-1 31SS112-2/31SS112-4 31SS114-1 31SS115-2/31SS115-6	-	-	6	0	
PCB Sampling Grid Area	-	-	31SS117-2/31SS117-4 31SS119-1 31SS120-2/31SS120-4 31SS122-1 31SS123-2/31SS123-4 31SS125-1	-	-	9	0	
Antenna AST Areas	-	-	31SS126-2/31SS126-4 31SS128-2/31SS128-4 31SS130-1	-	-	5	0	
Septic Outfall Area	-	-	31SS131-2/31SS131-3 31SS132-2/31SS132-4 31SS135-1 31SS136-1/31SS136-4 31SS138-1 31SS139-2	-	-	9	0	

KEY	DESCRIPTION
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			Surface or Near Surface Soil	Sediment	Surface Water	Soil & Sediment	Surface Water & Groundwater	
BACKGROUND	-	-	BGSS101 BGSS102 BGSS103 BGSS104 BGSS105 BGSS106 BGSS107 BGSS108 BGSS109 BGSS110 BGSS111 BGSS112 BGSS113 BGSS114 BGSS115 BGSS116 BGSS117 BGSS118	BGW101 BGW102 BGW103 BGW104 BGW105 BGW106 BGW107 BGW108 BGW109 BGW110	BGW101 BGW102 BGW103 BGW104 BGW105 BGW106 BGW107 BGW108 BGW109 BGW110	28	10	

KEY	DESCRIPTION
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LOCID	Location Identification: "01SS101-1" signifies Site 1 Surface Sample 101 collected at 1 foot below ground surface
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LIST OF ACRONYMS AND ABBREVIATIONS

^oF	Degrees Fahrenheit
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
BG	Background Sample
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CDQAR	Chemical Data Quality Assessment Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain of Custody
COELT	Corps of Engineers Electronic Loading Tool
COPC	Constituent Of Potential Concern
CQAR	Chemical Quality Assurance Report
DI	Deionized
DQO	Data Quality Objective
DRO	Diesel Range Organics
EDD	Electronic Data Deliverable
EPA	U.S. Environmental Protection Agency
GAC	Granular Activated Carbon
GPS	Global Positioning System
GRO	Gasoline Range Organics
GW	Groundwater Sample
HPC	Heterotrophic Plate Count
HTRW	Hazardous, Toxic, and Radiological Waste
IDW	Investigation-derived Waste
LOCID	Location Identification for COELT
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
mL	Milliliter
MOC	Main Operations Complex
MWH	Current name for company formerly known as Montgomery Watson Harza
NE Cape	Northeast Cape (former military installation)
ORP	Oxygen Reduction Potential
PAHs	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
PPE	Personal Protective Equipment
PQL	Practical Quantitation Limit
PVC	Polyvinyl Chloride
QA	Quality Assurance
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation

ACRONYM LIST (continued)

RRO	Residual Range Organics
SB	Subsurface Soil Sample
SD	Sediment Sample
SGS	SGS Environmental Services, Inc.
SOP	Standard Operating Procedure
SOW	Scope of Work
SQ	Soil Quality Control (blank) Sample
SS	Surface Soil Sample
SVOCs	Semi-Volatile Organic Compounds
SW	Surface Water Sample
TAH	Total Aromatic Hydrocarbons
TaqH	Total Aqueous Hydrocarbons
TICs	Tentatively Identified Compounds
TKN	Total Kjeldahl Nitrogen
TOC	Total Organic Carbon
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USDOD	United States Department of Defense
UST	Underground Storage Tank
WP	Work Plan
WQ	Water Quality Control (blank) Sample

SUMMARY REPORT
PHASE IV REMEDIAL INVESTIGATION
NORTHEAST CAPE
ST. LAWRENCE ISLAND, ALASKA

1.0 INTRODUCTION

This summary report presents the results of the Phase IV Remedial Investigation (RI) at Northeast Cape, St. Lawrence Island, Alaska. Northeast Cape (NE Cape) was the site of former military surveillance and communications stations that operated from about 1954 until 1972. The Phase IV RI was performed to collect data to address data gaps identified in previous investigations, and to collect data that may be used by others to refine estimates of impacted media volumes.

This work was performed for the Alaska District of the U.S. Army Corps of Engineers (USACE) under Shannon & Wilson's Hazardous, Toxic, and Radiological Waste (HTRW) Contract DACA85-03-D-0003, Task Order 0006. The scope of services for this project is based on the Scope of Work provided by the Alaska District of the USACE, and dated January 30 and July 15, 2004 (Modification #1).

Guidance for performing the RI and preparing this report was gathered from the following documents, as applicable:

- Shannon & Wilson's August 2004 Work Plan documents;
- USACE construction quality program and engineering manuals;
- ADEC reporting requirements for a Release Investigation, as specified in 18 AAC 75, "*Oil and Other Hazardous Substances Pollution Control*," (ADEC 2004), and "*Guidance for Cleanup of Petroleum Contaminated Sites*," (ADEC 2000); and
- US Environmental Protection Agency (EPA) "Guidance *for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*."

1.1 Project Purpose and Objectives

Following closure of the military installation, NE Cape has been subject to phased remedial investigations and removal actions. The USACE's remedial strategy at NE Cape has been to investigate and potentially remove physical and chemical hazards that the previous military activities may present to the landowners. The objectives of the Phase IV RI were to perform specific field work activities and laboratory analyses to address data gaps identified in previous investigations. Towards this end, the Phase IV RI consisted of data collection from 15 discrete sites at NE Cape, and from background locations outside of the general installation boundaries. The 2004 data are intended to be considered with previous RI and risk assessment work to recommend site-specific cleanup goals, refine estimates of impacted soil volumes, and/or support a cleanup feasibility study under future project phases.

1.2 Project Team

For Shannon & Wilson, Senior Environmental Engineer Matt Hemry, P.E., was the Program Manager, responsible for ensuring that work performed under the HTRW contract was in accordance with the contract and applicable regulations. Mr. John Spielman, C.P.G., was the Delivery Order Manager, managing the day-to-day tasks associated with the project and supervising the preparation of the project submittals. Jon Lindstrom, our Senior Chemist, oversaw the chemical data review. Randy Hessong acted as the Field Team Lead and Site Safety & Health Officer, and had the principal role in preparing project submittals. Randy was supported in the field by Julie Keener and Ben Heavner.

Discovery Drilling, Inc. of Anchorage, Alaska was subcontracted to provide drilling, monitoring well installation, and related services. Discovery Drilling subcontracted Winninger and Sons Drilling to provide these services. SGS Environmental Services, Inc. (SGS) of Anchorage, Alaska was subcontracted to provide analytical testing and consulting services. SGS is an Alaska Department of Environmental Conservation (ADEC)-approved and USACE-Certified Laboratory. Mammoth Consulting provided a Professional Land Surveyor to survey sampling locations and reduce the data into graphic form. The temporary field camp and cook were provided by Alaska Minerals Exploration Service. Arsenault-Legg was subcontracted to assist in the chemical data quality review.

2.0 ENVIRONMENTAL SETTING

2.1 Site Description

NE Cape is located on St. Lawrence Island in the Bering Sea, approximately 135 miles southwest of Nome, Alaska, as shown in Figure 2-1. The Village of Savoonga is the closest community, and is located approximately 60 miles northwest of NE Cape. The site is located near the northeast end of the island at around 63°19’ North, 168°58’ West, approximately 9 miles west of the northeastern cape of St. Lawrence Island. According to land acquisition records, the size of the NE Cape site, as a whole complex, is approximately 4,800 acres, or 7.5 square miles, and is bounded by Kitnagak Bay to the northeast, Kangighsak Point to the northwest, and the Kinipaghulghat Mountains to the south.

The former military installation operated from about 1954 until 1972 as a surveillance station and a White Alice Communications station. In 1982, the Navy obtained the former White Alice property (26 acres), but did not utilize the site as a communications site. The land transfer was later deemed invalid and property ownership reverted to Sivuqaq, Inc. and Savoonga Native Corporation. Demolition of the buildings and the majority of other structures has been completed under multiple USACE contracts. The runway, improved gravel roads, and concrete slabs of some of the former structures remain intact.

2.2 Geographic Setting and Topography

The area occupied by the former installation consists mainly of rolling tundra which rises from the Bering Sea on the north toward the base of the Kinipaghulghat Mountains. The Kinipaghulghat Mountains rise abruptly to an elevation of approximately 1,800 feet above sea level roughly 3 miles from the coastline, as shown on Figure 2-2. The installation activities spanned from the beach to the mountain summit. The main area of operation, termed the Main Operations Complex (MOC), is located at about 100 feet in elevation, just north of a glacier-carved valley that opens to the tundra. The former installation layout is shown in Figure 2-3.

2.3 Demographics and Land Use

There are currently no year-round residents in the vicinity of the NE Cape complex. Seasonal dwellings on Kitnagak Bay, at the end of Cargo Beach Road, are used for subsistence hunting, gathering, and fishing during the summer months. The establishment of a permanent community at NE Cape is being discussed by the residents of St. Lawrence Island.

2.4 Geology

The topography at the eastern end of St. Lawrence island is dominated by the uplift of granitic rock know as the Kinipaghulghat Mountains. Kangukhsam Mountain and the highest ridges of the Kinipaghulghat Mountains, which are shown on Figure 2-2, delineate the southern extent of the installation. There have been no focused geological studies of the NE Cape morphology. The following observations were made during this project.

The formation of the glacial valley draining north from Kangukhsam Mountain appears to have created the majority of the unconsolidated surficial deposits on which the installation was constructed. Glacial landforms include melt-out till, moraines, drumlins, a residual rock glacier, and basal till at depth. This alpine valley now holds the southern branch of the Suqitughneq (Suqi.) River, a small stream that arcs through the heart of the installation, trending north to the Bering Sea. Periglacial processes, such as frost rubble (talus) on the steeper slopes and frost patterning on the flats, are superimposed over the glacial landforms. Frost rubble from the valley walls appears to have been transported by the glacier, and comprises a significant amount of the melt-out till distributed across the site. Alluvial process are superimposed on the periglacial forms in limited areas along the southern branch of the Suqi. River in the vicinity of the White Alice Site (Site 31) and the Main Operations Complex (MOC).

Granitic bedrock is exposed at low tide in the western part of Kitnagak Bay. Investigators from the consulting firm MWH suggested that "quartz monzonitic bedrock underlies the unconsolidated materials at a relatively shallow depth on a wave-cut erosional platform." (MWH, 2003) The alignment of three large drumlins (including the Cargo Beach Road Landfill location) suggests that the former glacier transitioned from alpine to piedmont as it flowed toward Kitnagak Bay. The rocks around the Suqitughneq Lagoon and at Kitnagak Point resemble those on the drumlins. Breaking waves off shore of Kitnagak Bay may be due to a submarine terminal moraine, and the glacier may have had a tidewater terminus.

Soil and vegetation development is typical of sub-arctic to arctic tundra. Relatively flat areas that are poorly drained due to ice-rich permafrost and/or fine silt have well developed peat bogs. Thinner tundra vegetation and scant organic horizons are found on well drained areas. Over 1,000 feet in elevation, vegetation consists primarily of lichen.

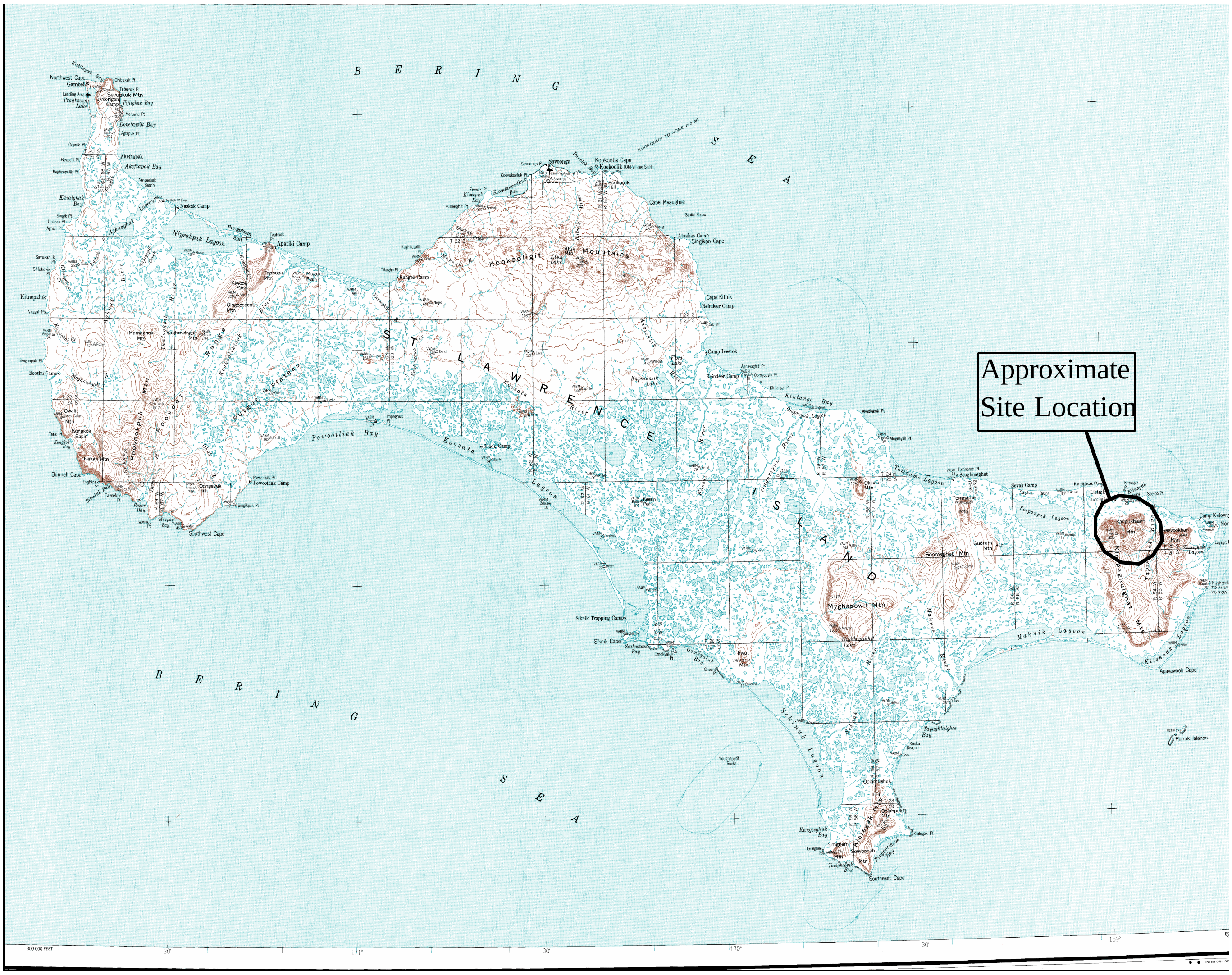
2.5 Hydrology

The hydrogeology of the Northeast Cape installation is complex. Groundwater moving through bedrock fractures is likely to be significant in the mountains. Beyond the mountain front, shallower aquifers in the depositional materials are present. These shallow aquifers are influenced by permafrost and active seasonal thawing. Shallow subsurface water has been observed perched on ice rich frozen ground in boggy areas. This is a relatively shallow (2 to 4 feet) active layer due to the insulative effects of thick tundra vegetation and peat. In areas of thin soil and exposed cobbles and boulders, heat conduction is greater, the active layer appears to be significantly deeper, and permafrost may be discontinuous. This aquifer typically consists of coarse granular material with high permeability. The water table in these areas has been encountered as shallow as 5 feet and as deep as 37 feet below ground surface (bgs). While it is difficult to recover rocky, course-grained soil with a drill rig without thawing it, frozen soil was suspected beneath this "medium depth" aquifer at several locations and confirmed at a few. The medium depth aquifer (and permafrost) may be perched on basal till from past glaciations. Evidence exists that this till, which was found to be frozen at two locations, acts as a confining layer for a deeper aquifer.

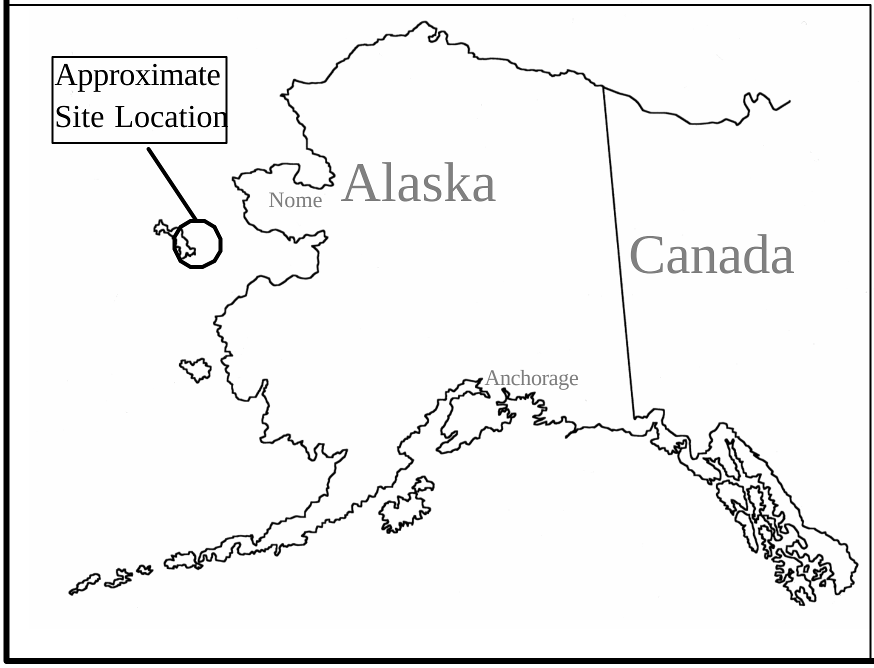
2.6 Climate and Ecology

St. Lawrence Island has a subarctic, maritime climate with some continental influences during winter, when the surrounding Bering Sea is frozen. Winds and fog are common, and precipitation occurs up to 300 days per year as light rain, mist, or snow. Annual precipitation is about 16 inches per year, and more than half falls as light rain between June and September. Summer temperatures average between 48 and 34 degrees Fahrenheit (°F), with a record high of 65°F. Winter temperatures average from minus 2°F to 10°F, with an extreme low of -30°F (URS, 1985).

Additional information on the climate and ecology of the NE Cape area has been included in several of the previous RI work plans and reports, and will not be duplicated here.



Contour Interval 100 Feet
Taken From St. Lawrence
U.S. Geological Survey
Quadrangle



Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PROJECT LOCATION

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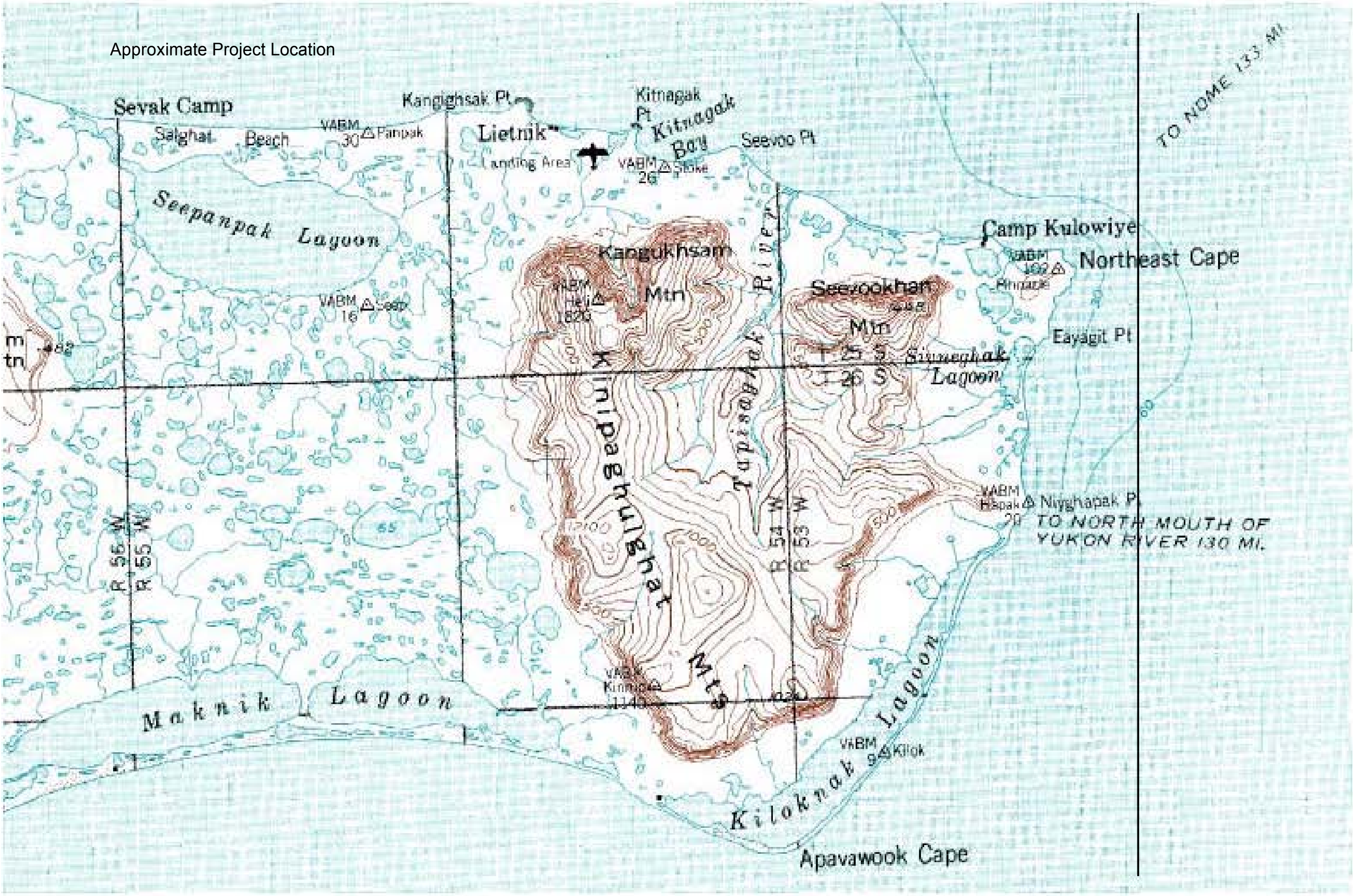
Fig.2-1



Contour Interval 100 Feet
Taken from St. Lawrence, Alaska
U.S. Geological Survey

0 3 6
APPROXIMATE SCALE IN MILES

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

VICINITY MAP

June 2005

32-1-16821

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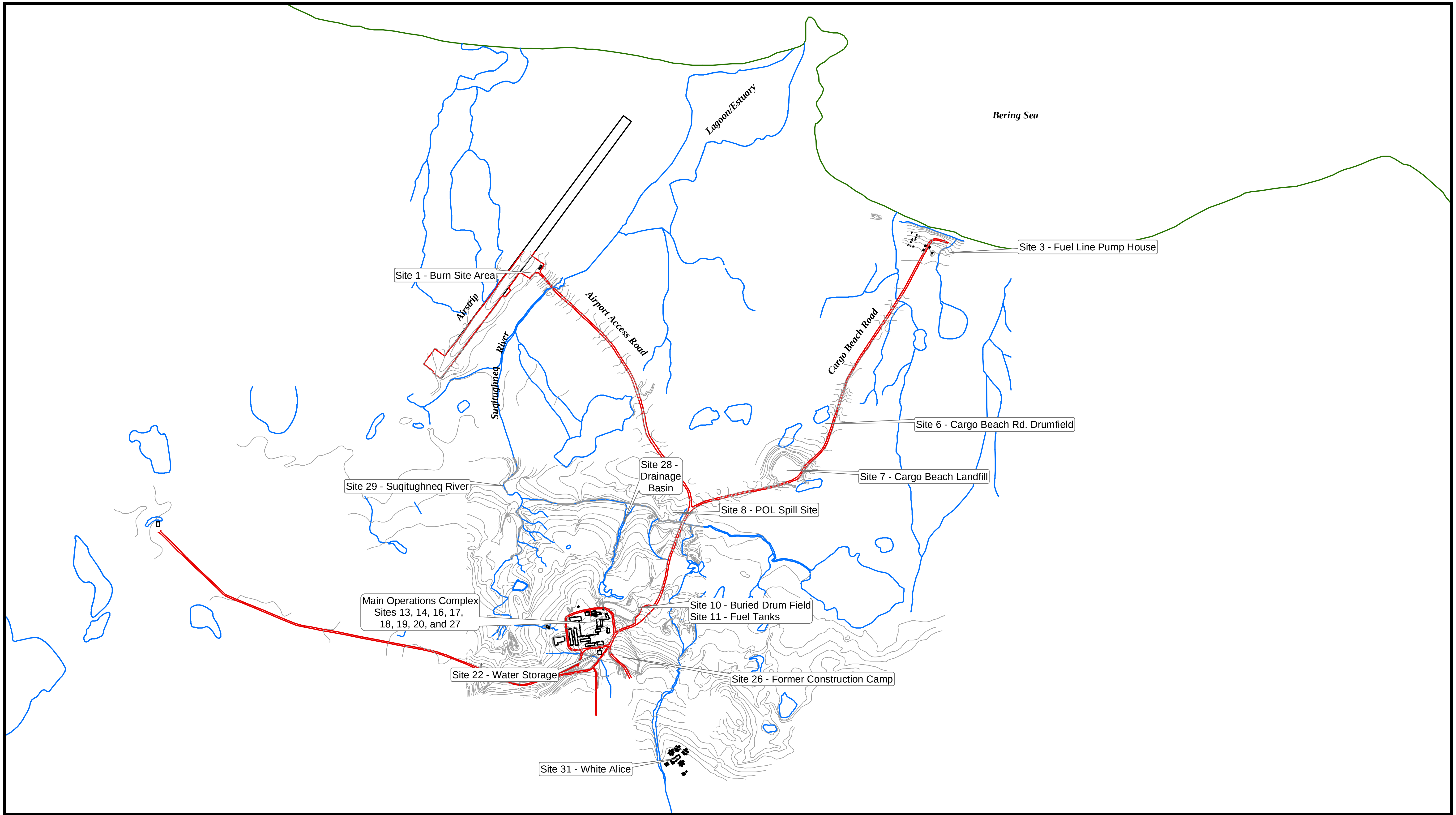
Fig. 2-2



Legend

- Water Feature
- Road
- Shoreline
- Topographic Contours (Interval: 5 ft)

0 750 1,500 3,000 4,500 6,000 Feet

1 inch equals approximately 1,500 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE MAP

June 2005

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Fig. 2-3

3.0 FIELD INVESTIGATION METHODS

The following section describes the general field methods and procedures used to complete the Phase IV RI fieldwork. Methods unique for an individual project site or background location are discussed by site in Section 5. Photographs 1 through 16 in Appendix A include images of many of the field methods in use.

3.1 Workplan Variances

In general, the Phase IV RI fieldwork conducted using the methods specified in Shannon & Wilson's August 2004 Work Plan (WP). However, variances from the WP were necessary due to actual physical field conditions that were different from those presented in the scope of work (SOW). The variances are discussed for each individual project site in Section 5.

3.2 Mobilization and Demobilization

A Hercules C-130 Transport operated by Lynden Air Cargo was used to transport equipment and supplies to the site in two flights. The Hercules C-130 is shown in Photograph 1 in Appendix A after unloading its cargo. The Lynden Hercules and a DC-6 cargo airplane charted from Everts Air Cargo were used to return the gear to Anchorage. Field personnel traveled to and from Northeast Cape on aircraft charted from Bering Air Service out of Nome. Bering Air was also chartered to transfer sample coolers from the site to Nome, where they were forwarded to Anchorage on Alaska Airlines Goldstreak Service.

A temporary camp, provided by Alaska Mineral Exploration Service, was set up to provide room and board for the field crew, which consisted of three environmental professionals from Shannon & Wilson, a two-person field crew from Discovery Drilling, a cook provided by Alaska Minerals Exploration Service, and a surveyor from Mammoth Consulting. The camp was erected on the gravel pad adjacent to the airstrip as illustrated in Photograph 2. Electricity was supplied by gasoline-fuelled generators. Surface water was pumped from the Suqi. River for filtration through a particulate filter and granular activated carbon for drinking and cleaning water.

3.3 Soil Sampling

Soil samples were collected in general accordance with ADEC's Underground Storage Tanks Procedures Manual (November 2002), and Shannon & Wilson's August 2004 Field Sampling Plan. The soil sampling efforts included the collection of surface soil, sediment and subsurface soil samples for chemical and geotechnical testing.

3.3.1 Surface Soil and Sediment Sample Collection

Surface soil and sediment samples were collected from depths of roughly 0 to 2 feet below the ground (or sediment) surface. To the extent practical, samples were collected from beneath the vegetation mat, and were representative of the particle size distribution of nearby soil or sediment. Steel shovels were used as necessary to remove vegetation, expose mineral soil, or reach a depth specified in the WP. Once the desired sample depth was exposed, material that may have been in contact with the shovel was swept away with a gloved hand or clean sampling spoon.

3.3.2 Shallow Subsurface Soil Sample Collection

Shallow subsurface soil samples (2 to 5 feet bgs) were collected, often at the same location as a corresponding surface soil sample (co-located). In soft soils, the target sample depth was accessed using a shovel and/or pickaxe. At locations with harder/denser soil and/or deeper sample intervals, a hand-cleaned (See Section 3.5) hollow-stem auger was advanced using the drill rig to access the sample interval. The auger was extracted from the hole, and the sample was collected from the auger flights. Care was taken to sample soil that was not in contact with the auger blade.

3.3.3 Soil Borings – Drilling and Sample Collection

A portable rotary drill rig equipped with hollow-stem auger and down-hole hammer capabilities was used to advance soil borings and install monitoring wells. Split-spoon samplers with 3-inch outside diameters were used to collect soil samples at intervals as boreholes were advanced. Photograph 5 shows a recovered sample in an open split-spoon, and Photograph 10 shows a split-spoon sampler in the foreground and the drill rig advancing a soil boring. Surface soil samples (to a depth of about 1.5 feet) were collected directly from the borehole using a stainless steel spoon. Split-spoon samplers were driven ahead of the auger or hammer at least 18 inches, if possible. Upon retrieval, the split-spoon sampler was opened and the samples were recovered from the center portion, excluding potentially disturbed soils at the top and bottom of the sampler. In some cases, the volume of soil required to fill the required containers exceeded the volume of soil recovered by the sampler. In these situations, the split-spoon sampler was driven a second time to obtain sufficient soil. Split-spoon samplers were decontaminated between each use. Soil Borings were documented on “Field Log of Boring” forms which included the project name, driller, drilling method, boring number, location, sample time, number, and depth, field screening results, and material descriptions.

Subsurface soil samples were collected from each sample interval for field headspace screening and potential laboratory analysis. A subset of the collected soil samples were selected for laboratory analysis based on field observations, the highest headspace screening readings, and the intervals designated in the WP. Borings not completed as monitoring wells were backfilled with the drill cuttings following the completion of soil sampling.

3.3.4 Field Screening Method

An HNU HW101 photoionization detector (PID) with a 11.7 electron-volt lamp or an OVM Model 580B PID with a 10.0 electron-volt lamp were used to screen soil for volatile hydrocarbons. Both instruments were calibrated using 100 part per million (ppm) isobutylene standard gas on each day used. Headspace screening was used as a semi-quantitative indication of contamination to aid in the identification and delineation of impacted areas and select soil samples for laboratory analysis. The HNU PID was used for all recorded headspace samples for consistency. Following ADEC headspace sampling procedures, headspace screening was accomplished by placing soil in a self sealing plastic bag to approximately one-half of its capacity using a clean spoon. The samples were then allowed to warm to a uniform temperature of at least 40 degrees Fahrenheit (10 minutes to one hour). To screen, the sample was agitated for about 15 seconds, the seal of the bag was opened slightly, the instrument probe was inserted into the air space above the soil, and the bag was held closed around the probe. The maximum ionization response as the PID drew vapor from the sample bag was recorded.

3.3.5 Analytical Soil Sample Collection

Once the desired sampling location was exposed, all soil and sediment samples were collected using clean new disposable stainless steel spoons. The soil screening bag (if required) was filled and sealed first, followed by the analytical sample containers in order of decreasing analyte volatility. Analytical samples, with the exceptions of gasoline range organics (GRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX), were collected by quickly and completely filling the appropriate laboratory-provided jars. Samples for analysis of GRO and BTEX were collected by placing approximately 50 to 60 grams of soil into a pre-weighed, laboratory-supplied 4-ounce (oz.) jar and adding the contents (25 milliliters) of one or more surrogated methanol vials to submerge the soil. If more than one methanol vial was used, it was noted on the sample container lid, as well as the Chain of Custody. To prevent leakage, the rim of each sample container was quickly wiped free of soil particles with a piece of clean paper towel before capping. The level of the methanol was marked on the sample jar to detect future leakage. Each soil sample was visually classified for soil type and field-screened for volatile hydrocarbons.

3.3.6 Geotechnical Soil Sample Collection and Testing

Where practicable, bulk density was measured at background soil and sediment sample locations using a balloon volumeter. Once a background sample location was selected, surface vegetation was cleared, and the soil surface was leveled to accept the base plate of the volumeter. The volumeter was placed on the base plate and an initial volume was recorded (essentially zeroing the instrument). The instrument was then set aside and roughly one gallon of soil was excavated through the base plate opening to make a smooth hole. The excavated soil was placed in a double plastic bag carefully to avoid sample loss. The balloon device was returned to the base plate and the volume of the soil removed was calculated by subtracting the initial volume from the final volume. The mass of soil removed, the moisture content of the soil, and the grainsize distribution (for granular soil) were measured in Shannon & Wilson's fixed laboratory from the contents of the sealed bag.

Geotechnical samples for moisture content and grainsize analyses were collected from the MOC area. Soil recovered with a split spoon sampler was placed in a pre-labeled plastic bag, sealed, and placed in a second plastic bag. Bulk soil samples were collected with a shovel and placed in plastic bag-lined woven poly sand bags or 5-gallon polyethylene buckets with lids to prevent moisture loss.

3.4 Water Sampling

Water samples were collected in general accordance with Shannon & Wilson's August 2004 Field Sampling Plan and, for groundwater, ADEC's Underground Storage Tanks Procedures Manual. Water sampling included collection of surface samples from bodies of water and groundwater samples from existing and new well points and monitoring wells.

3.4.1 Surface Water Sampling

Surface water samples were collected from the Suqitughneq River drainage and background locations. Surface water samples were collected by slowly submerging and raising clean, laboratory grade glass containers to minimize the disturbance of the water and surrounding sediment. The water was transferred into the appropriate laboratory-supplied containers. Several "dips" were often required to fill the appropriate sample containers. Slight shifts in the sample location were sometimes necessary to avoid turbid water that had developed from the sampling. Two surface water sampling locations are shown in Photographs 9 and 13.

Field observations, including surface water type (pond, stream, etc.), size, and depth of water were recorded at each sampling location. If the sample location was some distance from shore, the survey lath marker was placed at the edge of the stream/river, perpendicular to the channel, and the horizontal offset was recorded on the lath.

3.4.2 Well Point Installation

Well points are tubes that have points on the end and slots or holes to allow passage of water. Manufactured well points were driven directly into the ground and used to sample shallow groundwater at Sites 3 and 6 for the Phase IV RI. The manufactured well points consisted of 1.25-inch inside diameter, wire-wound stainless steel screens connected to an appropriate length of 1.25-inch inside diameter galvanized blank steel pipe with threaded connectors. The well points had a nominal slot size of 0.010 inches and typically had 3 feet of screen length. The well points and riser pipe were cleaned with a high pressure detergent wash, freshwater rinse, and de-ionized water rinse then packaged in polyethylene prior to mobilization.

Site 6 well points were driven into the ground using the drill rig air hammer after using the hammer to establish a pilot hole in the rocky ground. Site 3 well points were inaccessible to the drill rig, and were installed manually using a sledge hammer. The well point pipes were completed to approximately 3 feet above the ground, and included a locking cap and padlock. A well point construction log was completed for each well point installation. A typical well point installation is shown in Photograph 7.

3.4.3 Monitoring Well Installation

New monitoring wells were installed at the Main Operations Complex, Site 22, and Site 26 to sample deeper groundwater. A boring used to install a monitoring well at the Main Operation Complex is depicted in Photograph 10. Monitoring wells were installed in completed soil borings using 2-inch-diameter schedule 40 polyvinyl chloride (PVC) well-screen with 0.010 inch machined-slots threaded to the appropriate length of 2-inch-diameter blank PVC. The screened interval was placed at a depth intended to span the zone of water table fluctuation. A sand filter pack consisting of #10-20 silica sand was used to backfill around the well screen to a depth approximately one to two feet above the top of the screen. Bentonite chips were used to seal the riser casing at the top of the sand pack. The drill cuttings generated during the soil boring were used to fill the annular space between the blank casing and the formation above the bentonite seal, or surface spread on-location.

The wells were completed with flush-mounted monitoring well monuments set in concrete. The PVC casings were sealed with padlocked expansion plugs, and magnets were placed in the monument covers to aid in future location. A monitoring well construction log was completed following each monitoring well installation. Each monitoring well number was marked clearly on the monument cover, the wood form for the concrete, and the expansion plug.

3.4.4 Well Development and Sampling

Groundwater samples were collected from both the new and the previously existing monitoring wells and well points. Before sampling, new wells were developed and purged, and existing wells were purged. The water produced during development and purging of the wells was containerized and treated, as discussed in Section 3.7.

3.4.4.1 New Monitoring Well and Well Point Development

New well points were developed using a peristaltic pump and new disposable tubing. Water was removed while periodically raising and lowering the tubing until a visible decrease in turbidity was noted and at least three well volumes had been removed, or the well point was pumped dry. If the well was pumped dry, it was allowed to recover to within 90% of its original water level or to sit overnight before development continued or purging started. Development was complete when the well point was pumped dry at least three times.

New monitoring wells were developed with a submersible pump and disposable tubing. Development did not begin for at least 24 hours after installation to allow seals and monuments to hydrate. Initially, the pump was slowly lowered and raised through the water column while pumping at up to 4 liters per minute. The pump and tubing were periodically raised and lowered vigorously as development continued. After there was a visual decline in turbidity, even after agitation, the pumping rate was reduced, and the purging procedures discussed in Section 3.4.4.4 commenced. A minimum of three wells volumes were removed during the development process. The pump was decontaminated between each monitoring well as described in Section 3.5.

3.4.4.2 Low-Flow Well Purging and Sample Recovery

Both existing and new monitoring wells and well points were purged prior to sample recovery to obtain groundwater samples that are representative of the surrounding aquifer formation. Monitoring wells were purged and sampled with a Grundfos Redi-Flo 2 variable-speed submersible pump and new disposable tubing. A peristaltic pump was used to purge and sample each well point using new disposable tubing. Purging was performed at up to 2 liters per minute, with the rate declining toward a sampling rate of approximately 500 mL per minute as the turbidity decreased. Note, however, that the submersible pump would loose prime and act like it was out of water under some conditions as the flow rate approached 500 mL per minute. In these cases sampling was performed at roughly 750 mL per minute.

Water quality parameters, including temperature, specific conductance, dissolved oxygen (DO), pH, oxidation-reduction potential (ORP), and turbidity were monitored during purging using hand held meters and a flow-through cell. Purging was considered complete when the following stabilization of water quality parameters was measured between casing volumes:

- ORP within 10 mV
- pH within 0.2 units,
- conductivity within 3%, and
- temperature within 1 degree Celsius.

DO and turbidity values were recorded, but only used as informational stabilization data. If the well was purged dry while pumping at less than 1 liter per minute, the well was allowed to recover to within 90% of its original water level or to sit overnight, then purged dry a second time. Sampling began once the well had recovered.

Once purging was complete, groundwater samples were transferred directly from the pump tubing into the appropriate laboratory-supplied containers. Glass 1-liter containers were not filled completely to allow for expansion and contraction during shipping. At monitoring well and well point locations where natural attenuation indicators were collected, alkalinity and ferrous iron were measured using Hach field test reagents and a digital spectrophotometer after analytical samples were obtained. Finally, at “natural attenuation wells” water was pumped through the flow-through cell for the post-sampling measurement of dissolved oxygen, pH, temperature, and ORP. The final or stabilized, field-measured, water quality parameters are presented in the site-specific Groundwater Sampling Log tables in Section 5.

Caution should be used when using the field-measured water parameters. At low flow rates temperatures can be elevated due to the residence time in tubing exposed to warmer air. Oxygen concentrations can be biased low because oxygen sensors are consumptive, and low flow rates are inadequate to maintain fresh water at the sensor face. These effects were observed in the field when the submersible pump would loose prime. To resume pumping the pump was turned of, then started at a relatively high flow rate that was then diminished. Samplers could observe temperatures drop and oxygen concentrations rise when fresh water at the high flow rate reached the sensors.

3.4.5 Measuring Groundwater Elevation

Electronic water level indicators were used to measure the depth to water in below the top of the well or well point casing (TOC) to within 0.01 feet. New wells were marked on the casing to provide a reference point from which to measure. Existing casings with no mark were measured from the highest point of the casing, and a mark was made on the casing for future reference and surveying. Water levels were measured before performing development, purging, or sampling and sequentially by site at least 24 hours after sampling. The sequential measurements were performed to gather groundwater elevation data for specific areas in a small window of time. The elevation of well casing measuring points was determined as part of the survey (see Section 3.6), and water level elevation was calculated by subtracting the measured depth to water from the surveyed TOC elevation. Water level indicators were decontaminated as describe in Section 3.5.

3.5 Sampling Equipment Decontamination

Decontamination of split-spoons and hand tools was performed by washing with an Alconox solution, rinsing with potable water and rinsing again with deionized (DI) water after collecting each sample. If a split spoon or tool was not to be reused directly after cleaning, it was placed in a clean plastic bag to prevent contact with contaminants. If a petroleum product or sheen was visible on any sampling equipment, a "coarse" soapy water wash, clear water rinse, and alcohol rinse was performed before the normal decontamination procedures. To determine if cleaning procedures were adequate, equipment blank samples were collected by running DI water over tools that may contact analytical samples. Equipment blanks are discussed in Section 4.6.3

Drill augers and rods used for soil borings were decontaminated between borings at each site by hand using scrub brushes and a drum of soapy water followed by a clean water rinse. Drums of soapy and clean water were carried on the drill rig for this decontamination procedure (See Photograph 6). Augers and rod were further decontaminated between each site in the Northeast Cape complex by immersing and scrubbing them in a trough of soapy water, followed by a clean water rinse in a second trough. The water from the troughs and drums was treated as described in Section 3.7.

Submersible groundwater sampling pumps were decontaminated by disposing attached tubing and scrubbing the pump in water with Alconox. After scrubbing, the soapy water was run through the pump. The pump was rinsed by submerging it and running it first in potable water and then in DI water. Pump decontamination is illustrated in Photograph 11. To determine if cleaning procedures were adequate, equipment blank samples of DI water run through a cleaned pump. Equipment blanks are discussed in Section 4.6.3

Water level indicators were decontaminated between well measurements by, at a minimum, rinsing the lower two feet with DI water and drying with a clean paper towel. Indicator probes and measuring cord were cleaned with a laboratory grade detergent (Alconox) and potable water solution followed by potable and DI water rinses if used to sound a well for total depth, if a well had known contaminants, or if a petroleum odor was noted in a well.

3.6 Surveying

The field survey commenced September 3, 2004 and was substantially completed on September 8. Additional Global Positioning System (GPS) data for background samples were collected between September 8 and September 13th. The full survey report is included as Appendix D.

In general, rod and transit surveying techniques were used to survey sample locations. Northings and eastings were determined by measuring angles and distances from existing local baselines, and elevations were determined using differential leveling techniques. Horizontal locations were reported to 0.01 feet. Vertical elevations were reported to 0.01 feet for new and existing monitoring wells and well points and 0.1 feet for other sample locations. The locations and elevations of monitoring wells were determined at sampling reference marks on the well casings. For the well points at Sites 3 and 6, the horizontal positions were measured at the casing center at ground surface, and the elevations were measured at the TOC reference mark.

The locations of the Background Sample Sites were determined using differentially-corrected GPS data. Positions were collected using a Trimble GeoXT receiver. Horizontal precisions for the points collected were in the 6-meter range before processing, and the 1-meter range after correction using data from a continuously operating reference station (CORS station).

Swing-tie measurements from surveyed points were used to determine locations of three samples at Site 7, three samples at Site 13, and two bulk soil samples at the MOC. Swing tie measurements were made by the sampling crew with a fiberglass tape.

3.7 Waste Management

Investigation Derived Waste (IDW) generated during field activities included water from well/well point development and purging, water from decontamination of sampling and drilling equipment, drill cuttings from borings and monitoring wells, analytical soil samples that were not selected for analysis, used granular activated carbon (GAC), personal protective equipment (PPE), and miscellaneous disposable sampling equipment. Other wastes included water from precipitation in the fuel storage containment, waste generated by a small (1-2 gallon) diesel fuel spill to the ground from a camp heater during a storm; a leaking 5-gallon container of air cooler cleaning solvent found on the beach by a NE Cape resident and removed at his request; and general camp-related wastes such as garbage, gray water, and sanitary waste.

Groundwater was pumped or bailed from new monitoring wells and well points (developed) to remove sediment and/or turbid water resulting from the well installation. Similarly, existing monitoring wells and well points were purged of potentially stagnant water prior to sampling. Development and/or purge water was contained in 55-gallon steel drums at the site where it was generated. The water in the drums was processed on site using a GAC filter, and discharged to the ground surface. Decontamination water and rainwater that accumulated in the fuel storage containment cell were also pumped through the GAC filter and discharged to the ground surface.

Potentially contaminated soil generated during the investigation included headspace screening samples, soil samples from borings (including methanol preserved samples) which were not selected for analysis (excess), and drill cuttings. Headspace screening samples were returned to their original location or placed in the cuttings of the boring of origin. Excess unpreserved soil samples from borings were also placed in the cuttings of the boring of origin when practical. Some excess unpreserved samples and all excess methanol preserved soil samples were placed in the waste soil drum (see below). Drill cuttings and soil samples from monitoring wells were screened with a PID during drilling. Drill cuttings from monitoring wells were not observed to be contaminated based on visual, olfactory, or headspace screening results, and were used were used to fill the annular space above the screened interval seal or spread on the ground surface in the vicinity of the monitoring well. Drill cuttings from borings were used to backfill the boring of origin as completely as practicable.

A non-IDW soil was generated by a small (1-2 gallon) diesel fuel spill to the ground from a camp heater during a storm. Soil was excavated from the spill area by hand and placed in a 55-gallon drum. The excavation proceeded until field screening with a PID did not detect further impacted soil. The volume of excavated soil occupied approximately 1/3 the volume of the drum. Solids that settled out of the decontamination and development water and excess soil samples that were not submitted for analytical testing were placed in the drum with the soil excavated from diesel spill area. The drum was handled as contaminated soil, and transported to Anchorage for analysis and disposal by Emerald Alaska, Inc.

Used PPE, homogenization pans, paper towling for cleaning the exterior of sample containers, and emptied headspace bags were stored in polyethylene bags labled “PPE”. Used pump tubing and bailers were stored in polyethylene bags labled “Used Tubing”, and used sampling spoons were stored in polyethylene bags labels “Dirty Spoons”. Disposable sampling equipment and PPE were transported in heavy drum liner bags to Anchorage on cargo aircraft and disposed at the Municipality of Anchorage’s Hiland Road Landfill.

A pit toilet was constructed for human waste in the gravel pad near the intersection of the runway and the Camp Pad. The pit depth was three to five inches less than the specified minimum of 4 feet because frozen ground was encountered at 3 ft. bgs. and the soil was grading to ice rich silt. The pit toilet was filled with the original soil on the day of demobilization. Grey water from domestic washing was strained for solid particles and allowed to infiltrate into the gravel Camp Pad. The solid particles were incinerated.

Sorbent pads used during the transfer of fuel to prevent drips or spills were contained in a closed container labeled “Used Sorbents.” These Sorbent pads were burned with domestic trash to assist with combustion. Residual ash from domestic trash was packaged in plastic garbage bags and contained in “drum liner” polyethylene bags with non-burnable camp garbage. The bags were either flown to Nome for disposal in the local landfill by the charted air service or to Anchorage at demobilization for disposal in the Hiland Road Landfill.

A member of the local community observed a leaking 5-gallon container labeled “air cooler cleaner” on the beach to the north-northeast of the airstrip and requested a spill response from Shannon & Wilson’s field personnel. The constituents diesel fuel and nonylphenol were visible on the battered product label. Shannon & Wilson notified the USACE Project Manager the unanticipated waste and the proposed treatment/disposal method. The air cooler cleaning solvent was over-packed and transported as flammable product for energy recovery from Northeast Cape to Anchorage. Emerald Alaska characterized the contents of the container, identified Xylenol and 1,2-dichlorobenzene, and transported it to their facility as non-hazardous waste for disposal.

At the completion of the field work, the Waste Tracking Log, presented as Table E-1 in Appendix E, was checked to ensure that generated wastes were staged for removal from the site or had been treated and disposed at the site. The Waste Tracking Log was used to verify that waste materials were not inadvertently left behind after demobilization, in accordance with the WP. Table E-1, and other documentation for the handling and disposal of generated wastes from the site, is provided in Appendix E.

4.0 ANALYTICAL DATA

The project's chemical data was generated using methods that conform to the USDOD Quality Systems Manual for Environmental Laboratories, Version 2; the USACE QA Shell Document, EM-200-1-3; and the ADEC Underground Storage Tanks Procedures Manual.

4.1 Data Collection Objectives

The data collection objective of the Phase IV RI was to generate defensible definitive chemical data from the sample locations and methodologies specified in the SOW. Samples for chemical and/or geotechnical analyses were collected from the surface soil, subsurface soil, surface water, groundwater and sediment at the former NE Cape facility.

4.2 Sample Identification

Samples were assigned unique identification numbers in the field. The sample identification numbers were unique eleven-character strings of the form YYNESNSSXXX, where:

- YY is the year (04);
- NE is the project location (Northeast Cape);
- SN is the discrete site within the general Northeast Cape project area (e.g. "06" for Site 6 or "BG" for background samples);
- SS is the sample matrix (GW for groundwater, SS for surface soil, SD for sediment, SB for soil boring or subsurface soil, SQ for soil quality control blanks, and SW for water quality control blanks); and
- XXX is the sample number, incrementing upwards from 101 at each discrete site. Quality control duplicates were indicated by 2XX, and replicates by 3XX, where XX matched the sample identification, which was of the form 1XX.

For example, Sample 04NE03SB105 would be assigned to a subsurface soil sample collected at Site 3, and would reflect the fifth analytical soil/sediment sample collected at this site ("105"). If replicate samples were collected from this location, the duplicate and triplicate sample numbers would be "04NE03SB205" and "04NE03SB305," respectively. In this report, the suffix "04NE" has been omitted for brevity and readability.

Sample locations were also assigned discrete location identification (LOCID) numbers for use in the electronic data deliverables system. Where multiple samples were collected from different depths at the same horizontal location, the approximate depth, in feet bgs, follows a dash in the LOCID. For example, the LOCID for Sample 04NE03SB103 was "03B1-2" which signifies the sample was collected from Site 3, Boring 1, 2 to 3.5 feet (bgs). Background surface water and sediment sample locations were given the same LOCID. Sample identification numbers, LOCIDs, sample location descriptions, and depths are summarized in the Section 5 tables "Sample Location and Descriptions".

Sample labels that contained the sample identification numbers, date and time of collection, and analyses to be performed were prepared and applied in the field prior to sample transport to the project and QA laboratories.

4.3 Sample Packaging and Transport

Environmental samples were preserved, packaged and shipped to the project and QA laboratories using the methods outlined in Shannon & Wilson's August 2004 Work Plan. Precautions for sample preservation, hazardous material shipping, cross contamination avoidance, and environmental and physical stress mitigation were addressed to ensure that samples reached the laboratory in good condition.

4.3.1 Sample Preservation

Each laboratory sample was preserved at a cool temperature by placing the sample in an insulated cooler shortly after collection. Frozen gel packs (blue ice) were used to establish and maintain sample temperatures of 4^o Celsius (C) plus or minus 2^o C. Methanol was used in 25 mL aliquots to preserve soil samples collected for volatiles analysis. Hydrochloric and sulfuric acids were used to preserve water samples at or below a pH of 2 for various analyses. These preservatives are considered hazardous materials for shipping and required special handling. Due to regulations governing nitric acid shipment on commercial aircraft, water samples for metals analyses were collected and submitted to the laboratory in unpreserved containers. The laboratory then added the appropriate amount of nitric acid at least 24 hours prior to analysis.

4.3.2 Sample Packaging

After labeling, sample containers were individually padded with bubble-wrap. The containers for soil samples preserved with methanol were pre-weighed with labels applied at the laboratory. To meet shipping requirement for a secured lid, these containers were placed in thin plastic bags and then wrapped with tape to avoid adding mass to the container. To reduce the risk of volatile compounds from other samples or the environment migrating into a sample container, each container (or sample set) was placed in a sealable plastic bag. Samples collected from locations with strong fuel odors were stored and shipped in separate coolers.

Coolers were prepared for shipment by ensuring that the cooler drain was taped closed from both sides, then adding sorbent material (vermiculite). The bagged samples were placed inside a plastic garbage bag in the cooler, and ice packs were placed around and among the sample containers. The liner bag was then tied or taped closed, and additional inert cushioning was added to protect and insulate the samples. Adequate cushioning was double checked by ensuring that no movement was audible in the closed cooler with moderate shaking. A resealable plastic bag was taped to the inside lid of the cooler to contain the Chain-of-Custody (COC). Finally, shipping labels were placed on the exterior of the cooler and the laboratory address was secured to the top.

Final packaging was completed at the time of shipment. The COC was relinquished and sealed inside the cooler. Two custody seals were applied to opposite corners, and clear tape was placed over the seals to protect them from abrasion. A minimum of two full wraps of strapping tape were placed around the cooler in two places to secure the lid, and a shipping form was affixed to the top.

4.3.3 Sample Shipping and Contacts

The time and temperature sensitive nature of environmental samples were discussed with commercial shipping personnel in Nome. The project and QA laboratories were informed of cooler shipments through the Delivery Order Manager. The laboratories completed a cooler receipt form upon sample receipt to document sample conditions at the time of receipt. The Delivery Order Manager was notified of discrepancies by the laboratory.

4.4 Analytical Parameters

Table 4-4 lists the analyses and analytical methods specified in the SOW, and includes the abbreviations applied in this report. The analyses to be performed on samples from individual sites were specified in the SOW and are discussed in Section 5.

The influence of biogenic compounds on the diesel and residual range organic (DRO, and RRO) results from specific sites identified in the Work Plan were assessed by the project laboratory. Background soil and sediments were assessed for biogenic compounds by running a library search on DRO/RRO extracts by Method SW8270. The laboratory project manager reviewed the tentatively identified compounds (TICs) from the library search and the DRO/RRO chromatograms to comment on whether petroleum hydrocarbons were the likely source of reported DRO and RRO concentrations. This methodology is not nationally published, relies largely on the skills of the project laboratory, and will not be subject to the same level of QC as the primary project samples. The assessments are summarized in the site-specific summary of analytical results tables. The laboratory project manager's comments are included in Table D-1 of Appendix D.

TABLE 4-4 ANALYTICAL METHODS

ANALYSIS/ANALYTE	ABBREVIATION	METHOD
Gasoline Range Organics	(GRO)	AK101
Diesel Range Organics	(DRO)	AK102
Residual Range Organics	(RRO)	AK103
Total Organic Carbon	(TOC)	TOC - SGS SOP
Aromatic Volatile Organics (benzene, toluene, ethylbenzene, xylenes)	(BTEX)	SW8260B
Polynuclear Aromatic Hydrocarbon	(PAH)	PAH SIM
Semi-volatile Organic Compound	(SVOC)	SW8270C
Polychlorinated Biphenyl	(PCB)	SW8082
Pesticides		SW8081A
Total Metals (excluding Mercury)		SW6020
Mercury (water / soil)		SW7470A / 7471A
Natural Attenuation Parameters		
Nitrate		EPA300.0
Ammonia		SM4500
Total Kjeldal Nitrogen		SM4500
Orthophosphate (soluble reactive phosphate)		ASA 24-5
Potassium		SW6020
Sulfate		EPA300.0
Iron, total		SW6010B
Heterotrophic Plate Count	(HPC)	SM9215B
Oil Degrading Bacteria		Sheen Screen
Physical (Geotechnical)		
Grain Size Classification		ASTM C136/D422
Moisture Content	(% M)	ASTM D2216
Bulk Density		ASTM D2167M

KEY	DESCRIPTION
AK	Alaska Method
SW	Solid Waste Method
SGS	SGS Environmental Services, Inc.
SOP	Standard Operating Procedures
SIM	Selective Ion Monitoring
EPA	Environmental Protection Agency
ASTM	American Society for Testing Materials

Shannon & Wilson's Work Plan stated that total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH) were to be calculated using the aromatic volatile organics (BTEX) and polynuclear aromatic hydrocarbon (PAH) results. TAH and TAqH values were requested for the following surface water samples: 08SW101, 29SW101 through 29SW103, and BGSW101 through BGSW110, plus associated QC/QA samples. TAH was calculated by adding the total concentration of the BTEX analytes. Similarly, TAqH was calculated as the sum of the BTEX and the PAH analytes. Estimated concentrations were included in the calculation, and ½ of the practical quantitiation limit (PQL) was used when an analyte was not detected.

The natural attenuation parameters nitrate, ammonia, total kjeldahl nitrogen (TKN), ortho-phosphate, potassium, sulfate, total iron, heterotrophic plate count (HPC), and oil degrading bacteria were analyzed. These results can be used along with field measurements of groundwater alkalinity and ferrous iron to evaluate the capability of natural systems to degrade contaminants. Natural attenuation parameter results are presented in the site-specific Summary of Analytical Results tables in Section 5. Alkalinity and ferrous iron field results are presented in the site-specific Groundwater Sampling Log tables in Section 5.

4.5 QA/QC Samples

4.5.1 Field Replicate Samples

Replicate samples are collected in the field and submitted for analysis of regulated compounds to evaluate both the sample matrix heterogeneity and variability in sampling and analytical practices. Field quality control (QC) duplicate, and quality assurance (QA) triplicate samples were co-collected with project samples and analyzed at a rate of one QC/QA set per ten project samples for each method and matrix, with the exception of natural attenuation parameters and TOC. The QC samples were submitted to the project laboratory and the QA samples were submitted to North Creek Analytical in Bothell Washington.

Soil and sediment replicate samples were collected by quickly adding an appropriate amount of soil or sediment to the three methanol-preserved containers for GRO and/or BTEX one at a time as soon as fresh soil was exposed. Once the methanol preserved containers were sealed, the soil in the sample hole was mixed with the sample spoon, and containers were filled simultaneously to provide a more homogeneous sample set. Split-spoon samplers do not contain enough soil volume to fill the containers of a replicate sample set with a long analyte list. Therefore, the majority of replicate sets were collected from near-surface samples. Analytic sets were broken up (such as GRO/BTEX replicates from one split-spoon, and metals from another) when necessary to maintain the 10-percent replicate frequency.

Replicate surface water and groundwater water samples were collected by completely filling the appropriate container for GRO and BTEX. The remaining containers were partially homogenized by moving the pump discharge tube alternately between the three containers for each analysis. The wells selected for replicate samples exhibited good yield, so that pumping the well dry was avoided in the middle of a sample set.

4.5.2 Trip Blanks

Trip (or travel) blank samples are used to determine if sample containers become contaminated during storage and shipment to and from the project. At least one trip blank for each matrix (soil/sediment or water) was included with each sample cooler shipped from the field with samples for gasoline range organics (GRO) and BTEX. Trip blanks were prepared by the project and QA laboratories before mobilization. Trip blank results are summarized in Table D-2 in Appendix D.

4.5.3 Equipment Blanks

Equipment blanks demonstrate that reusable sampling equipment has been cleaned effectively to prevent cross-contamination of samples. Equipment blank samples were collected by pouring DI water over split-spoon samplers and the sediment dredge or pumping DI water through the RediFlo 2 submersible pump. Rinse water was captured in clean laboratory-grade containers for transfer to the appropriate sample containers. One equipment blank was collected for every 20 samples collected from reused (decontaminated) sampling equipment. Equipment blank results are summarized in Appendix D Table D-2

4.5.4 Temperature Blanks

Temperature blanks are containers of water that travel in the coolers with samples. The project and QA laboratories measured the temperature of the water upon arrival at the laboratory. One laboratory-provided temperature blank was included with each sample cooler shipped from the field.

4.6 Chemical Laboratory Deliverables

Analytical data were supplied by the project laboratory to Shannon & Wilson and by the QA laboratory to the USACE in hard copy and electronic formats. A separate data package was prepared for each laboratory sample delivery group, commonly called a work order. A work order typically consists of a batch of samples that were submitted to the laboratory at one time, although separate work orders were often prepared for water samples and for soil/sediment samples. The data packages include both the analytical results, and sufficient information to demonstrate that the project's data quality objectives (DQOs) have been satisfied. The DQOs include the numerical measurement quality objectives for precision, accuracy, representativeness, comparability, and sensitivity.

Hard copy packages were submitted as discrete definitive data packages for each sample delivery group. In accordance with EM 200-1-6, each definitive data package is a sequentially-numbered submittal that contains a cover sheet, table of contents, case narrative, the analytical results, laboratory reporting limits, sample documentation information, and internal laboratory QA/QC information. Each sample delivery group data package was also submitted as an electronic data deliverable (EDD) using the COELT format. The EDDs were prepared in accordance with the *Alaska District Corps of Engineers Environmental Program Manual for Electronic Deliverables* (USACE 2003). Hard copy packages and EDDs have been provided to the USACE for archiving.

4.7 Chemical Data Assessment

Shannon & Wilson's role in the data assessment process included implementing chemical data quality management procedures to identify data quality discrepancies, and preparing a chemical quality assurance report (CQAR) that conforms to EM 200-1-6, Table 3-1, "Data Evaluation," (USACE, 1997). Per EM 200-1-6, data evaluation is ultimately the responsibility of the USACE, and the final determination of data usability is made by the USACE project chemist. The draft CQAR prepared by Shannon & Wilson was reviewed and utilized by the USACE project chemist to help assess the data usability and prepare the Chemical Data Quality Assessment Report (CDQAR). Appendix C includes a hard copy of the CDQAR and a CD-ROM of both the CQAR and the CDQAR in electronic Portable Document Format (pdf).

4.8 Data Presentation

Results of laboratory analyses are presented in the summary of analytical results tables provided at the end of each site-specific subsection of Section 5. Separate tables were prepared for soil/sediment and for water matrices. The abbreviation "PQL" is used in the text and in the table legends for the laboratory-established practical quantitation limit. PQLs are sometimes know as method reporting limits or detection limits. The data qualifiers established through the chemical data assessment process are incorporated into the summary of analytical results tables.

Comparison of the laboratory results to regulatory standards or established site-specific criteria was not included in the SOW. However, to provide a conceptual regulatory context and a basis for further data evaluation, the USACE and Shannon & Wilson agreed to compare the data to standard soil and groundwater cleanup levels promulgated by the State of Alaska through the ADEC, as published in 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2003b, 2004). Sediment and soil sample results are compared to the most stringent Method 2 soil cleanup levels listed in Tables B1 and B2, 18 AAC 75.341, for the "Under 40 Inches" precipitation zone. The most stringent levels are typically in the migration to groundwater exposure pathway. If the most stringent level is for a different exposure pathway, the pathway has been noted in the summary of results tables in Section 5. Those compounds with surface water and groundwater results are compared to the groundwater cleanup levels listed in Table C, 18 AAC 75.345. TAH and TAqH results are compared to 18 AAC 70, *Water Quality Standards* (ADEC, 2003a).

5.0 SITE-SPECIFIC ACTIVITIES

The NE Cape complex has been subdivided by previous investigators into separate sites. The Phase IV RI was focused on additional site characterization at those sites where data gaps remain. The following sections describe the site conditions, scope of investigation, and analytical results for the 15 individual sites investigated and data collected from background locations during the 2004 Phase IV RI.

5.1 Site 1: Burn Site Southeast of Airstrip

Visual reconnaissance, 20 field screening samples, and analytical soil samples from four locations (01SS101, 01SS102, 01SS103, and 01SS104) were collected at Site 1.

5.1.1 Site Description

An area near the airstrip was reportedly used as a burn pit or perhaps for fire training. Previous investigations did not collect samples from the reported burn area. The airport terminal area on the southeast side of the airstrip, where the road connects, shows the greatest degree of human disturbance (grading, debris, etc.), presumably because initial construction and later investigation/demolition activities were staged from this location. Figure 5-1 presents the location of the scoped study area.

The airstrip is located on a low, relatively flat northeast/southwest trending ridge paralleling the lower Suqi. River Drainage. The topography around the airstrip is depositional, with permafrost within a few feet of ground surface, and is suggestive of a lateral moraine from a former piedmont glacier. No bedrock outcrops were observed in the vicinity of the airstrip. The airstrip appears to have been constructed by plowing back the active layer of peaty soil to frozen ground, placing rocky fill on the frozen ground, and grading the surface with gravel and sand. Windrows of the removed tundra are visible as mounds around the airstrip, and areas between the mounds and the airstrip have become ponds due to differential permafrost melting.

5.1.2 Data Collection Objectives

Three types of data were gathered. The first is whether or not visual evidence of a fire training or burned area exists in the vicinity of the airstrip, with a focus on the southeast side. The second is headspace screening of soil for volatile hydrocarbons, and the third is laboratory analysis of soil sampled from four locations based on screening results.

5.1.3 Field Investigation

Field activities at Site 1 commenced on August 9, 2004 and were completed on September 3, 2004.

5.1.3.1 Visual Observation and Headspace Screening

The developed airstrip area and adjacent tundra were observed during a site reconnaissance when the field team arrived at NE Cape. The walk-through was partially to look for potential burn areas, and partially to familiarize the crew with camp environs. A more thorough investigation was performed by collecting field screening samples from 20 locations. Photograph 3 in Appendix A shows the typical topography and screening sample location FS1-8. The approximate locations of the field screening and analytical soil samples are shown on Figure 5-1. No apparent fire training or burn area was identified by visual observation or field screening methods.

5.1.3.2 Soil Sampling

Samples were collected using a hand shovel to cut out a “plug” of vegetation and roots to access the soil beneath. Stainless steel spoons were then used to collect the headspace samples. The headspace samples were warmed to a common temperature and screened with the HNU HW101 PID. Analytical samples were then collected at the four locations with the highest screening results. Soil descriptions and screening results are presented in Table 5-1, and sample locations are shown in Figure 5-1.

Sample location 01SS103 is outside the study area boundary, and was the largest area of distressed tundra observed. The distressed tundra consisted of two areas of desiccated (orange, yellow and dark brown to black) vegetation at the same elevation as the surrounding tundra. One area was roughly ten feet in diameter, and the other was rectangular, roughly 15 feet wide by 30 feet long. The underlying root mats and peat were intact.

5.1.3.3 IDW

The soil in the headspace bags was returned to the appropriate sample location and the removed vegetation replaced. The plastic bags were place in the project IDW waste bag.

5.1.3.4 Field Observations

Distressed tundra where previous field camps had discharged gray water was observed, and some recently charred lumber was found on the gravel “Camp Pad” during the initial field reconnaissance. Debris and remnants from airfield communications and weather systems were also found.

In general, the tundra vegetation mat was intact across the study area with the exception of the developed road, airstrip, and gravel pad. Root mats and peat were found beneath the vegetation at all but two sampling locations. These two sample locations (01SS101 and 01SS102) were adjacent to the former air terminal, and showed signs of disturbance from recent demolition activities.

5.1.4 Analytical Results

The selected soil samples were analyzed for GRO, DRO, RRO, SVOCs, and RCRA Metals. Table 5-1b presents the analytical results for Site 1. All DRO results plus RRO results from locations 01SS103 and 01SS104 exceed ADEC cleanup criteria, likely due to biogenic compounds in the organic soil. GRO and SVOC results were not reported above the PQLs. GRO and pentachlorophenol were reported at estimated concentrations ("J" flag) less than the PQL at location 01SS103. Many of the SVOC PQLs exceed the ADEC cleanup criteria, likely due to matrix interference because of high moisture and biogenic contents. Arsenic was measured at concentrations above cleanup criteria that may be attributable to natural soil content. Chromium and selenium exceeded their respective cleanup levels at one location each, although it is possible that the chromium is not hexavalent.

TABLE 5-1a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 1: BURN SITE SOUTHEAST OF AIRSTRIP

Sample Number**	LOCID	Date	Sample Location (See Figure 5-1)	Depth (feet)	Screening (ppm) ^	Sample Classification†
Soil Samples						
* 01SS101	01SS101-1	9/2/04	Low, muddy area NE of former air terminal at FS1-1	0.5	0.6	Dark brown, silty PEAT; moist to wet - sparse vegetation
FS1-2	-	9/2/04	Low area N of former air terminal, base of gravel pad	0.3	0.2	Brown, silty angular GRAVEL; moist
* 01SS102	01SS102-1	9/3/04	Mound at NE corner of air terminal pad	0.7-0.9	1.0	Dark brown, silty PEAT; trace gravel; moist - bits of lumber
FS1-4	-	9/2/04	E of former terminal	0.3	<0.2	Dark brown, slightly silty PEAT; wet
FS1-5	-	9/2/04	200 ft. SE of former terminal, N of bridge	0.3	<0.2	Dark brown PEAT; wet
FS1-6	-	9/3/04	SW of gravel Camp Pad, SE of airstrip	0.2	<0.2	Dark brown PEAT; traces of silt and gravel; moist - on high mound
FS1-7	-	9/3/04	SE of FS1-6 on low mound	0.2	<0.2	Brown, slightly gravelly, silty SAND; moist; with organics (roots)
FS1-8	-	9/3/04	S of SE corner Camp Pad, SE of FS107	0.2	0.2	Brown, silty PEAT; moist
FS1-9	-	9/3/04	Low mound SW of FS1-8	0.2	0.1	Brown, slightly gravelly, sandy PEAT; moist; with roots
FS1-10	-	9/3/04	N of wooden platform, S of FS1-6	0.2	<0.2	Brown, silty PEAT; moist; with roots
FS1-11	-	9/3/04	E of widened area of airstrip, SW of FS1-6	0.2	<0.2	Brown, slightly gravelly, silty PEAT; moist
* 01SS104	01SS104-1	9/3/04	SE of widened area of airstrip, at FS1-12, SW of	0.5-0.7	0.8	Brown, silty PEAT; wet
FS1-13	-	9/3/04	W corner of proposed study area	0.6	0.3	Brown, silty PEAT; moist
FS1-14	-	9/3/04	SE of FS1-13 along SW border of Site 1 study area	0.4	<0.2	Brown PEAT; wet
FS1-15	-	9/3/04	SE of FS1-14 along SW border of Site 1study area	0.5	<0.2	Dark brown PEAT; wet
FS1-16	-	9/3/04	NW of Suqi. River, SW border of Site 1study area	0.5	<0.2	Brown, silty PEAT; wet
FS1-17	-	9/3/04	Low mound NW of Suqi. R	0.5	0.4	Brown, silty PEAT; moist
FS1-18	-	9/3/04	In line with SW edge of Camp Pad	0.5	<0.2	Brown, silty PEAT; wet
FS1-19	-	9/3/04	S of corner of Camp Pad, W of road	0.5	0.2	Brown, silty PEAT; wet
* 01SS103	01SS103-1	9/3/04	SE of Suqi R., near E corner of Site 1 study area	0.5-0.7	1.7	Dark brown, slightly silty PEAT; wet - distressed vegetation
* 01SS203	01SS103-1	9/3/04	QC replicate of 01SS103	0.5-0.7	1.7	Dark brown, slightly silty PEAT; wet - distressed vegetation
* 01SS303	01SS103-1	9/3/04	QA replicate of 01SS103	0.5-0.7	1.7	Dark brown, slightly silty PEAT; wet - distressed vegetation

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-1b)
**	The full sample number is preceded by "04NE", for example 01SS101 is sample 04NE01SS101
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
LOCID	Location Identification: "01SS101-1" signifies Site 1, Surface Sample 101 at 1-foot depth (depth is rounded to the nearest foot)

TABLE 5-1b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 1: BURN SITE SOUTHEAST OF AIRSTRIP

Site 1 - Burn Site Southeast of Airstrip

Soil Matrix

			Sample Type:	SURFACE SOIL					
			Location ID:	01SS101-1	01SS102-1	01SS103-1			01SS104-1
			Sample ID:	04NE01SS101	04NE01SS102	04NE01SS103	04NE01SS203	04NE01SS303	04NE01SS104
			Depth (ft):	0.5	0.7-0.9	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7
			Sample Date:	9/2/2004	9/3/2004	9/3/2004	9/3/2004	9/3/2004	9/3/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**			*Primary*	*Duplicate*	*Triplicate*	
PID Headspace Reading	HNU HW101 PID	ppm	–	0.6	1.0	1.7	1.7	1.7	0.8
Percent Moisture	A2540G / E160.3M	%	–	44.2	41.7	76.5	77.6	78.2	76.1
Gasoline Range Organics (GRO)	AK101	mg/kg	300	[5.83]	[5.57]	2.05 J	[24.4]	2.05 J	[20.0]
Diesel Range Organics (DRO)	AK102	mg/kg	250	**895 J**	**1200 J**	**1870 J**	**1970 J**	**387**	**1230 J**
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	7260 J	7920 J	**13800 J**	**19300 J**	4550	**10600 J**
Semivolatile Organic Compounds (SVOC)									
1,2,4-Trichlorobenzene	SW8270C	mg/kg	2	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
1,2-Dichlorobenzene	SW8270C	mg/kg	7	[4.51]	[4.54]	**[11.6]**	**[11.1]**	[1.38]	**[11]**
1,3-Dichlorobenzene	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[1.38]	[11]
1,4-Dichlorobenzene	SW8270C	mg/kg	0.8	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[1.38]**	**[11]**
2,4,5-Trichlorophenol	SW8270C	mg/kg	90	[4.51]	[4.54]	[11.6]	[11.1]	[11]	[11]
2,4,6-Trichlorophenol	SW8270C	mg/kg	0.6	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
2,4-Dichlorophenol	SW8270C	mg/kg	0.45	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.75]**	**[11]**
2,4-Dimethylphenol	SW8270C	mg/kg	4	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	[2.75]	[11]
2,4-Dinitrophenol	SW8270C	mg/kg	0.2	**[36.1]**	**[36.3]**	**[92.9]**	**[88.5]**	**[11.7]**	**[88.1]**
2,4-Dinitrotoluene	SW8270C	mg/kg	0.005	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
2,6-Dinitrotoluene	SW8270C	mg/kg	0.0044	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
2-Chloronaphthalene	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
2-Chlorophenol	SW8270C	mg/kg	1.4	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.75]**	**[11]**
2-Methyl-4,6-dinitrophenol	SW8270C	mg/kg	–	[36.1]	[36.3]	[92.9]	[88.5]	[13.8]	[88.1]
2-Methylnaphthalene	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[4.82]	[11]
2-Methylphenol (o-cresol)	SW8270C	mg/kg	7	[4.51]	[4.54]	**[11.6]**	**[11.1]**	[2.27]	**[11]**
2-Nitroaniline	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[11.7]	[11]
2-Nitrophenol	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
3,3'-Dichlorobenzidine	SW8270C	mg/kg	0.02	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[11]**	**[11]**
3-Methylphenol/4-Methylphenol coelution	SW8270C	mg/kg	–	[5.41]	[4.54]	[13.9]	[13.3]	[2.27]	[13.2]
3-Nitroaniline	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[11.7]	[11]
4-Bromophenyl phenyl ether	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
4-Chloro-3-methyl phenol	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
4-Chloroaniline	SW8270C	mg/kg	0.5	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
4-Chlorophenyl phenyl ether	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
4-Nitroaniline	SW8270C	mg/kg	–	[9.02]	[9.07]	[23.2]	[22.1]	[11.7]	[22]
4-Nitrophenol	SW8270C	mg/kg	–	[18]	[18.1]	[46.5]	[44.2]	[11.7]	[44.1]
Acenaphthene	SW8270C	mg/kg	210	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Acenaphthylene	SW8270C	mg/kg	210	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Aniline	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Anthracene	SW8270C	mg/kg	4,300	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Azobenzene	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	–	[11]
Benzo(a)anthracene	SW8270C	mg/kg	6	[4.51]	[4.54]	**[11.6]**	**[11.1]**	[2.27]	**[11]**
Benzo(a)pyrene	SW8270C	mg/kg	1 (ing)	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
Benzo(b)fluoranthene	SW8270C	mg/kg	21	[4.51]	[4.54]	[11.6]	[11.1]	[5.57]	[11]
Benzo(g,h,i)perylene	SW8270C	mg/kg	1,500	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Benzo(k)fluoranthene	SW8270C	mg/kg	1,500	[4.51]	[4.54]	[11.6]	[11.1]	[5.64]	[11]
Benzoic acid	SW8270C	mg/kg	390	[18]	[18.1]	[46.5]	[44.2]	[6.88]	[44.1]
Benzyl alcohol	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Benzyl butyl phthalate	SW8270C	mg/kg	5,600	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Bis(2-chloroisopropyl)ether	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
Chrysene	SW8270C	mg/kg	620	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
Di-n-butyl phthalate	SW8270C	mg/kg	1,700	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Di-n-octyl phthalate	SW8270C	mg/kg	2,000 (ing)	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Dibenzo(a,h)anthracene	SW8270C	mg/kg	1 (ing)	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
Dibenzofuran	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Diethyl phthalate	SW8270C	mg/kg	190	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Dimethyl phthalate	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]

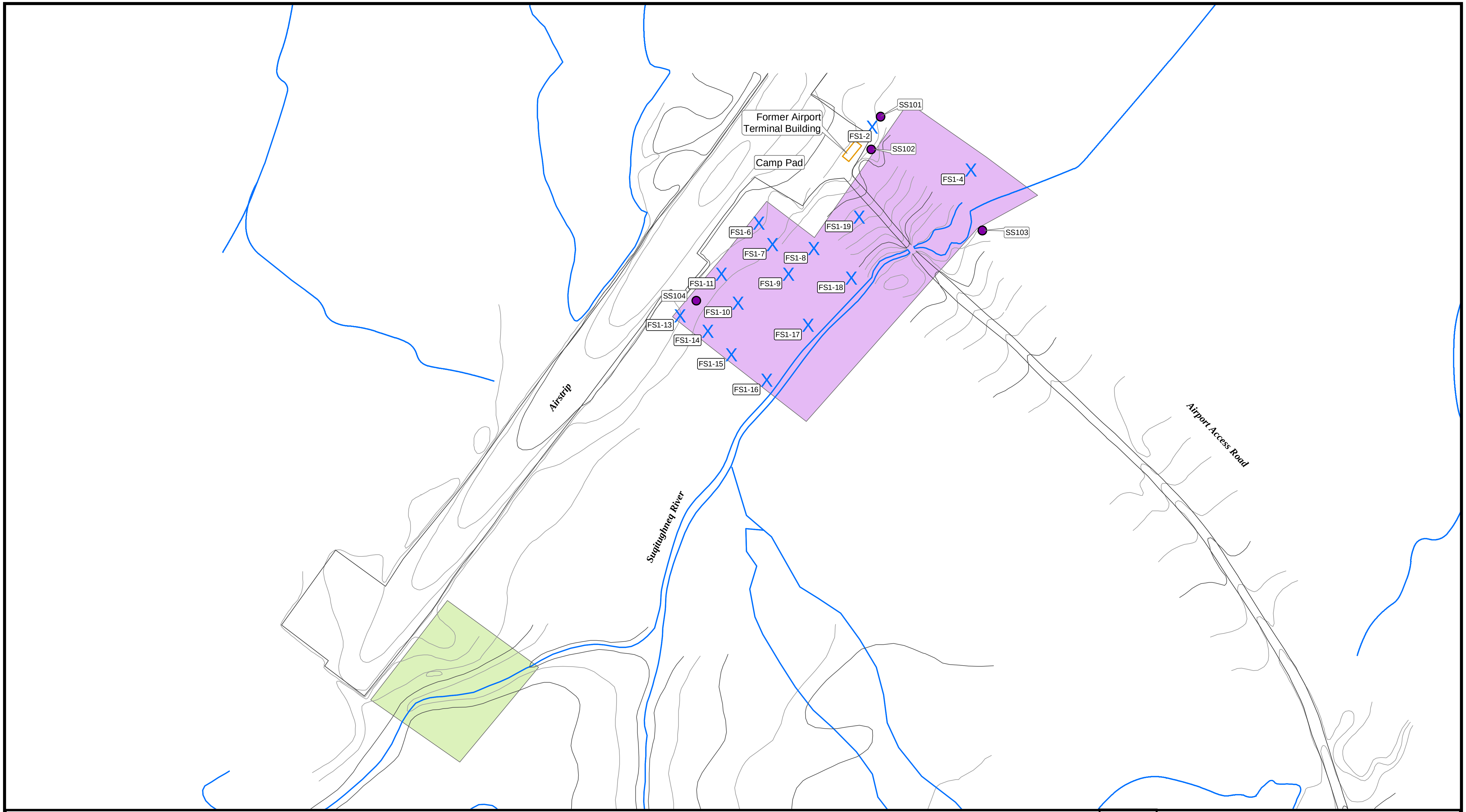
Analytes continued on next page

Key on next page

TABLE 5-1b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 1: BURN SITE SOUTHEAST OF AIRSTRIP

Site 1 - Burn Site Southeast of Airstrip **Soil Matrix**			Sample Type:	**SURFACE SOIL**					
			Location ID:	01SS101-1	01SS102-1	01SS103-1			01SS104-1
			Sample ID:	04NE01SS101	04NE01SS102	04NE01SS103	04NE01SS203	04NE01SS303	04NE01SS104
			Depth (ft):	0.5	0.7-0.9	0.5-0.7	0.5-0.7	0.5-0.7	0.5-0.7
			Sample Date:	9/2/2004	9/3/2004	9/3/2004	9/3/2004	9/3/2004	9/3/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**			*Primary*	*Duplicate*	*Triplicate*	
SVOCs (continued)									
Fluoranthene	SW8270C	mg/kg	2100	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Fluorene	SW8270C	mg/kg	270	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Hexachlorobenzene	SW8270C	mg/kg	0.73	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
Hexachlorobutadiene	SW8270C	mg/kg	8	[4.51]	[4.54]	**[11.6]**	**[11.1]**	[2.27]	**[11]**
Hexachlorocyclopentadiene	SW8270C	mg/kg	7 (inh)	**[18]**	**[18.1]**	**[46.5]**	**[44.2]**	[2.27]	**[44.1]**
Hexachloroethane	SW8270C	mg/kg	1.6	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.75]**	**[11]**
Indeno(1,2,3-cd)pyrene	SW8270C	mg/kg	11 (ing)	[4.51]	[4.54]	**[11.6]**	**[11.1]**	[2.27]	**[11]**
Isophorone	SW8270C	mg/kg	3	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	[2.27]	**[11]**
Naphthalene	SW8270C	mg/kg	21	[4.51]	[4.54]	[11.6]	[11.1]	[2.27]	[11]
Nitrobenzene	SW8270C	mg/kg	0.06	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.27]**	**[11]**
Pentachlorophenol	SW8270C	mg/kg	0.01	**[18]**	**[18.1]**	**[46.5]**	**[44.2]**	**0.459 J**	**[44.1]**
Phenanthrene	SW8270C	mg/kg	4,300	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
Phenol	SW8270C	mg/kg	67	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
Pyrene	SW8270C	mg/kg	1,500	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
bis-(2-chloroethoxy)methane	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
bis-(2-chloroethyl)ether	SW8270C	mg/kg	0.002	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[2.75]**	**[11]**
bis-(2-ethylhexyl)phthalate	SW8270C	mg/kg	590 (ing)	[4.51]	[4.54]	[11.6]	[11.1]	[2.75]	[11]
n-Nitrosodi-n-propylamine	SW8270C	mg/kg	0.00036	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[4.82]**	**[11]**
n-Nitrosodimethylamine	SW8270C	mg/kg	–	[4.51]	[4.54]	[11.6]	[11.1]	[3.44]	[11]
n-Nitrosodiphenylamine	SW8270C	mg/kg	3.4	**[4.51]**	**[4.54]**	**[11.6]**	**[11.1]**	**[6.12]**	**[11]**
Total Metals									
Arsenic	SW6020	mg/kg	2	**4.51**	**7.23**	**4.98 J**	**3.59 J**	**4.32 J**	**3.64 J**
Barium	SW6020	mg/kg	1,100	124	172	21.1	22.7	30.5 J	49.8
Cadmium	SW6020	mg/kg	5	0.225 J	0.405	[0.806]	[0.87]	0.669 J	[0.82]
Chromium	SW6020	mg/kg	26 (total Cr)	**26.4**	25.9	9.8	12.5	10.8 J	3.93
Lead	SW6020	mg/kg	400 (inh/ing)	11.6	32.6	4.21	4.2	4.90 J	1.5
Mercury	SW7471A	mg/kg	1.4	0.0709	0.103	[0.169]	0.0924 J	0.0998 J	0.256
Selenium	SW6020	mg/kg	3.5	1.12	0.931	2.39	**3.68**	3.25 J	2.52
Silver	SW6020	mg/kg	21	[0.176]	0.105 J	[0.403]	[0.435]	2.82 J	[0.41]

KEY	**DESCRIPTION**
–	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve



Legend

X Soil screening sample collected by Shannon & Wilson, Inc. August/September 2004
● Surface soil sample collected by Shannon & Wilson, Inc. August/September 2004 selection
S Historical sample location, collected by others

— Topographic Contours (Interval: 5 ft)
— Former Buildings
— Rivers and Streams

🟪 Site 1 New Study Area
🟩 Site 1 Original Study Area

0 150 300 600 900 1,200 Feet

1 inch equals 300 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 1 - BURN SITE SOUTHEAST OF AIRSTRIP

June 2005
32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-1

5.2 Site 3: Fuel Line Corridor and Pumphouse

Soil borings 03B1, 03B2, and 03B3 were advanced with two samples from each submitted for laboratory analysis, well points 03WP5 and 03WP6 were installed and sampled, existing well points 03WP102 and 03WP3 were sampled, and sediment samples 03SD107 and 03SD108 were collected from Site 3. Table 5-2a provides a description of the samples.

5.2.1 Site Description

Phase IV work was performed in the vicinity of a former pumphouse that was used to transfer fuel from barges to the MOC. The site is located just south of Cargo Beach on Kitnagak Bay, and is shown on Figure 5-2. The pumphouse is roughly 1.5 miles from the MOC and over 60 feet lower in elevation. Three seasonal dwellings with associated fuel containers, ATVs, and scrap machinery are located within 100 feet of the pumphouse location.

The site topography generally slopes toward the beach to the north-northeast. The area between the pumphouse and the beach has what appear to be former dunes covered with tundra. The general topography of Site3 is visible in Photograph 4. The area south of the pumphouse appears to contain unconsolidated deposits, likely of glacial origin, with a thick tundra mat cover. Permafrost and ice-rich soil underlie the tundra.

5.2.2 Data Collection Objectives

Data was collected to further delineate the lateral extent of the shallow groundwater contamination, the vertical extent of soil contamination, and the potential for contaminant transport through overland flow. Soil, sediment, and groundwater samples were analyzed for GRO, DRO, RRO, BTEX; and select samples were analyzed for PAHs. Biogenic influence on DRO and RRO concentrations, likely due to the thick tundra and peat, was also assessed.

5.2.3 Work Plan Variances

Conditions found in the field led to alterations in the planned sampling activities. The plan called for two soil borings to be drilled through the approximately 5-foot thick gravel pad on either side of the former pumphouse, with each boring advanced to bedrock (or up to 15 feet). Three analytical samples were to be selected from each boring. Upon arrival at the site, the gravel pad was found to be less than 2 feet thick at the boring locations, and frozen ground was encountered between 3 and 4 feet below ground surface (bgs). Ice recovered from 5 feet bgs is shown in Photograph 5. Because vertical migration of contaminants is presumably restricted by the ice-rich ground, three shallow soil borings were advanced, with two analytical samples selected from each boring.

Well Point 01NE03WP104 was not sampled. The riser pipe and location stake for the well point were found laying on the ground surface, but the screened section was not found.

5.2.4 Field Investigation

Field activities at Site 3 commenced on August 18, 2004, and were completed on September 5, 2004.

5.2.4.1 Soil Sampling

Three soil borings were drilled through the perimeter of the former pumphouse gravel pad at the locations shown in Figure 5-2. The borings were advanced into ice-rich ground, to a maximum depth of 7.5 feet bgs. Three soil samples were collected from each boring and field screened, and two of these samples were selected for laboratory analysis. Screening results and sample descriptions are included on Table 5-2a, and boring logs are presented in Appendix B.

5.2.4.2 Groundwater Sampling

Two well points were installed by driving 1.25” ID screen and riser pipe with a sledge hammer. Well Point 03WP06 is located between the former pumphouse and the beach, down hill from two existing well points. Well Point 03WP05 is located uphill from the pumphouse. The general slope and drainage of the fuel line corridor is downward to the northeast, toward Well Point 03WP05 and the pumphouse. The new well points were developed first by surging with a micro bailer, then by purging three well volumes with a peristaltic pump. The two previously existing well points, 03WP102 and 03WP103, were purged and sampled using the peristaltic pump. Well point locations are shown on Figure 5-2, and a groundwater sampling log is provided as Table 5-2c. Well Points 03WP103 and 03WP05 had very low water yields, and required several days to purge and sample.

5.2.4.3 Surface Water and Sediment Sampling

To evaluate whether site contaminants may be migrating from the site in surface runoff, two surface water samples (one upgradient and one downgradient) were to be collected from the intermittent stream which drains the area east of the former Fuel Pumphouse. Flowing surface water was not present during the period of field work. This possibility was anticipated in the Work Plan, and two sediment samples were collected as specified. The sample locations are shown on Figure 5-2 and sediment descriptions are in Table 5-2a. Sediment Sample 03SD107 was collected from a downstream location where the topographic drainage from the site joins with a larger drainage to the east. Sediment Sample 03SD108 was collected from an upstream location of the topographic drainage. Sample 03SD107 was selected for PAH analysis.

5.2.4.4 IDW

Headspace samples were returned to the soil surface at the corresponding soil boring location. Soil cuttings were used to backfill the boring of origin. Headspace bags and sampling gloves were placed in the project IDW bag. Groundwater sampling tubing was placed in a tubing-specific IDW bag. The well point purge water was treated and discharged to the gravel surface at the site.

5.2.4.5 Field Observations

The ground surface at Site 3 appeared to have been disturbed by heavy equipment in the last few years. A large portion of the pumphouse gravel pad had been excavated and placed in a pile near the center of the site. The gravel pile and excavation restricted drill rig access, leading to some adjustment of boring locations (See Photograph 4). The excavation also exposed the underlying dark peat, leading to melting and formation of a pond. Areas of sheen on the water surface, some of which had the "stringy" flow characteristics of petroleum and some of which had the "crackly" or brittle characteristics of biogenic material, were observed.

Another shallow excavation was observed at the boundary between the beach and tundra northeast of the pumphouse. Visible tire tracks suggest the shallow excavation was created by a front loader. Sandy soil in the bottom of the excavation was stained and had a weathered diesel odor. The stained soil is an estimated 25 feet from Well Point 03WP06.

Permafrost was encountered in the soil borings, and Well Points 03WP102, 03WP103, and 03WP05 appear to be in the active layer of wet tundra above the ice. Well Point 03WP104 was likely lifted from the ground by frost jacking, and the 03WP102 screen was exposed at the ground surface. Well Point 03WP102 was driven to refusal before sampling during the Phase IV RI. Well Point 03WP06 is located near the beach, and was driven to a depth of 7.5 ft bgs without encountering frozen ground. Groundwater level measurements varied significantly (3 ft.) in this well, suggesting a tidal influence.

The intermittent stream along the east side of the site appears to be a series of linked low spots in the tundra rather than an active erosional channel. The stream "bed" consists of dense grassy vegetation with deep roots in saturated peat. Surface water was not flowing in late August or early September. Mineral soils were not encountered within 1 foot of the surface while collecting sediment samples. The up-gradient stream sample location shown in the Work Plan does not flow past Site 3, but turns to flow to the beach further east. The location marked in the Work Plan is in a trench that, according to seasonal resident Eugene Toolie, was created during the original construction of NE Cape. The contractor plowed away vegetation to create a "permafrost road" for access to a quarry for road construction material. Sample 03SD108 was located to represent surface drainage up-gradient of the site and is in the same topographic drainage as former Well Point 03WP104.

5.2.5 Analytical Results

Table 5-2b presents the Site 3 soil and sediment analytical results. The soil samples from Borings 03B1 and 03B3 contained DRO concentrations that exceed the ADEC Method Two soil cleanup criterion, with concentrations ranging from 373 to 20,500 mg/kg. The biogenic assessment of DRO and RRO results only noted typical diesel-range petroleum hydrocarbon patterns for Boring 03B3 Samples 03SB105 and 03SB106 (See Appendix D). The DRO and RRO results for the other soil samples were attributed to biogenics. Toluene was detected in three samples, with the highest estimated concentration of 1,620 µg/kg measured in Sample 03SB104 from Boring 03B1. Benzene was not detected above the PQL in the six soil samples, however the PQLs exceeded the ADEC criterion for three of the samples. The elevated PQLs are likely due to the high moisture contents and organic nature of the soils.

Sediment Samples 03SD107 and 03SD108 both contained DRO and RRO concentrations that exceed the ADEC soil cleanup criteria. The up-gradient sample, Sample 03SD108, contained the highest estimated concentrations, with 3,720 mg/kg DRO and 28,500 mg/kg RRO. The hydrocarbons measured in the sediment samples were attributed to biogenics by SGS. Toluene was detected in Sample 03SD108 at an estimated concentration of 677 mg/kg which is below the ADEC cleanup criterion. Benzene was not detected, but the PQL for benzene exceeded the cleanup criterion for both wet, organic sediment samples.

Groundwater sample results are presented in Table 5-2d. Samples from Well Points 03WP102 and 03WP5 contained DRO and RRO concentrations that exceed the ADEC cleanup criteria. The RRO concentration in Sample 03GW103, from Well point 03WP6, also exceeds the criterion. The highest concentrations were measured in Sample 03GW104 from 03WP102, with 3.40 mg/L DRO and 3.40 mg/L RRO. Sample 03GW104 was the only water sample in which the laboratory noted typical DRO petroleum compounds. Sample 03GW101 contained 1.70 mg/L DRO, and 2.60 mg/L RRO. Although not detected, the detection limits for the PAHs benzo(a)pyrene and and dibenzo(a,h)anthracene exceed the ADEC cleanup criteria in Sample 03GW101. Samples 03GW101 through 03GW103 were not run through the mass spectrometer to assess TICs due to a mistake on the COC. The fuel chromatograms were reviewed by the laboratory project manager and typical biogenic hydrocarbon patterns were observed.

TABLE 5-2a - SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 3: FUEL LINE CORRIDOR AND PUMPHOUSE

Sample Number**	LOCID	Date	Sample Location (See Figure 5-2 for borehole locations)	Depth (feet)	Field Screening (ppm) ^	Sample Classification†
Soil Samples						
B1S1	-	8/18/04	Boring 03B1	1	<0.2	Dark brown, gravelly SILT; moist; organic (sewage) odor
* 03SB103	03B1-2	8/18/04	Boring 03B1	2 - 3.5	<0.2	Brown, sandy SILT; trace organics; moist
* 03SB104	03B1-6	8/18/04	Boring 03B1	4 - 5.5	0.7	Brown SILT; with organics; ice rich (frozen)
B2S1	-	8/18/04	Boring 03B2	0 - 1.5	<0.2	Brown, gravelly medium SAND; wet; slight hydrocarbon odor
* 03SB101	03B2-2	8/18/04	Boring 03B2	2 - 3.5	0.4	Brown to dark gray SILT; wet to frozen and ice rich
* 03SB102	03B2-6	8/18/04	Boring 03B2	4 - 5.5	<0.2	Gray SILT; frozen; with 1/4 to 1/2-inch lenses of ICE
B3S4	-	8/18/04	Boring 03B2	6 - 7.5	<0.2	Gray SILT; frozen; with ICE strata less than 1/4-inch thick
* 03SB105	03B3-1	8/18/04	Boring 03B3	1 - 2.5	9.6	Dark brown alternating layers of SILT and PEAT; wet; mild hydrocarbon and sewage odors
* 03SB106	03B3-3	8/18/04	Boring 03B3	3 - 4.5	6.5	Dark brown, silty PEAT; wet
B3S3	-	8/18/04	Boring 03B3	5 - 6.5	3.0	Dark brown, sandy PEAT; frozen (field screen) and ICE
Sediment Samples						
* 03SD107	03SD107	8/20/04	Down-gradient, junction of surface drainages to east	0.8	-	Brown organic SILT in active grass roots; wet
* 03SD108	03SD108	8/20/04	Up-gradient in eastern surface drainage	0.8	-	Brown organic SILT in active grass roots; wet
Groundwater Samples						
* 03GW101	03WP5	8/24/04	Up-gradient (south) Well Point 03WP5 (installed in 2004)	WL 0.5	-	Near-surface groundwater in active organic layer - 2 day sample
* 03GW102	03WP103	8/24/04	Well Point 03WP103, east of site (installed in 2001)	WL 0.1	-	Near-surface groundwater in active organic layer - 2 day sample
* 03GW103	03WP6	8/24/04	Down-gradient (NE) Well Point 03WP6 (installed in 2004)	WL 2-3	-	Shallow groundwater near beach - water level variations suggest tidal influence
* 03GW104	03WP102	8/24/04	Down-gradient (north) Well Point 03WP102 (installed in 2001)	WL 0-1	-	Near-surface groundwater in active layer - multi-day sample - water level sensitive to weather

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Tables 5-2b and 5-2d)
**	The full sample number is preceded by "04NE", for example 03SB103 is sample 04NE03SB103
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
WL	approximate static water level in feet below ground surface after installation
LOCID	Location Identification: "03B1-2" signifies Site 3, Boring 1 at 2-foot depth (depth is rounded to the nearest foot)

TABLE 5-2b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 3: FUEL LINE CORRIDOR AND PUMPHOUSE

Site 3 - Fuel Line Corridor and Pumphouse

Soil Matrix

			Sample Type:	BOREHOLE 03B1		BOREHOLE 03B2		BOREHOLE 03B3		SEDIMENT	
			Location ID:	03B1-2	03B1-6	03B2-2	03B2-6	03B3-1	03B3-3	03SD107	03SD108
			Sample ID:	04NE03SB103	04NE03SB104	04NE03SB101	04NE03SB102	04NE03SB105	04NE03SB106	04NE03SD107	04NE03SD108
			Depth (ft):	2 - 3.5	4 - 5.5	2 - 3.5	4 - 5.5	1 - 2.5	3 - 4.5	0.8	0.8
			Sample Date:	8/18/2004	8/18/2004	8/18/2004	8/18/2004	8/18/2004	8/18/2004	8/20/2004	8/20/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**								
PID Headspace Reading	HNU HW101 PID	ppm	–	<0.2	0.7	0.4	<0.2	9.6	6.5	–	–
Percent Moisture	A2540G / E160.3M	%	–	42.9	55.2	50	34.3	49.9	44.5	88.8	91.0
Gasoline Range Organics (GRO)	AK101	mg/kg	300	1.26 J	7.08 J	3.63 J	0.717 J	2.94 J	34.5 J	8.07 J	11.2 J
Diesel Range Organics (DRO)	AK102	mg/kg	250	**373 J**	**971 J**	168	126	**20,500 J**	**15,900 J**	**2,610 J**	**3,720 J**
Laboratory Assessment of Hydrocarbon Origin†	–	–	–	biogenic	biogenic	biogenic	biogenic	**diesel**	**diesel**	biogenic	biogenic
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	2,790 J	6,120 J	1,160	1,150 J	4,000 J	3,020 J	**17,300 J**	**28,500 J**
Laboratory Assessment of Hydrocarbon Origin†	–	–	–	biogenic	biogenic	biogenic	biogenic	biogenic	biogenic	biogenic	biogenic
Aromatic Organic Compounds (BTEX)											
Benzene	SW8260B	µg/kg	20	[15.3]	**[59.5]**	[16.1]	[16.4]	**[22.3]**	**[40.9]**	**[126]**	**[148]**
Ethylbenzene	SW8260B	µg/kg	5,500	[29.3]	[114]	[30.9]	[31.6]	[42.9]	[78.6]	[243]	[284]
Toluene	SW8260B	µg/kg	5,400	[58.7]	1620 J	859 J	[63.2]	[85.9]	145 J	[486]	677 J
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[29.3]	[114]	[30.9]	[31.6]	[42.9]	77.1 J	[243]	[284]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[58.7]	[229]	[61.7]	[63.2]	[85.9]	[157]	[486]	[569]
Polynuclear Aromatic Hydrocarbons (PAH)											
Acenaphthene	PAH SIM	µg/kg	210,000	–	–	[151]	–	–	[89.8]	[738]	–
Acenaphthylene	PAH SIM	µg/kg	210,000	–	–	[151]	–	–	[89.8]	[738]	–
Anthracene	PAH SIM	µg/kg	4,300,000	–	–	[151]	–	–	[89.8]	[738]	–
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	–	–	[151]	–	–	[89.8]	[738]	–
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	–	–	[151]	–	–	[89.8]	[738]	–
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	–	–	[151]	–	–	[89.8]	[738]	–
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	–	–	[151]	–	–	[89.8]	[738]	–
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	–	–	[151]	–	–	[89.8]	[738]	–
Chrysene	PAH SIM	µg/kg	620,000	–	–	[151]	–	–	[89.8]	[738]	–
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	–	–	[151]	–	–	[89.8]	[738]	–
Fluoranthene	PAH SIM	µg/kg	2,100,000	–	–	[151]	–	–	[89.8]	[738]	–
Fluorene	PAH SIM	µg/kg	270,000	–	–	[151]	–	–	[89.8]	[738]	–
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	–	–	[151]	–	–	[89.8]	[738]	–
Naphthalene	PAH SIM	µg/kg	21,000	–	–	[151]	–	–	[89.8]	[738]	–
Phenanthrene	PAH SIM	µg/kg	4,300,000	–	–	[151]	–	–	[89.8]	[738]	–
Pyrene	PAH SIM	µg/kg	1,500,000	–	–	[151]	–	–	[89.8]	[738]	–

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve

TABLE 5-2c GROUNDWATER SAMPLING LOG
SITE 3: FUEL LINE CORRIDOR AND PUMPHOUSE

WELL POINT INSTALLATION DATA

WELL ID	**03WP102**	**03WP103**	**03WP05**	**03WP06**
DATE WELL INSTALLED	2001	2001	8/7/04	8/7/04
GROUND SURFACE ELEVATION (ft)	13.43	13.01	18.61	8.30
WELL MP ELEVATION (ft)	15.71	16.06	21.16	8.69
INTERVAL OF SCREENED SECTION BELOW MP (ft)			2.54-5.48	5.01-8.07
TOTAL DEPTH OF WELL BELOW MP (ft)	6.12	6.09	5.48	8.07
DIAMETER OF WELL CASING (inches)	1.25	1.25	1.25	1.25

DEVELOPMENT DATA

DATE OF DEVELOPMENT	-	-	8/20-21/2004	8/21/2004
TIME DEVELOPMENT INITIATED	-	-	10:15	16:13
DEVELOPMENT COMPLETED	-	-	8/23/04	8/23/04
DEPTH TO WATER BELOW MP (ft)	-	-	3.01	3.46
WATER COLUMN IN WELL (ft)	-	-	2.47	4.61
GALLONS PER FOOT	0.064	0.064	0.064	0.064
GALLONS IN WELL	-	-	0.16	0.30
DEVELOPMENT METHOD	-	-	micro bailer	micro bailer
VOLUME WATER REMOVED (gallons)	-	-	Dry 6 times	Dry 4 times

PURGING & SAMPLING DATA

LOCID	03WP102	03WP103	03WP5	03WP6
SAMPLE ID	04NE03GW104	04NE03GW102	04NE03GW101	04NE03GW103
DATE (Purging)	8/22-23/2004[1]	8/22-23/2004[1]	8/22-23/2004[1]	8/22-23/2004[1]
TIME PURGING INITIATED	16:10	16:25	14:31	15:40
TIME SAMPLE INITIATED	15:38, 8/24/04	12:04, 8/24/04	11:16, 8/24/04	14:33, 8/24/04
DEPTH TO WATER BELOW MP (ft)	3.94	3.11	3.08	2.50
WATER COLUMN IN WELL (ft)	2.18	2.98	2.40	5.57
GALLONS IN WELL	0.14	0.19	0.15	0.36
PURGING METHOD	Peristaltic	Peristaltic	Peristaltic	Peristaltic
VOLUME WATER REMOVED (gallons)	Dry 2 times	Dry 2 times	Dry 2 times	Dry 2 times

WATER QUALITY DATA - YSI 556

DATE MEASURED	8/23/04	8/22/04	8/22/04	8/22/04
TIME MEASURED	17:45	18:23	16:57	17:53
TEMPERATURE (°C)	9.1	9.7	6.9	4.8
SPECIFIC CONDUCTANCE (mS/cm)	0.41	0.38	0.78	0.89
DISSOLVED OXYGEN (mg/L)	2.2	5.7-3.5	4.2	0.93
pH (Standard Units)	6.0	5.5-5.6	6.0	6.6
OXYGEN REDUCTION POTENTIAL (mV)	75	76-80	40-60	-102
TURBIDITY (NTUs) - Oakton	527	-	-	-

WATER LEVEL MEASUREMENT DATA

DATE WATER LEVEL MEASURED	9/14/04	9/14/04	9/14/04	9/14/04
TIME WATER LEVEL MEASURED	10:50	10:53	10:45	10:56
DEPTH TO WATER BELOW MP (ft)	2.29	3.11	3.36	3.65
WATER LEVEL ELEVATION (ft)	13.42	12.95	17.80	5.04

[1] Purging and sampling of well points occurred over an extended time duration due to low flow volun

KEY	**DESCRIPTION**
-	Not developed or not measured
°C	Degrees Celsius
ft	Feet
mg/L	Milligrams per liter
MP	Measuring Point is Top of Well Casing
mV	Millivolts
NTUs	Nepholometric Turbidity Units
mS/cm	Millisiemens per centimeter

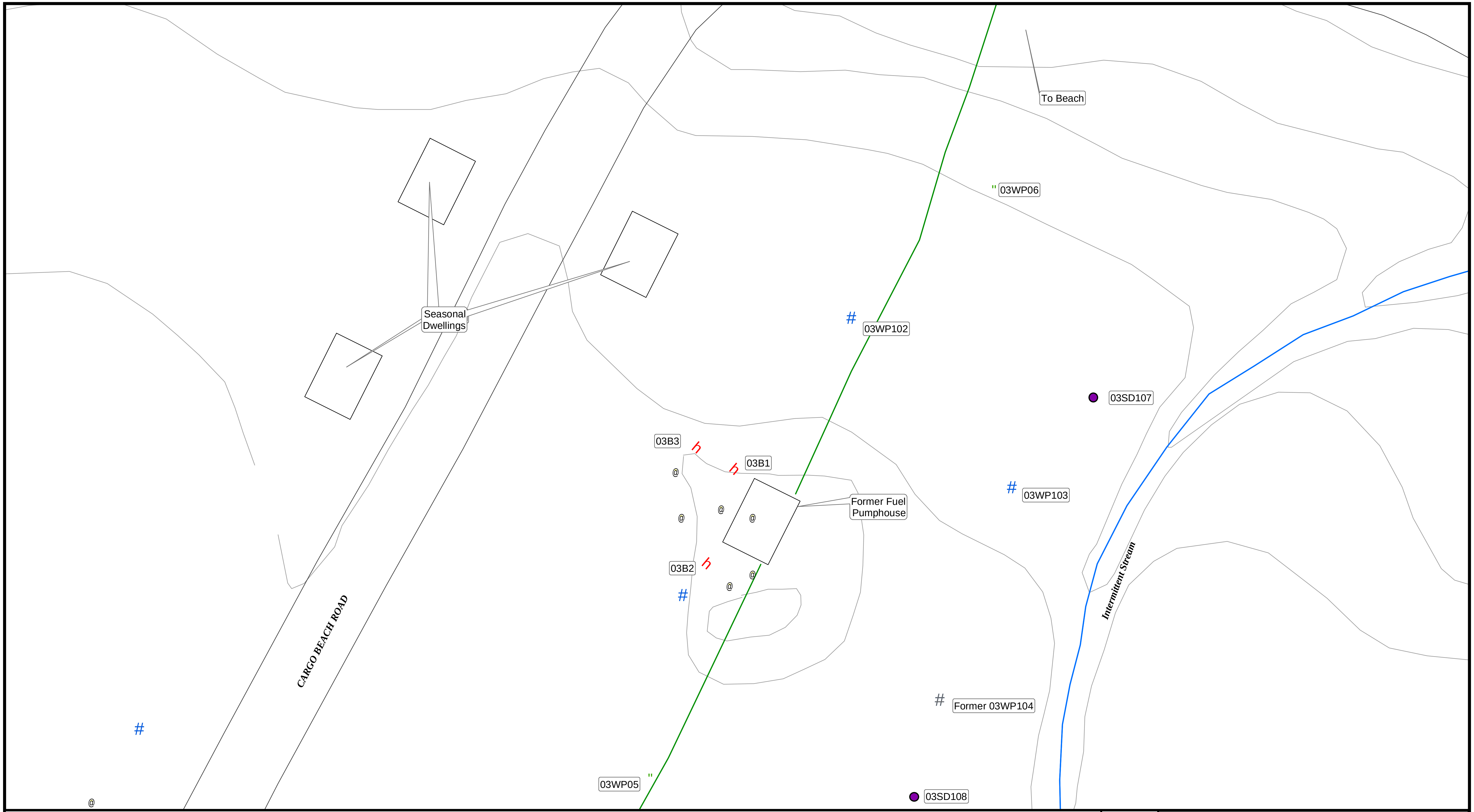
TABLE 5-2d SUMMARY OF WATER ANALYTICAL RESULTS - SITE 3: FUEL LINE CORRIDOR AND PUMPHOUSE

Site 3 - Fuel Line Corridor and Pumphouse

Water Matrix

			Sample Type:	GROUNDWATER			
			Location ID:	03WP102	03WP103	03WP5	03WP6
			Sample ID:	04NE03GW104	04NE03GW102	04NE03GW101	04NE03GW103
			Depth (ft):	WL 0-1	WL 0.1	WL 0.5	WL 2-3
			Sample Date:	8/24/2004	8/24/2004	8/24/2004	8/24/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**				
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	0.0196 J	0.0643 J	0.405 J	0.0277 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	**3.40**	0.433	**1.70**	0.826
Lab Assessment of Hydrocarbon Origin†	-	-	-	diesel	biogenic*	biogenic*	biogenic*
Residual Range Organics (RRO)	AK103	mg/L	1.1	**3.40**	0.641	**2.60**	**1.38**
Lab Assessment of Hydrocarbon Origin†	-	-	-	biogenic	biogenic*	biogenic*	biogenic*
Aromatic Organic Compounds (BTEX)							
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]	0.27 J	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	[1]
Toluene	SW8260B	µg/L	1000	[1]	6.03	252	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)							
Acenaphthene	PAH SIM	µg/L	2,200	[0.0549]	[0.0543]	[0.538]	0.02 J
Acenaphthylene	PAH SIM	µg/L	2,200	[0.0549]	[0.0543]	[0.538]	[0.0556]
Anthracene	PAH SIM	µg/L	11,000	[0.0549]	[0.0543]	[0.538]	[0.0556]
Benzo(a)anthracene	PAH SIM	µg/L	1	[0.0549]	[0.0543]	[0.538]	[0.0556]
Benzo(a)pyrene	PAH SIM	µg/L	0.2	[0.0549]	[0.0543]	**[0.538]**	[0.0556]
Benzo(b)fluoranthene	PAH SIM	µg/L	1	[0.0549]	[0.0543]	[0.538]	[0.0556]
Benzo(g,h,i)perylene	PAH SIM	µg/L	1,100	[0.0549]	[0.0543]	[0.538]	[0.0556]
Benzo(k)fluoranthene	PAH SIM	µg/L	10	[0.0549]	[0.0543]	[0.538]	[0.0556]
Chrysene	PAH SIM	µg/L	100	[0.0549]	[0.0543]	[0.538]	[0.0556]
Dibenzo(a,h)anthracene	PAH SIM	µg/L	0.1	[0.0549]	[0.0543]	**[0.538]**	[0.0556]
Fluoranthene	PAH SIM	µg/L	1,460	[0.11]	[0.109]	[1.08]	[0.111]
Fluorene	PAH SIM	µg/L	1,460	[0.0549]	[0.0543]	[0.538]	[0.0556]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/L	1	[0.0549]	[0.0543]	[0.538]	[0.0556]
Naphthalene	PAH SIM	µg/L	700	0.0309 J	0.0195 J	[0.538]	0.0339 J
Phenanthrene	PAH SIM	µg/L	11,000	[0.11]	[0.109]	[1.08]	[0.111]
Pyrene	PAH SIM	µg/L	1,100	[0.0549]	[0.0543]	[0.538]	[0.0556]

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
J	Estimated concentration; refer to Appendix C for data qualification information
*	Library search not performed. Assessment based on DRO/RRO chromatograms.
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup level
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup level
WL	Approximate depth to water below ground surface



Legend

- " Well point location installed by Shannon & Wilson, Inc. August/September 2004
- ● Sediment sample collected by Shannon & Wilson, Inc. August/September 2004
- ϟ Boring advanced by Shannon & Wilson, Inc. August/September 2004
- # Existing well point installed by others
- # Former well point installed by others
- @ Historical sample location, collected by others
- — Former fuel pipeline
- — Rivers and Streams
- — Topographic Contours (Interval: 5 ft)

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data. Figure based on previous work. Physical features may not correspond to 2004 field observations.

0 15 30 60 90 120 Feet

1 inch equals 30 feet

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 3 - FUEL LINE CORRIDOR & PUMPHOUSE

June 2005

32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-2

5.3 Site 6: Cargo Beach Drum Field

Six soil borings (06B1 through 06B6) were advanced with two samples from each submitted for laboratory analysis, well points 06WP5, 06WP6, and 06WP7 were installed and sampled, and existing well point 06WP103 was sampled at Site 6.

5.3.1 Site Description

The Cargo Beach Drum Field is located west of Cargo Beach Road, between Cargo Beach Road Landfill and the Fuel Line Pumphouse (see Figure 2-3). Scattered drums were removed under prior removal actions. Site 6 is located on the trailing (northeast) side of the large glacial drumlin where the Site 7 landfill is located. The unconsolidated surface deposits resemble lodgment till, and appear to be frost segregated. Topographical depressions to the west-northwest and south contain only boulders and large cobbles at the surface, and relatively fine soils amongst cobbles are exposed in the center of the site. Figure 5-3 shows site features sketched by others, historical sampling points, and Phase IV RI well point and boring locations. The sketched features do not match the conditions observed in 2004 very well.

5.3.2 Data Collection Objectives

Previous investigations at Site 6 identified petroleum impacts in soil and elevated concentrations of some metals in the shallow groundwater. The Phase IV RI objectives were to evaluate the lateral and vertical extent of petroleum impacts in soil, and lateral extent of metals in shallow groundwater. Six soil borings were advanced to assess soil quality around the perimeter of the site. Shallow groundwater quality was assessed by installing and sampling three well points and sampling one existing well point. Soil and groundwater samples were analyzed for GRO, DRO, RRO, BTEX, PCBs, and RCRA metals. Soil samples were also tested for PAHs. The groundwater DRO and RRO results were assessed for the presence of natural organics versus petroleum derived compounds.

5.3.3 Work Plan Variances

The Work Plan specified sampling the Site 6 borings at 5-foot intervals. The rocky nature of the soil often led to inadequate sample recovery at the specified interval. Actual sample intervals varied, and were based on drill action to maximize soil recovery. The Work Plan stated that the borings would be drilled up to a maximum depth of 20 feet. Groundwater was encountered between 4 and 8 feet bgs, and frozen ground was suspected at 12 to 15 feet bgs in the first two borings, which were drilled to total depths of 16 and 21.5 feet, respectively. Because determining depth and extent of contamination was our objective, the final four borings were completed to 11.5 feet bgs, rather than the specified 20 feet bgs. This depth was well into the aquifer, but above suspected frozen ground.

Due to the rocky nature of the soil, the three new well points were installed by drilling pilot holes with the air hammer before driving the well points with the drill rig. The first location for Well Point 06WP7 did not yield adequate water for sampling, and the water yield in Well Point 06WP5 was marginal. Well Point 06WP7 was installed in a new location, and Well Point 06WP5 was driven deeper using the drill rig.

5.3.4 Field Investigation

Field activities at Site 6 commenced on August 20, 2004, and were completed on September 11, 2004.

5.3.4.1 Soil Sampling

Six soil borings, located around the perimeter of Site 6 as shown on Figure 5-3, were advanced to depths ranging from 11.5 to 21.5 feet bgs. Soil samples were collected for field screening and potential laboratory analysis at approximately 5-foot intervals, and two soil samples were selected from each boring for laboratory analysis. Table 5-3a includes headspace screening results, sample descriptions, and collection depths. Boring Logs are included in Appendix B for each boring.

5.3.4.2 Groundwater Sampling

Three well points were installed along the western boundary of Site 6, as shown in Figure 5-3. Existing Well Point 06WP103 was sampled along with new Well Points 06WP5, 06WP6, and 06WP7. A typical setup for sampling well points with a peristaltic pump is depicted in Photograph 7 of Appendix A. Well Points 06WP103 and 06WP5 had low water yields, and required two days to collect analytical samples. The GRO and BTEX vials for Samples 06GW101 and 06GW201, from 06WP7, were frozen at the laboratory. Samples 06GW105, 06GW205, and 06GW305 were collected from 06WP7 at a later date to replace the GRO and BTEX QC/QA replicate set. Table 5-3c is a Well Point Sampling Log for Site 6.

5.3.4.3 IDW

Soil cuttings were used to backfill the boring of origin. Headspace samples were returned to the soil surface at the boring location. Headspace bags and sampling gloves were place in the project IDW bag. Groundwater sampling tubing was place in a tubing-specific IDW bag. The well point purge water was treated and discharged to the ground surface at the site.

5.3.4.4 Field Observations

The Work Plan suggests that the drum field is a constructed gravel pad. Observations suggest that the native materials were simply graded to level the site. The area appears to be subject to the forces of frost segregation, resulting in areas of uplifted fines and areas of rock. The central/west-central area of soil staining is in an area with fines. Smaller particles with adhered contaminants may tend to be lifted toward the surface by frost in the winter, and move with runoff to the west during the summer. Boring 06B5 and Well Points 06WP103 and 06WP6 are in the area where the majority of surface runoff flows westward from the stained portion of the site.

The 2001/2002 RI report suggests that bedrock at Site 6 is roughly 5 feet bgs. Based on our borings and observations, bedrock is at a depth greater than 21.5 feet bgs in the vicinity of Site 6. Based on the log of 1950 Boring DH-53, and the fact that glacial till (basal) was not encountered at 21.5 feet bgs (in our boring 06B3), bedrock may be over 40 feet bgs (near sea level).

An excavation and stockpile were present on the north side of the site access road, between the site and Cargo Beach Road (pipe ends were visible in the north wall of the excavation). The stockpile is visible in the lower left corner of Photograph 6. Boring 06B2 was placed as close as practicable to the western slope of this stockpile to characterize the eastern extent of apparent site activities. The area directly north of Boring 06B2 is a low rise with old vegetation and little evidence of disturbance.

The water table elevation is higher at 06WP6 than at the other three well points, suggesting northeastern or southeastern trending groundwater flow. Surface topography in the greater Site 6 vicinity suggests on overall runoff gradient to the north-northeast. Shallow groundwater flow is likely to be complex. The first location for Well Point 06WP7 was in an area of fines, and yielded insufficient groundwater. The final location is at a boundary between fines and rock, and has excellent yield.

5.3.5 Analytical Results

Tables 5-3b and 5-3d summarize the Site 6 analytical results for soil and water samples, respectively.

5.3.5.1 Soil Results

GRO was detected at less than the PQL and the cleanup criterion in all six borings. DRO was reported at concentrations above the PQL only in Boring 06B5. A QC/QA replicate set was collected from 5 to 6.5 feet bgs in this boring. Sample 06SB107 and QC duplicate (Sample 06SB207) were reported to contain 48.3 mg/kg and 55.0 mg/kg DRO, respectively, while the QA replicate, Sample 06SB307, contained 358 mg/kg DRO, exceeding the 250 mg/kg cleanup criterion. The results for Samples 06SB107 and 06SB207 were selected as the preferred results in the CQAR due to the 40-time dilution of 06SB307. RRO concentrations were all less than the ADEC cleanup criterion, with the highest concentrations being measured in Boring 06B5. Arsenic exceeded the 2 mg/kg cleanup criterion in all soil samples, at concentrations that may be attributable to natural soil content.

5.3.5.2 Groundwater Results

Groundwater Sample 06GW102 from Well Point 06WP6 contained levels of arsenic, barium, chromium, and lead that are elevated above the ADEC cleanup criteria. The concentrations are 67.8 µg/L, 2980 µg/L, 792 µg/L, and 144 µg/L, respectively. Sample 06GW103 from 06WP5 contained 19.8 µg/L of lead, which exceeds the 15µg/L cleanup criterion. DRO and RRO detections were too low to reasonably assess biogenic influence. No detectable concentrations of BTEX or PCBs were measured in the Site 6 groundwater samples.

TABLE 5-3a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 6: CARGO BEACH ROAD DRUM FIELD

Sample Number**	LOCID	Date	Sample Location (See Figure 5-3 for borehole locations)	Depth (feet)	Screening (ppm) ^	Sample Classification†
Soil Samples						
B2S1	06B2-2	8/19/04	Boring 06B2	1.5-2	<0.2	Brown coarse SAND; moist
B2S2	06B2-5	8/19/04	Boring 06B2 - minimal recovery	5-6.5	-	Brown, coarse SAND and granitic rock chips; wet
B2S3	06B2-6.5	8/19/04	Boring 06B2 - no recovery	6.5-8	-	Fractured granitic rock in sampler
* 06SB101	06B2-10	8/19/04	Boring 06B2 - 2 split spoons driven at this depth	10-11.5	0.4	Light gray, slightly silty, fine to medium SAND; wet
* 06SB102	06B2-15	8/19/04	Boring 06B2 - bottom of borehole	14.5	16	Light gray, slightly silty, fine to medium SAND; wet
B3S1	06B3-0.5	8/20/04	Boring 06B3	0.5	0.8	Brown, sandy SILT; moist
* 06SB103	06B3-3	8/20/04	Boring 06B3 - just above water	3-4.5	1.2	Brown, sub-angular gravelly, fine sandy SILT; moist
* 06SB104	06B3-5	8/20/04	Boring 06B3 - just into water	5-6.5	0.6	Light gray, silty, sandy GRAVEL; wet
B3S3	06B3-10	8/20/04	Boring 06B3	10-11.5	<0.2	Light gray, slightly silty medium SAND; wet
B3S4	06B3-15	8/20/04	Boring 06B3	15-16.5	0.7	Light gray, slightly silty SAND; trace angular gravel; wet
B3S5	06B3-20	8/20/04	Boring 06B3 - bottom of borehole	20-21.5	0.4	Light gray, slightly silty, medium to coarse angular SAND; wet
* 06SB105	06B4-4	8/20/04	Boring 06B4	3.5-5	1.2	Brown, silty GRAVEL; moist
B4S2	06B4-5	8/20/04	Boring 06B4 - at water level, sample may be slough	5-6.5	0.6	Brown, silty, gravelly SAND; moist to wet
* 06SB106	06B4-10	8/20/04	Boring 06B4 - bottom of borehole	10-11.5	<0.2	Light brown, slightly silty, angular gravelly SAND; wet
B5S1	06B5-3	8/21/05	Boring 06B5	3-4.5	0.6	Brown, silty GRAVEL; moist
* 06SB107	06B5-5	8/21/04	Boring 06B5	5-6.5	0.4	Light brown to reddish brown, sandy SILT; trace gravel; moist
* 06SB207	06B5-5	8/21/04	QC replicate of 06SB107	5-6.5	0.4	Light brown to reddish brown, sandy SILT; trace gravel; moist
* 06SB307	06B5-5	8/21/04	QA replicate of 06SB107	5-6.5	0.4	Light brown to reddish brown, sandy SILT; trace gravel; moist
* 06SB108	06B5-10	8/21/04	Boring 06B5 - bottom of borehole	10-11.5	0.7	Light brown, silty GRAVEL; wet
* 06SB109	06B6-2	8/21/04	Boring 06B6	2-3.5	0.4	Brown and gray, slightly gravelly SILT; moist
* 06SB110	06B6-7	8/21/04	Boring 06B6	6.5-8	0.2	Brown/gray/rusty orange, slightly gravelly SILT; thin lenses of dark gray fine SAND; wet
B6S3	06B6-10	8/21/04	Boring 06B6 - bottom of borehole	10-11.5	0.2	Brown and gray, slightly gravelly SILT; moist
B1S1	06B1-5	8/21/04	Boring 06B1 - no recovery	5-6.5	-	Fractured granitic rock in sampler; wet
* 06SB111	06B1-7	8/21/04	Boring 06B1	6.5-8	0.3	Light brown, silty, subangular coarse GRAVEL; wet
* 06SB112	06B1-10	8/21/04	Boring 06B1 - bottom of borehole	10-11.5	0.3	Silty SAND; wet

TABLE 5-3a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 6: CARGO BEACH ROAD DRUM FIELD

Sample Number**	LOCID	Date	Sample Location (See Figure 5-3 for borehole locations)	Depth (feet)	Screening (ppm) ^	Sample Classification†
Groundwater Samples						
* 06GW101	06WP7	9/5/04	Well Point 06WP7, (installed in 2004)	WL 6.1	-	Groundwater
* 06GW201	06WP7	9/5/04	QC replicate of 06GW101	WL 6.1	-	Groundwater
* 06GW301	06WP7	9/5/04	QA replicate of 06GW101	WL 6.1	-	Groundwater
* 06GW105	06WP7	9/11/04	Replacement for frozen sample 06GW101	WL 6.1	-	Groundwater
* 06GW205	06WP7	9/11/04	Replacement for frozen sample 06GW201	WL 6.1	-	Groundwater
* 06GW305	06WP7	9/11/04	QA replicate of 06GW105	WL 6.1	-	Groundwater
* 06GW102	06WP6	9/5/04	Well Point 06WP6 (installed in 2004)	WL 5.1	-	Groundwater
* 06GW103	06WP5	9/5/04	Well Point 06WP5 (installed in 2004)	WL 4.1	-	Groundwater
* 06GW104	06WP103	9/5/04	Well Point 06WP103 (installed in 2001)	WL 6.8	-	Groundwater

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Tables 5-3b and 5-3d)
**	The full sample number is preceded by "04NE", for example 06SB101 is sample 04NE06SB101
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
WL	Approximate static water level in feet below ground surface after installation
LOCID	Location Identification: "06WP7" signifies Site 6, Well Point 06WP7

TABLE 5-3b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 6: CARGO BEACH ROAD DRUM FIELD

Site 6 - Cargo Beach Road Drum Field **Soil Matrix**			Sample Type:	**BOREHOLE 06B1**		**BOREHOLE 06B2**		**BOREHOLE 06B3**		**BOREHOLE 06B4**		**BOREHOLE 06B5**				**BOREHOLE 06B6**	
			Location ID:	06B1-7	06B1-10	06B2-10	06B2-15	06B3-3	06B3-5	06B4-4	06B4-10	06B5-5			06B5-10	06B6-2	06B6-7
			Sample ID:	04NE06SB111	04NE06SB112	04NE06SB101	04NE06SB102	04NE06SB103	04NE06SB104	04NE06SB105	04NE06SB106	04NE06SB107	04NE06SB207	04NE06SB307	04NE06SB108	04NE06SB109	04NE06SB110
			Depth (ft):	6.5-8	10-11.5	10-11.5	14.5	3-4.5	5-6.5	3.5-5	10-11.5	5-6.5	5-6.5	5-6.5	10-11.5	2-3.5	6.5-8
			Sample Date:	8/21/2004	8/21/2004	8/19/2004	8/19/2004	8/20/2004	8/20/2004	8/20/2004	8/20/2004	8/21/2004	8/21/2004	8/21/2004	8/21/2004	8/21/2004	8/21/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**									*Primary*	*Duplicate*	*Triplicate*			
PID Headspace Reading	HNU HW101 PID	ppm	–	0.3	0.3	0.4	16	1.2	0.6	1.2	<0.2	0.4	0.4	0.4	0.7	0.4	0.2
Percent Moisture	A2540G / E160.3M	%	–	11.7	10.3	13.1	19.1	4.8	9.2	6.7	20	18.5	20.1	20.6	21	35.1	15.3
Gasoline Range Organics (GRO)	AK101	mg/kg	300	0.584 J	0.687 J	0.497 J	0.658 J	1.140 J	0.642 J	0.628 J	0.666 J	0.808 J	0.810 J	0.306 J	0.666 J	0.838 J	0.913 J
Diesel Range Organics (DRO)	AK102	mg/kg	250	8.24 J	1.52 J	3.69 J	18.2 J	13.5 J	4.77 J	3.54 J	5.7 J	48.3	55.0	**358**	166	18 J	6.21 J
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	24.1	13.6 J	9.95 J	43.0	77.1	21.9	[20.8]	24 J	473	605	3,600	1600 J	174	24.4
Aromatic Organic Compounds (BTEX)																	
Benzene	SW8260B	µg/kg	20	[8.33]	[9.3]	[7.49]	[9.95]	[11]	[7.86]	[8.39]	[8.36]	[11.1]	[12.9]	**[100]**	[9.64]	[12]	[11.1]
Ethylbenzene	SW8260B	µg/kg	5,500	[16]	[17.9]	[14.4]	[19.1]	[21.2]	[15.1]	[16.1]	[16.1]	[21.4]	[24.8]	[100]	[18.5]	[23.2]	[21.3]
Toluene	SW8260B	µg/kg	5,400	[32]	[35.8]	[28.8]	[38.3]	[42.3]	[30.2]	[32.3]	[32.1]	[42.8]	[49.6]	[100]	[37.1]	[46.3]	[42.5]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[16]	[17.9]	[14.4]	[19.1]	[21.2]	[15.1]	[16.1]	[16.1]	[21.4]	[24.8]	[100]	[18.5]	[23.2]	[21.3]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[32]	[35.8]	[28.8]	[38.3]	[42.3]	[30.2]	[32.3]	[32.1]	[42.8]	[49.6]	[200]	[37.1]	[46.3]	[42.5]
Polynuclear Aromatic Hydrocarbons (PAH)																	
Acenaphthene	PAH SIM	µg/kg	210,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Acenaphthylene	PAH SIM	µg/kg	210,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Anthracene	PAH SIM	µg/kg	4,300,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Chrysene	PAH SIM	µg/kg	620,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	3.81 J	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Fluoranthene	PAH SIM	µg/kg	2,100,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Fluorene	PAH SIM	µg/kg	270,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Naphthalene	PAH SIM	µg/kg	21,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Phenanthrene	PAH SIM	µg/kg	4,300,000	[5.68]	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	[6.19]	[6.28]	[10]	[6.28]	[7.76]	[5.89]
Pyrene	PAH SIM	µg/kg	1,500,000	2.73 J	[5.35]	[5.81]	[5.93]	[5.24]	[5.56]	[5.29]	[6.16]	4.07 J	4.06 J	[10]	2.61 J	[7.76]	[5.89]
Polychlorinated Biphenyls (PCBs)			Sum of congeners:														
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.056]	[0.0547]	[0.0573]	[0.0605]	[0.0526]	[0.0543]	[0.053]	[0.0625]	[0.0618]	[0.0612]	[0.025]	[0.0646]	[0.0775]	[0.0583]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.056]	[0.0547]	[0.0573]	[0.0605]	[0.0526]	[0.0543]	[0.053]	[0.0625]	[0.0618]	[0.0612]	[0.050]	[0.0646]	[0.0775]	[0.0583]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.056]	[0.0547]	[0.0573]	[0.0605]	[0.0526]	[0.0543]	[0.053]	[0.0625]	[0.0618]	[0.0612]	[0.025]	[0.0646]	[0.0775]	[0.0583]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.056]	[0.0547]	[0.0573]	[0.0605]	[0.0526]	[0.0543]	[0.053]	[0.0625]	[0.0618]	[0.0612]	[0.025]	[0.0646]	[0.0775]	[0.0583]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.056]	[0.0547]	[0.0573]	[0.0605]	[0.0526]	[0.0543]	[0.053]	[0.0625]	[0.0618]	[0.0612]	[0.025]	[0.0646]	[0.0775]	[0.0583]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.056]	[0.0547]	[0.0573]	[0.0605]	[0.0526]	[0.0543]	[0.053]	[0.0625]	[0.0618]	[0.0612]	[0.025]	[0.0646]	[0.0775]	[0.0583]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	[0.056]	[0.0547]	[0.0573]	[0.0605]	[0.0526]	[0.0543]	[0.053]	[0.0625]	[0.0618]	[0.0612]	[0.025]	[0.0646]	[0.0775]	[0.0583]
Total Metals																	
Arsenic	SW6020	mg/kg	2	**2.9**	**2.03**	**2.59**	**2.84**	**2.78**	**3.25**	**5.78**	**2.72**	**4.25**	**4.81**	**5.27 J**	**4.72**	**3.28**	**9.90**
Barium	SW6020	mg/kg	1,100	21.4	10.5	13.1	14.9	24.0	14.5	19.7	21.0	56.4 J	62.0	78.3 J	47.9 J	57.9 J	133
Cadmium	SW6020	mg/kg	5	0.173 J	0.105 J	0.136 J	0.155 J	0.13 J	0.122 J	0.123 J	0.122 J	0.128 J	0.468 J	0.252 J	0.123 J	[0.294]	0.173 J
Chromium	SW6020	mg/kg	26 (total Cr)	8.89	4.71	6.06	6.71	8.62	5.54	6.43	13.9	14.8	15.9	17.9 J	13.8	8.25	22.2
Lead	SW6020	mg/kg	400 (ing/inh)	16.3	11.7	15.4	17.5	14.0	14.3	13.0	15.2	12.0	11.6	14.9 J	12.3	6.32	16.6
Mercury	SW7471A	mg/kg	1.4	0.0234 J	0.0186 J	[0.0456]	[0.0487]	[0.0419]	[0.0434]	[0.0423]	[0.0496]	0.334	0.188	0.0497	0.0875	0.0905	0.0851
Selenium	SW6020	mg/kg	3.5	0.248 J	[0.555]	[0.56]	0.265 J	0.2 J	0.21 J	0.319 J	[0.604]	0.487 J	[0.607]	0.749 J	0.568 J	[0.736]	[0.677]
Silver	SW6020	mg/kg	21	[0.111]	[0.111]	[0.112]	[0.119]	0.0323 J	[0.105]	[0.104]	0.0912 J	0.652	0.414	0.896 J	0.148	[0.147]	0.0811 J

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector

KEY	DESCRIPTION
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway

KEY	DESCRIPTION
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.

TABLE 5-3c GROUNDWATER SAMPLING LOG
SITE 6: CARGO BEACH ROAD DRUM FIELD

WELL POINT INSTALLATION DATA

WELL ID	**06WP103**	**06WP5**	**06WP6**	**06WP7**
DATE WELL INSTALLED	2001	8/21/04	9/1/04	9/1/04
GROUND SURFACE ELEVATION (ft)	45.88	45.24	46.16	46.57
WELL MP ELEVATION (ft)	48.33	48.35	50.57	49.87
TOP OF SCREENED SECTION, BELOW MP (ft)	est. 6.25	7.80	12.9	9.9
TOTAL DEPTH OF WELL BELOW MP (ft)	9.24	10.78	15.85	12.9
DIAMETER OF WELL CASING (inches)	1.25	1.25	1.25	1.25

DEVELOPMENT DATA

DATE OF DEVELOPMENT	-	8/23-9/3/2004	9/2-3/2004	9/2-3/2004
TIME DEVELOPMENT INITIATED	-	17:00	11:00	11:26
TIME DEVELOPMENT COMPLETED	-	12:34	11:56	12:21
DEPTH TO WATER BELOW MP (ft)	-	7.18	9.57	9.36
WATER COLUMN IN WELL (ft)	-	3.60	6.28	3.54
GALLONS PER FOOT	0.064	0.064	0.064	0.064
GALLONS IN WELL	-	0.23	0.40	0.23
DEVELOPMENT METHOD	-	Peristaltic	Peristaltic	Peristaltic
VOLUME WATER REMOVED (gallons)	-	0.9	1.5	4.0

PURGING & SAMPLING DATA

LOCID	06WP103	06WP5	06WP6	06WP7
SAMPLE ID	04NE06GW104	04NE06GW103	04NE06GW102	04NE06GW101
DATE	9/4-5/2004	9/4-5/2004	9/4-5/2004	9/4-5/2004
TIME PURGING INITIATED	16:00	15:34	17:20	16:45
TIME SAMPLE INITIATED	16:54, 9/5/04	16:12, 9/5/04	15:35, 9/5/04	13:27, 9/5/04
DEPTH TO WATER BELOW MP (ft)	7.75	7.96	10.83	9.50
WATER COLUMN IN WELL (ft)	1.49	2.82	5.02	3.40
GALLONS IN WELL	0.10	0.18	0.32	0.22
PURGING METHOD	Peristaltic	Peristaltic	Peristaltic	Peristaltic
VOLUME WATER REMOVED (gallons)	1.0	0.3	0.4	1.0

WATER QUALITY DATA - YSI 556

DATE MEASURED	09/04/04	09/04/04	09/04/04	09/04/04
TIME MEASURED	16:28	15:45	17:28	17:05
TEMPERATURE (^{o}C)	6.4	5.0	5.4	4.2
SPECIFIC CONDUCTANCE (mS/cm)	0.13	0.32	0.41	0.07
DISSOLVED OXYGEN (mg/L)	8.5	5.0	0.7	9.0
pH (Standard Units)	5.6	6.9	6.5	5.9
OXYGEN REDUCTION POTENTIAL (mV)	181	-99	-258	102
TURBIDITY (NTUs) - Oakton	-	-	-	-

WATER LEVEL MEASUREMENT DATA

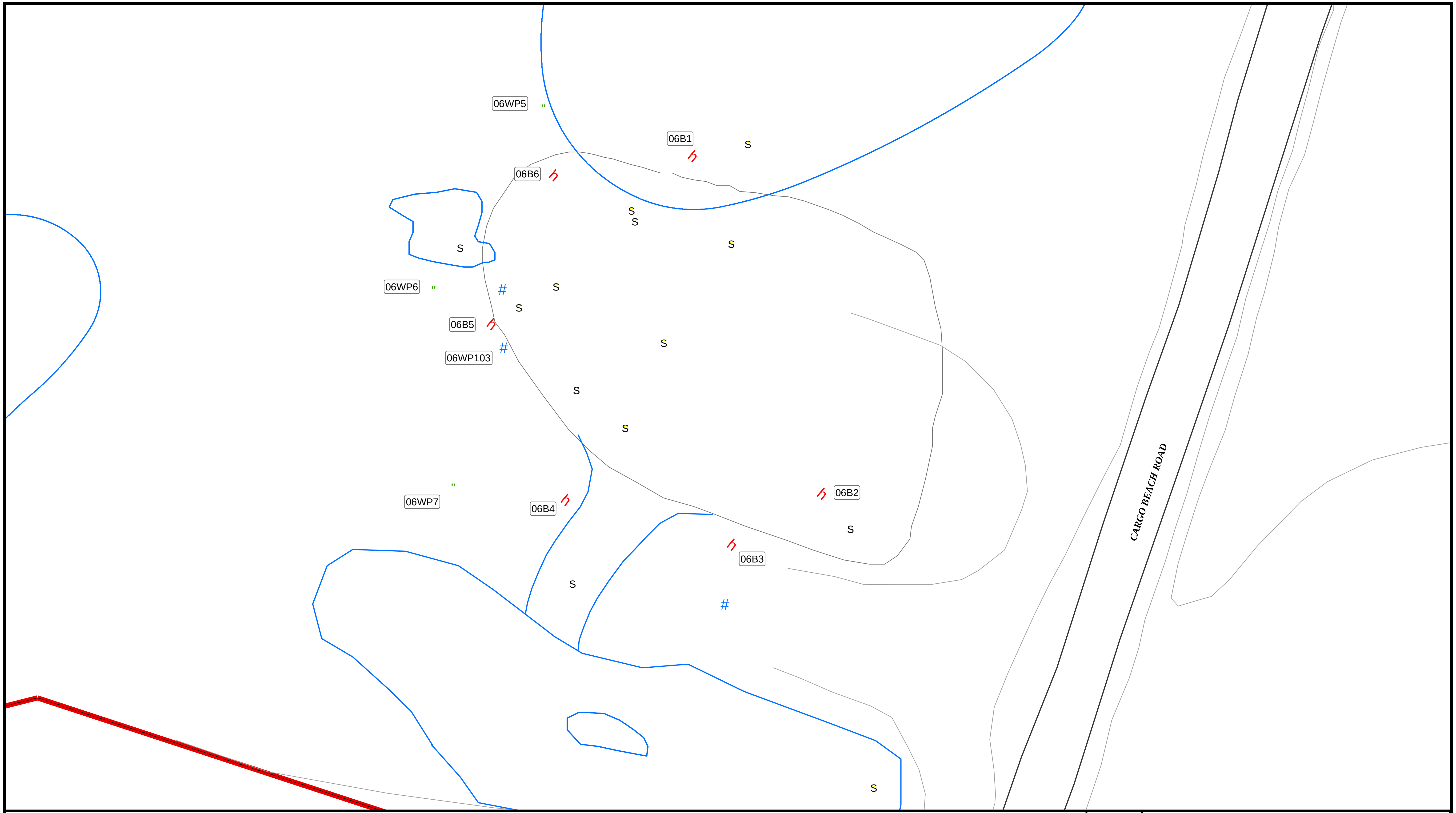
DATE WATER LEVEL MEASURED	09/13/04	09/13/04	09/13/04	09/13/04
TIME WATER LEVEL MEASURED	18:25	18:20	18:17	18:15
DEPTH TO WATER BELOW MP (ft)	7.80	8.03	10.00	9.59
WATER LEVEL ELEVATION (ft)	40.53	40.32	40.57	40.28

KEY	**DESCRIPTION**
-	Not developed or not measured
^{o}C	Degrees Celsius
ft	Feet
mg/L	Milligrams per liter
MP	Measuring Point is Top of Well Casing
mV	Millivolts
NTUs	Nepholometric Turbidity Units
mS/cm	Millisiemens per centimeter

TABLE 5-3d SUMMARY OF WATER ANALYTICAL RESULTS - SITE 6: CARGO BEACH ROAD DRUM FIELD

Site 6 - Cargo Beach Road Drum Field **Water Matrix**			Sample Type:	**GROUNDWATER**								
			Location ID:	06WP103	06WP5	06WP6	06WP7					
			Sample ID:	04NE06GW104	04NE06GW103	04NE06GW102	04NE06GW101	04NE06GW105$^{\#}$	04NE06GW201	04NE06GW205$^{\#}$	04NE06GW301	04NE06GW305$^{\#}$
			Depth (ft):	WL 6.8	WL 4.1	WL 5.1	WL 6.1	WL 6.1	WL 6.1	WL 6.1	WL 6.1	WL 6.1
			Sample Date:	9/5/2004	9/5/2004	9/5/2004	9/5/2004	9/11/2004	9/5/2004	9/11/2004	9/5/2004	9/11/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**				*Primary*	*Primary*	*Duplicate*	*Duplicate*	*Triplicate*	*Triplicate*
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	0.0120 J	0.0175 J	.0482 J	–	0.0187 J	–	0.0204 J	0.0239 J	0.0148 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	0.164 J	0.385	0.213 J	0.189 J	–	0.213 J	–	0.0794 J	–
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	^	^	^	-	^	-	-	-
Residual Range Organics (RRO)	AK103	mg/L	1.1	0.217 J	0.728	0.268 J	0.204 J	–	0.185 J	–	[0.75]	–
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	^	^	^	-	^	-	-	-
Aromatic Organic Compounds (BTEX)												
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]	[0.4]	–	[0.4]	–	[0.4]	[0.5]	[0.5]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	–	[1]	–	[1]	[1]	[1]
Toluene	SW8260B	µg/L	1,000	[1]	[1]	[1]	–	[1]	–	[1]	0.360J	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	–	[1]	–	[1]	[1]	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	–	[2]	–	[2]	[2]	[2]
Polychlorinated Biphenyls (PCBs)												
PCB-1016 (Aroclor 1016)	SW8082	µg/L	0.5	[0.108]	[0.108]	[0.112]	[0.109]	–	[0.109]	–	[0.5]	–
PCB-1221 (Aroclor 1221)	SW8082	µg/L	0.5	[0.108]	[0.108]	[0.112]	[0.109]	–	[0.109]	–	[0.5]	–
PCB-1232 (Aroclor 1232)	SW8082	µg/L	0.5	[0.108]	[0.108]	[0.112]	[0.109]	–	[0.109]	–	[0.5]	–
PCB-1242 (Aroclor 1242)	SW8082	µg/L	0.5	[0.108]	[0.108]	[0.112]	[0.109]	–	[0.109]	–	[0.5]	–
PCB-1248 (Aroclor 1248)	SW8082	µg/L	0.5	[0.108]	[0.108]	[0.112]	[0.109]	–	[0.109]	–	[0.5]	–
PCB-1254 (Aroclor 1254)	SW8082	µg/L	0.5	[0.108]	[0.108]	[0.112]	[0.109]	–	[0.109]	–	[0.5]	–
PCB-1260 (Aroclor 1260)	SW8082	µg/L	0.5	[0.108]	[0.108]	[0.112]	[0.109]	–	[0.109]	–	[0.5]	–
PCB-1262 (Aroclor 1262)	SW8082	µg/L	0.5	–	–	–	–	–	–	–	[0.5]	–
PCB-1268 (Aroclor 1268)	SW8082	µg/L	0.5	–	–	–	–	–	–	–	[0.5]	–
Total Metals												
Arsenic	SW6020	µg/L	50	[10]	12.7	**67.8**	[10]	–	3.52 J	–	0.650 J	–
Barium	SW6020	µg/L	2,000	15	588	**2,980**	12.5	–	9.68	–	11.7 J	–
Cadmium	SW6020	µg/L	5	[2]	[2]	1.97 J	[2]	–	[2]	–	[1]	–
Chromium	SW6020	µg/L	100 (Total)	1.88 J	91	**792**	[4]	–	[4]	–	1.13 J	–
Lead	SW6020	µg/L	15	[1]	**19.8**	**144**	1.8	–	1.16	–	2.82 J	–
Mercury	SW7470A	µg/L	2	[0.2]	[0.2]	0.176 J	[0.2]	–	[0.2]	–	0.0952 J	–
Selenium	SW6020	µg/L	50	[10]	[10]	9.74 J	[10]	–	[10]	–	0.480 J	–
Silver	SW6020	µg/L	180	[2]	[2]	1.2 J	[2]	–	[2]	–	0.240 J	–

KEY	**DECSRIPTION**
–	Measurement not recorded or not applicable
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
^	Tentatively identified compounds not reviewed due to low concentration
$^{\#}$	Replacement samples for original and frozen GRO/BTEX samples collected from 06WP7
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
WL	Approximate depth to water below ground surface



Legend

" Well point installed by Shannon & Wilson, Inc. August/September 2004

ϟ Boring advanced by Shannon & Wilson, Inc. August/September 2004

Existing monitoring wells or well point installed by others

S Historical sample location collected by others

▬ Site 7 Landfill Boundary

— Ephemeral Ponds (various years)

— Topographic Contours (Interval: 5 ft)

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

0 20 40 80 120 160 Feet

1 inch equals 40 feet

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 6 - CARGO BEACH ROAD DRUM FIELD

June 2005

32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-3

5.4 Site 7: Cargo Beach Road Landfill

Ten surface soil samples and two near-surface samples were collected from Site 7. See Figure 5-4 and Table 5-4a for locations and descriptions.

5.4.1 Site Description

This site is an unpermitted solid waste landfill located about mid-way between the MOC and Cargo Beach, as shown on Figure 2-3. The landfill was used between 1965 and 1974. Scattered drums and metal debris were removed from the site during previous removal actions. The landfill appears to have been created by dumping debris off the sides of a large glacial drumlin. The debris appear to have been covered frequently by grading soil out from the top of the drumlin. Debris remain visible around the perimeter of the drumlin (a more extreme example is shown in Photograph 8), except where Cargo Beach Road crosses.

5.4.2 Data Collection Objectives

Two surface soil samples collected in 2001 suggest an area with potential PCB impacts. Additional soil sampling was performed to further delineate the PCB-impacted areas.

5.4.3 Work Plan Variances

The stake marking the location of 2001 sample 01NE07SS127 was not found. The area had been re-graded within the last two years, based on the heavy equipment tracks and lack of vegetation. The 2004 sample locations were selected using the relationship between physical features and the 2001 sample location shown on the site plan. The surveyor later identified the surveyed location of 01NE07SS127, which was about 30 feet northeast of the estimated location due to scaling discrepancies on the site plans. Therefore, samples 07SS101 through 07SB104 intended to be east and south of Sample 07SS127 are actually west and southwest of the 2001 sample location. Laboratory testing of the three original samples 07SS105 through 07SS107 was cancelled, and new samples 07SS113 to 07SS115 were collected to represent the north and east areas. The supply of disposable booties had been depleted, so the samplers decontaminated their rubber boots at the edge of the study area.

5.4.4 Field Investigation

The Site 7 field activities were completed between August 20, 2004 and September 13, 2004. Figure 5-4 shows the layout of the study area and the sampled locations.

5.4.4.1 Soil Sampling

Analytical soil samples were collected from five locations around each of two previous sample locations, as shown in Figure 5-4. Sample descriptions are included in Table 5-4a. Five near surface and two co-located subsurface samples were collected from the vicinity of previous sample location 01NE07SS127. The co-located surface and sub-surface samples (07SS101/07SB102 and 07SS103/07SB104) were collected from auger flights with the help of the drill rig. Five near surface soil samples were collected from the vicinity of previous sample location 01NE07SS125 with hand tools. Samples 07SS110 through 07SS112 were collected from soil used to cover the debris. Samples 07SS108 and 07SS109 were collected from native soil at the base of the debris/fill.

5.4.4.2 IDW

The augers and shovels used to access the samples and the drillers' boots were decontaminated before leaving the site. The samplers wore disposable booties and gloves, which were placed in a polyethylene bag along with the sampling spoons before returning to Cargo Beach Road.

5.4.5 Analytical Results

Site 7 analytical results are summarized in Table 5-4b. The PCB Aroclor 1260 was the only congener detected at Site 7, and was reported in each of the seven samples collected near the 01NE07SS127 location. Three samples contained concentrations greater than the 1 mg/kg inhalation/ingestion PCB cleanup criterion. Samples 07SS101 and 07SS103 contained 2.37 mg/kg and 2.18 mg/kg, respectively. Sample 07SS113 contained the highest concentration, with an estimated "J" value of 50.8 mg/kg. In addition, an estimated concentration of 0.998 mg/kg is reported for Sample 07SS115. Aroclor 1260 was detected at three of the five sample locations around the 01NE07SS125 location. Only Sample 07SS112 exceeded the 1 mg/kg criterion with 4.76 mg/kg.

The highest PCB concentration was measured in surface soil Sample 07SS113, collected north of the recently graded soil in the vicinity of location 01NE07SS127. The deepest samples in the vicinity (LOCID 07SS101-4 at 4 to 4.5 feet bgs and Sample 07SS104 at 2.8 to 3 feet bgs) had the lowest concentrations of Aroclor 1260. Sample 07SS112 was located just below the top of the fill slope above Sample 01NE07SS125 and contained the second highest concentration of Aroclor 1260. These observations suggest that the PCB release occurred at the ground surface, and that soil with relatively high concentrations was either removed or relocated when the area was graded.

TABLE 5-4a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 7: CARGO BEACH ROAD LANDFILL

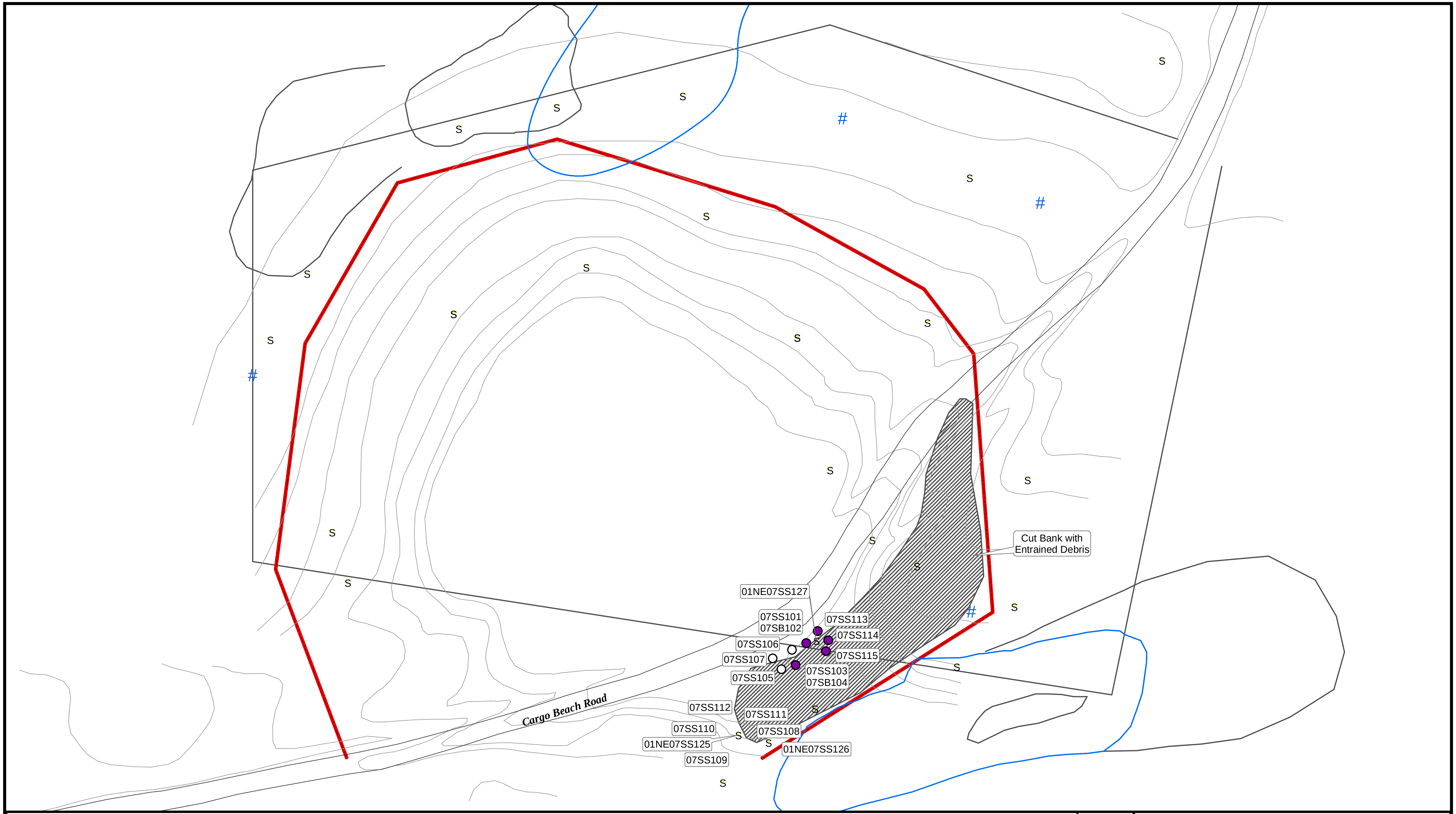
Sample Number**	LOCID	Date	Sample Location (See Figure 5-4)	Depth (feet)	Sample Classification†
Soil Samples					
* 07SS101	07SS101-1	9/1/04	Roughly 10 ft. SW of 2001 Sample 01NE07SS127	1.1	Brown, gravelly, sandy SILT and cobbles; moist
* 07SB102	07SS101-4	9/1/04	Roughly 10 ft. SW of 2001 Sample 01NE07SS127	4-4.5	Light brown, silty, sandy GRAVEL; some cobbles; moist
* 07SB202	07SS101-4	9/1/04	QC replicate of 07SB102	4-4.5	Light brown, silty, sandy GRAVEL; some cobbles; moist
* 07SB302	07SS101-4	9/1/04	QA replicate of 07SB102	4-4.5	Light brown, silty, sandy GRAVEL; some cobbles; moist
* 07SS103	07SS103-2	9/1/04	Roughly 35 ft. SW of 2001 Sample 01NE07SS127	1.4-1.8	Brown, silty, sandy GRAVEL; moist
* 07SB104	07SS103-3	9/1/04	Roughly 35 ft. SW of 2001 Sample 01NE07SS127	2.8-3	Redish brown, silty, sandy GRAVEL; trace cobbles; moist
07SS105	07SS105-2	9/1/04	Analysis cancelled - too far west of 01NE07SS127	1.8-2.1	Brown, silty, gravelly SAND; trace cobbles; moist
07SS106	07SS106-1	9/1/04	Analysis cancelled - too far west of 01NE07SS127	1.1-1.2	Redish brown, sandy SILT in coarse gravel; moist; traces of debris
07SS107	07SS107-1	9/1/04	Analysis cancelled - too far west of 01NE07SS127	0.7-0.9	Gray and rusty brown, sandy SILT in gravel/cobble matrix; moist
* 07SS108	07SS108-1	9/1/04	Roughly 12 feet SE of 2001 Sample 01NE07SS125	0.5-0.6	Light brown, sandy SILT / dark brown PEAT interface; moist
* 07SS109	07SS109-1	9/1/04	Roughly 15 feet S of 2001 Sample 01NE07SS125	0.7-0.8	Gray and light brown, slightly sandy SILT; trace organics; moist
* 07SS110	07SS110-1	9/1/04	Roughly 12 feet W of 2001 Sample 01NE07SS125	0.8-0.9	Brown, silty SAND; trace organics; moist
* 07SS111	07SS111-1	9/1/04	Roughly 8 feet N of 2001 Sample 01NE07SS125	0.5-0.6	Brown, silty SAND; moist; with bits of rust and paper debris
* 07SS112	07SS112-1	9/1/04	Roughly 14 feet NNW of 2001 Sample	0.6-0.8	Light brown, gravelly, sandy SILT; moist; with small roots
* 07SS113	07SS113-1	9/13/04	Roughly 10 ft. N of Sample 01NE07SS127	0.8-0.9	Brown, slightly gravelly SILT; trace roots and debris; moist
* 07SS114	07SS114-1	9/13/04	Roughly 15 ft. E of Sample 01NE07SS127	0.7-0.9	Brown, sandy, angular gravelly SILT; moist
* 07SS115	07SS115-1	9/13/04	Roughly 13 ft. SE of Sample 01NE07SS127	0.8	Brown, sandy, angular gravelly SILT; moist

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-4b)
**	The full sample number is preceded by "04NE", for example 07SS101 is sample 04NE07SS101
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
LOCID	Location Identification: "07SS101-1" signifies Site 7, Surface Sample 101 at 1-foot depth (depth is rounded to the nearest foot)

TABLE 5-4b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 7: CARGO BEACH ROAD LANDFILL

Site 7 - Cargo Beach Road Landfill Soil Matrix			Sample Type:	SURFACE AND SHALLOW SUBSURFACE SOIL NEAR 01NE07SS127									SURFACE SOIL NEAR 01NE07SS125				
			Location ID:	07SS101-1	07SS101-4			07SS103-2	07SS103-3	07SS113-1	07SS114-1	07SS115-1	07SS108-1	07SS109-1	07SS110-1	07SS111-1	07SS112-1
			Sample ID:	04NE07SS101	04NE07SB102	04NE07SB202	04NE07SB302	04NE07SS103	04NE07SB104	04NE07SS113	04NE07SS114	04NE07SS115	04NE07SS108	04NE07SS109	04NE07SS110	04NE07SS111	04NE07SS112
			Depth (ft):	1.1	4-4.5	4-4.5	4-4.5	1.4-1.8	2.8-3	0.8-0.9	0.7-0.9	0.8	0.5-0.6	0.7-0.8	0.8-0.9	0.5-0.6	0.6-0.8
			Sample Date:	9/1/2004	9/1/2004	9/1/2004	9/1/2004	9/1/2004	9/1/2004	9/13/2004	9/13/2004	9/13/2004	9/1/2004	9/1/2004	9/1/2004	9/1/2004	9/1/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		*Primary*	*Duplicate*	*Triplicate*										
Percent Moisture	A2540G / E160.3M	%	–	12.8	5.3	4.8	4.5	7.5	6.5	4.8	6.7	5.4	33.0	18.6	10.7	12.2	7.0
Polychlorinated Biphenyls (PCBs)			Sum of congeners:														
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.0565]	[0.0521]	[0.0516]	[0.025]	[0.0533]	[0.0544]	[0.0516]	[0.0532]	[0.0533]	[0.0754]	[0.0621]	[0.0569]	[0.0582]	[0.0537]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.0565]	[0.0521]	[0.0516]	[0.050]	[0.0533]	[0.0544]	[0.0516]	[0.0532]	[0.0533]	[0.0754]	[0.0621]	[0.0569]	[0.0582]	[0.0537]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.0565]	[0.0521]	[0.0516]	[0.025]	[0.0533]	[0.0544]	[0.0516]	[0.0532]	[0.0533]	[0.0754]	[0.0621]	[0.0569]	[0.0582]	[0.0537]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.0565]	[0.0521]	[0.0516]	[0.025]	[0.0533]	[0.0544]	[0.0516]	[0.0532]	[0.0533]	[0.0754]	[0.0621]	[0.0569]	[0.0582]	[0.0537]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.0565]	[0.0521]	[0.0516]	[0.025]	[0.0533]	[0.0544]	[0.0516]	[0.0532]	[0.0533]	[0.0754]	[0.0621]	[0.0569]	[0.0582]	[0.0537]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.0565]	[0.0521]	[0.0516]	[0.025]	[0.0533]	[0.0544]	[0.0516]	[0.0532]	[0.0533]	[0.0754]	[0.0621]	[0.0569]	[0.0582]	[0.0537]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	**2.37**	0.0806	0.0307 J	0.0278	**2.18**	0.029 J	**50.8 J**	0.715 J	0.998 J	0.0972	[0.0621]	[0.0569]	0.286	**4.76**

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
%	percent
mg/kg	milligrams per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)



Legend

- ● Surface (SS) and/or subsurface (SB) soil sample collected by Shannon & Wilson, Inc. August/September 2004 selection
- ○ Surface and/or subsurface soil sample collected, but analysis canceled by Shannon & Wilson, Inc. August/September 2004
- # Existing monitoring well or well point, installed by others
- S Historical sample location, collected by others
- Site 7 Landfill Boundary
- Water Features
- Topographic Contours (Interval: 5 ft)

0 50 100 200 300 400 Feet

1 inch equals 100 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not corrspeond to 2004 field observations.

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 7 - CARGO BEACH ROAD LANDFILL

June 2005

32-1-16821

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Fig. 5-4

5.5 Site 8: POL Spill Site

Sediment samples from two locations (08SD102 and 08SD103) and surface water sample 08SW101 were collected from Site 8 (see Figure 5-5 and Table 5-5a).

5.5.1 Site Description

The POL Spill Site is a wetland with thick surface vegetation, typical of locations along roads and the Airstrip where a thick tundra mat was removed before construction. The roughly 40-foot wide wetland slopes southward for approximately 300 feet toward the Suqi. River. Photograph 9 is a view across the site from the bank of the Suqi. River. The wetland narrows as it approaches the river.

A steel fuel pipeline extended from the Site 3 fuel pumphouse to the three large fuel storage tanks at Site 11. The fuel pipeline was drained and removed during a recent removal action. Community members recalled a break in the pipeline near the intersection of Cargo Beach Road and the Airport Access Road, and a patch or expansion joint was observed before removal. The reported break location is on the west side of the main road embankment, south of the Cargo Beach Road intersection and north of the Middle Suqitughneq River (Mid-Suqi.) Bridge (See Figure 5-5).

5.5.2 Data Collection Objectives

To assess possible fuel impacts to the wetland, sediment samples were collected and analyzed for DRO, RRO, GRO, PAHs, and BTEX. Additionally, assessment of the biogenic influence on the DRO and RRO results was performed to assess fuel impacts. A surface water sample was collected and analyzed for PAHs, and BTEX to investigate water quality where drainage from the wetland gathers to enter the Suqi. River. TAH and TAqH values were calculated from the results of the water analysis.

5.5.3 Field Investigation

Sampling was performed at Site 8 on August 15, 2004. The approximate location of the pipeline break was suggested by disturbed ground and a petroleum odor in the gravelly soil that has accumulated at the base of the road embankment.

5.5.3.1 Sediment and Surface Water Sampling

Two sediment sample locations were selected to represent down-gradient wetlands. A hand shovel was used to cut into the vegetation, and a clean stainless steel spoon was used to pick as many soil particles as possible out of the resulting water-filled hole. A clean laboratory-supplied jar was used to dip water from a spring at the toe of the wetland, a few feet from a high water mark left by the Suqi. River.

5.5.3.2 IDW

The samplers wore disposable gloves, which were placed in the project IDW polyethylene bag. Used sampling spoons were placed in the dirty spoon bag.

5.5.3.3 Field Observations

The work plan figure was not representative of conditions observed by the project field team. The apparent location of the pipeline break is further south than depicted on the work plan figure, less than 50 feet from the 08SD103 location. The drainage shown on Figure 5-5 is farther west than found in the field, although it roughly resembles the wetland/tundra boundary.

Water flowed clear and cold at several gallons per minute from the spring that was sampled. A stringy sheen, possibly indicating petroleum hydrocarbons, was observed when the sediment in the spring was disturbed. It is possible that the water emanating from the spring is not drainage from the active surface of the wetland. Permafrost channeling may bring the water from a source not apparent from the ground surface. At the time of sampling, the spring was the only apparent surface flow, although water from the wetland may enter the Suqi. River as near surface flow through the vegetation mat.

The material encountered in the wetland consisted of dense, grassy vegetation and roots with little soil or peat development. Some sand was encountered between cobbles under the vegetation mat at the 08SD102 Location. Sheen and odors that may have been biogenic with a hint of petroleum were noted while collecting Sample 08SS102. A sheen and apparent petroleum odor were observed while digging at the Sample 08SD103 location. The vegetation in the wetland did not appear to be stressed or petroleum stained.

5.5.4 Analytical Results

5.5.4.1 Sediment

Table 5-5b summarizes the analytical results for sediment from Site 8. DRO concentrations in excess of the cleanup criterion were measured at both sediment sample locations. Sample 08SD102 was reported to contain 19,500 mg/kg DRO, and Sample 08SD103 contained 6,760 mg/kg DRO. The chromatographic patterns and TICs resembled weathered middle distillate fuel (diesel). RRO test results of 3,880 mg/kg in Sample 08SD102 and 4,360 mg/kg in primary sample 08SD103 are below the soil cleanup criterion and assessed as biogenic. Benzene was not detected, however the PQLs are above cleanup criteria, likely due to the high water and organic contents of the samples. The PAHs chrysene, flourene, naphthlene, and phenanthrene were detected at concentrations below soil cleanup criteria in Sample 08SD102. Samples 08SD203 and 08SD303 are QC and QA replicates of Sample 08SD103 with comparable DRO and RRO results.

5.5.4.2 Water

PAH and BTEX compounds were not detected above the PQLs in water Sample 08SW101. The PQLs, shown on Table 5-5c, are all below the cleanup criteria, resulting in low TAH and TAqH values.

TABLE 5-5a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 8: POL SPILL SITE

Sample Number**	LOCID	Date	Sample Location (See Figure 5-5)	Depth (feet)	Screening (ppm) ^	Sample Classification†
Sediment Samples						
* 08SD102	08SD102	8/15/04	Wetland on W side of road, about 80 ft. N of Suqi. R.	0.5-0.6	4.2	Brown organic SILT and active roots; wet; Cobbles and boulders with a trace of coarse sand encountered under vegetation mat
* 08SD103	08SD103	8/15/04	55 ft. NE of 08SD102, near signs of pipeline	0.6-0.8	5.3	Brown organic SILT in active roots; wet; weathered diesel odor
* 08SD203	08SD103	8/15/04	QC replicate of 08SD103	0.6-0.8	5.3	Brown organic SILT in active roots; wet; weathered diesel odor
* 08SD303	08SD103	8/15/04	QA replicate of 08SD103	0.6-0.8	5.3	Brown organic SILT in active roots; wet; weathered diesel odor
Surface Water Sample						
* 08SW101	08SW101	8/15/04	Spring at bottom of wetland, 15 ft from Suqi. R.	-	-	Clear surface water. Sheen observed when sediment disturbed.

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Tables 5-5b and 5-5c)
**	The full sample number is preceded by "04NE", for example 08SD102 is sample 04NE08SD102
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
LOCID	Location Identification: "08SD102" signifies Site 8, Sediment Sample 102

TABLE 5-5b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 8: POL SPILL SITE

Site 8 - POL Spill Site Soil Matrix			Sample Type:	SEDIMENT, WETLANDS AREA			
			Location ID:	08SD102	08SD103		
			Sample ID:	04NE08SD102	04NE08SD103	04NE08SD203	04NE08SD303
			Depth (ft):	0.5-0.6	0.6-0.8	0.6-0.8	0.6-0.8
			Sample Date:	8/15/2004	8/15/2004	8/15/2004	8/15/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		*Primary*	*Duplicate*	*Triplicate*
PID Headspace Reading	HNU HW101 PID	ppm	–	4.2	5.3	5.3	5.3
Percent Moisture	A2540G / E160.3M	%	–	69.3	57.5	56.9	51
Gasoline Range Organics (GRO)	AK101	mg/kg	300	15.3 J	2.50 J	2.27 J	[3.07] B
Diesel Range Organics (DRO)	AK102	mg/kg	250	**19,500**	**6,760**	**6,700**	**8,920**
Laboratory Assessment of Hydrocarbon Origin†	–	–	–	**diesel**	**diesel**	**diesel**	**-**
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	3,880	4,360	3,430	2,920 J
Laboratory Assessment of Hydrocarbon Origin†	–	–	–	biogenic	biogenic	biogenic	-
Aromatic Organic Compounds (BTEX)							
Benzene	SW8260B	µg/kg	20	**[80]**	**[43.3]**	**[44]**	**[123]**
Ethylbenzene	SW8260B	µg/kg	5,500	[154]	[83.2]	[84.6]	[123]
Toluene	SW8260B	µg/kg	5,400	[308]	[166]	[169]	34.4 J
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[154]	[83.2]	[84.6]	[369] total
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[308]	[166]	[169]	-
Polynuclear Aromatic Hydrocarbons (PAH)							
Acenaphthene	PAH SIM	µg/kg	210,000	[247]	[160]	[154]	[204]
Acenaphthylene	PAH SIM	µg/kg	210,000	[247]	[160]	[154]	[204]
Anthracene	PAH SIM	µg/kg	4,300,000	[247]	[160]	[154]	[204]
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	[247]	[160]	[154]	[204]
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	[247]	[160]	[154]	[204]
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	[247]	[160]	[154]	[204]
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	[247]	[160]	[154]	[204]
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	[247]	[160]	[154]	[204]
Chrysene	PAH SIM	µg/kg	620,000	158 J	[160]	[154]	[204]
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	[247]	[160]	[154]	[204]
Fluoranthene	PAH SIM	µg/kg	2,100,000	[247]	[160]	[154]	[204]
Fluorene	PAH SIM	µg/kg	270,000	759 J	[160]	[154]	[204]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	[247]	[160]	[154]	[204]
Naphthalene	PAH SIM	µg/kg	21,000	1,240	[160]	[154]	[204]
Phenanthrene	PAH SIM	µg/kg	4,300,000	852 J	[160]	[154]	[204]
Pyrene	PAH SIM	µg/kg	1,500,000	[247]	[160]	[154]	[204]

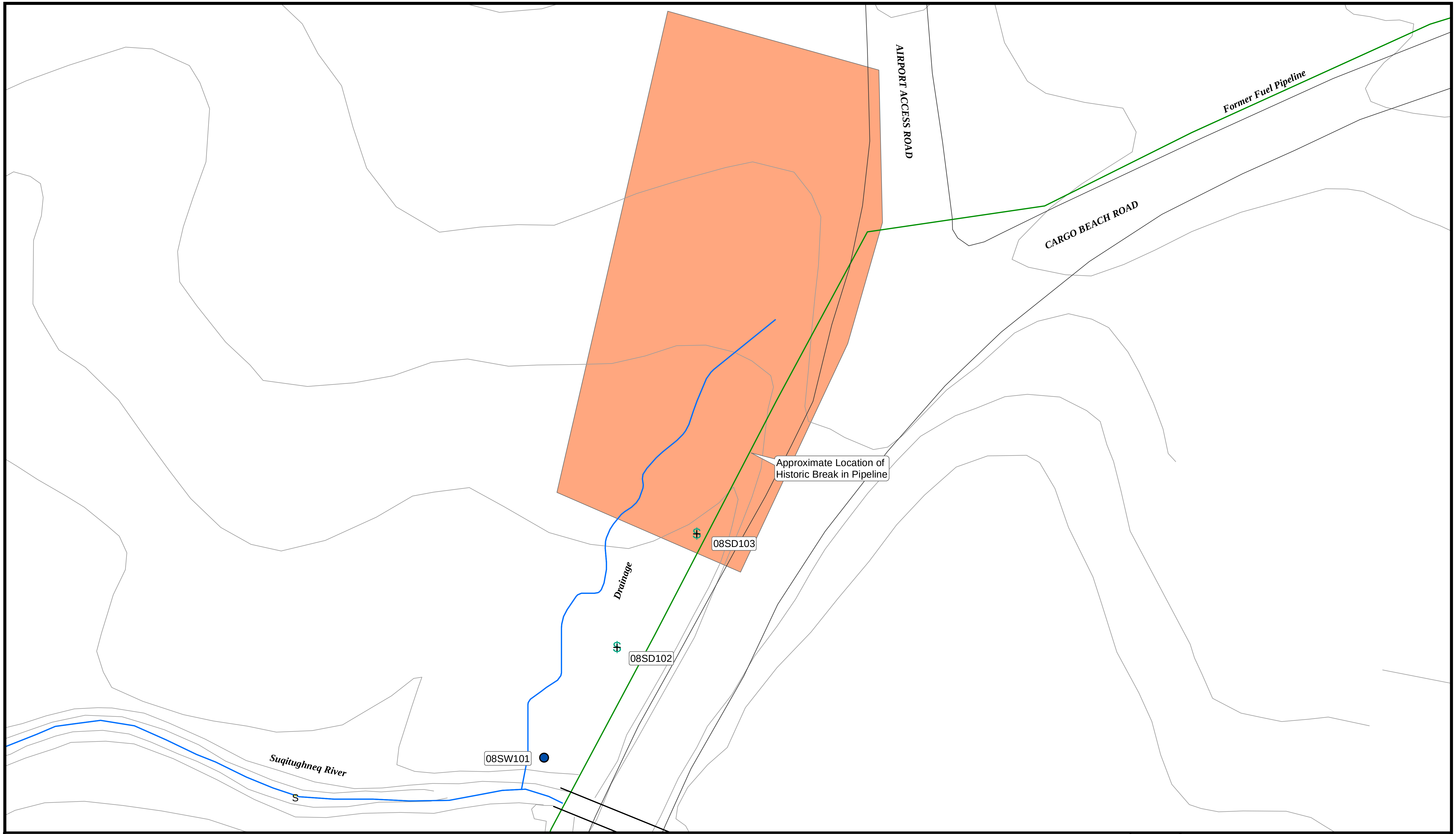
KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[3.07] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve

TABLE 5-5c SUMMARY OF WATER ANALYTICAL RESULTS - SITE 8: POL SPILL SITE

Site 8 - POL Spill Site
Water Matrix

			Sample Type:	SURFACE WATER
			Location ID:	08SW101
			Sample ID:	04NE08SW101
			Depth (ft):	-
			Sample Date:	8/15/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**	
Aromatic Organic Compounds (BTEX)				
Benzene	SW8260B	µg/L	5	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]
Toluene	SW8260B	µg/L	1,000	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)				
Acenaphthene	PAH SIM	µg/L	2,200	[0.0532]
Acenaphthylene	PAH SIM	µg/L	2,200	[0.0532]
Anthracene	PAH SIM	µg/L	11,000	[0.0532]
Benzo(a)anthracene	PAH SIM	µg/L	1	[0.0532]
Benzo(a)pyrene	PAH SIM	µg/L	0.2	[0.0532]
Benzo(b)fluoranthene	PAH SIM	µg/L	1	[0.0532]
Benzo(g,h,i)perylene	PAH SIM	µg/L	1,100	[0.0532]
Benzo(k)fluoranthene	PAH SIM	µg/L	10	[0.0532]
Chrysene	PAH SIM	µg/L	100	[0.0532]
Dibenzo(a,h)anthracene	PAH SIM	µg/L	0.1	[0.0532]
Fluoranthene	PAH SIM	µg/L	1,460	[0.106]
Fluorene	PAH SIM	µg/L	1,460	[0.0532]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/L	1	[0.0532]
Naphthalene	PAH SIM	µg/L	700	[0.0532] B
Phenanthrene	PAH SIM	µg/L	11,000	[0.106]
Pyrene	PAH SIM	µg/L	1,100	[0.0532]
Calculated Total aromatic hydrocarbons (TAH) †	(see text)	µg/L	10	2.7
Calculated Total aqueous hydrocarbons (TAqH) ‡	(see text)	µg/L	15	3.2

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C and, for TAH/TAqH, surface water levels in 18 AAC 70.
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
†	TAH equals the sum of BTEX analyte concentrations estimated below the PQL or detected above the PQL, plus 1/2 the PQL of analytes not reported above the Method Detection Limit (MDL).
‡	TAqH equals the sum of BTEX and PAH analyte concentrations estimated below the PQL or detected above the PQL, plus 1/2 the PQL of analytes not reported above the Method Detection Limit (MDL).



Legend

⊕ Sediment sample collected by Shannon & Wilson, Inc. August/September 2004
● Surface water sample collected by Shannon & Wilson, Inc. August/September 2004
S Historical Sample Location collected by others

— Former Fuel Pipeline
— Rivers and Streams
— Topographic Contours (Interval: 5 ft)
🟧 Site 8 targeted area from scope of work

0 20 40 80 120 160 Feet

1 inch equals 40 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 8 - POL SPILL SITE

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Fig. 5-5

5.6 Site 10: Buried Drums

Soil borings 10B1 and 10B2 were advanced, and three samples from each submitted for laboratory analysis at Site 10 (see Figure 5-6 and Table 5-6a). Monitoring Well MW10-1 was sampled in association with Site 11 field activities, and is discussed in that section.

5.6.1 Site Description

Site 10 is located along the main access road due east of the MOC, and currently appears to be a wide gravel area on the northwest side of the road. The embankment on the northwest side has a few pieces of decomposing drums exposed, and a shallow wetland basin is at the base of the embankment.

5.6.2 Data Collection Objectives

Previous investigations indicate the presence of petroleum hydrocarbons; however, the total depth of contamination was uncertain. To evaluate the vertical extent of hydrocarbons, two soil borings were advanced to 15 feet bgs and soil samples were collected at 5-foot intervals. Three soil samples from each boring were analyzed for DRO, RRO, GRO, and BTEX. One sample from each boring was analyzed for PAHs and TOC.

5.6.3 Work Plan Variances

One near-surface sample was collected from the borehole wall of each boring before drilling to 5 feet and driving a split-spoon sampler. Sampling and screening the near-surface soil was not specified in the Work Plan. It was performed to provide the sampler with a baseline headspace reading and soil type to assist in selecting analytical samples. An extra sample was driven in Boring 10B2 from 11 to 11.5 feet because a soil transition was detected near 11 feet bgs. A rock in the sampler shoe prevented recovery of soil from the deeper formation. The high blow counts and loose, wet soil recovered in the extra sample suggested a transition from thawed to frozen ground.

5.6.4 Field Investigation

Soil Borings 10B1 and 10B2 were advanced with hollow stem augers on August 23, 2004, and are located as shown on Figure 5-6. Soil screening results and sample descriptions are listed in Table 5-6a, and lithology is presented in Boring Log Figures B-10a and B-11a in Appendix B. Equipment decontamination and IDW disposal were handled in the standard manner.

Boring 10B1 was located near the northern extent of the gravel fill area. The transition from fill to native soil was not clear based on the recovered samples, but was likely between 1.5 and 5 feet bgs. Frozen ground was suspected between 10 and 11 feet bgs and strongly indicated at 16 feet bgs. Boring 10B2 was located in the area where the fill appeared to be the thickest, up gradient of the wetland basin and Monitoring Well MW 10-1. The transition from fill to native soil was at 5 feet bgs, and frozen ground appeared to start at 11 to 12 feet bgs.

5.6.5 Analytical Results

Samples 10SB104 and 10SB106 from Boring 10B1 contained DRO concentrations that exceed the 250mg/kg ADEC cleanup criterion. Sample 10SB104 was collected from soil with a trace of organics and some discoloration at 5 to 6.5 feet bgs, and contained an estimated concentration of 619 mg/kg DRO. Sample 10SB106 was collected from what appeared to be a transition to frozen ground 15 to 16.5 feet bgs, and contained an estimated concentration of 275 mg/kg DRO. GRO, BTEX, and PAHs were not detected above their PQLs. RRO concentrations were reported at estimated values ranging from 25 mg/kg to 1,270 mg/kg, all less than the cleanup criterion. Table 5-6b summarizes the Site 10 analytical results.

TABLE 5-6a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 10: BURIED DRUMS

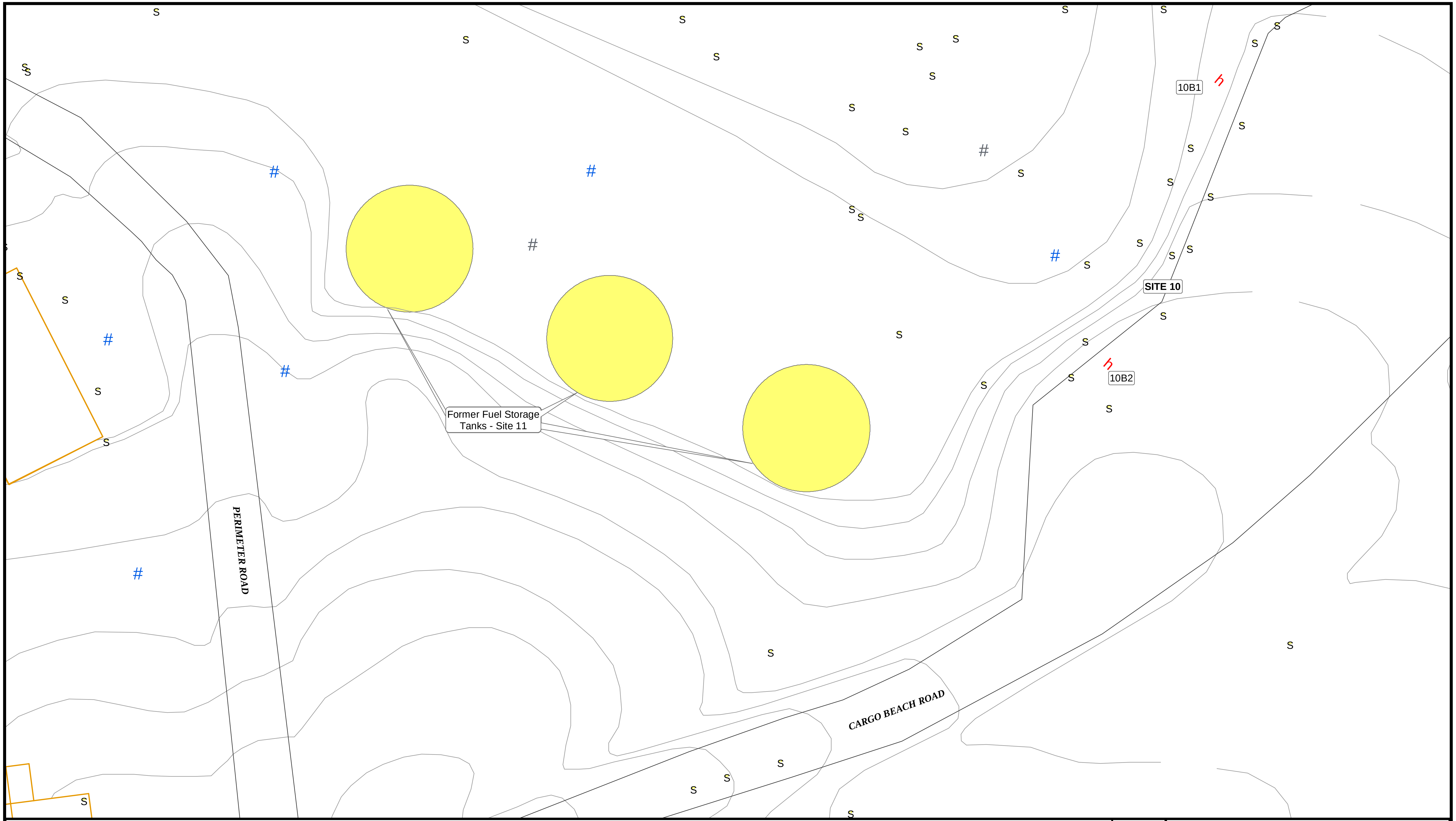
Sample Number**	LOCID	Date	Sample Location (See Figure 5-6 for borehole locations)	Depth (feet)	Screening (ppm) ^	Sample Classification†
Soil Samples						
B1S1	10B1-1	8/23/04	Boring 10B1	0-1.5	0.4	Brown, slightly silty, gravelly SAND; trace organics (roots); moist, hydrocarbon odor (resembles used motor oil)
* 10SB104	10B1-5	8/23/04	Boring 10B1	5-6.5	0.2	Dark to orange-brown, silty, gravelly SAND; trace roots; moist
* 10SB105	10B1-10	8/23/04	Boring 10B1	10-11.5	<0.2	Brown to dark brown, silty, angular gravelly SAND; moist
* 10SB106	10B1-15	8/23/04	Boring 10B1	15-16.5	<0.2	Gray/brown, silty, gravelly angular SAND; moist or frozen
B2FS1	10B2-1	8/23/04	Boring 10B2	0.-1.5	0.4	Brown SILT; moist; with organics, grass, cobbles
* 10SB101	10B2-5	8/23/04	Boring 10B2	5-6.5	1.3	Brown, gravelly, sandy SILT; trace organics (roots); moist
* 10SB102	10B2-10	8/23/04	Boring 10B2	10-11	0.7	Brown, gravelly SILT and cobbles; trace organics (roots); moist
B2S3	10B2-11	8/23/04	Boring 10B2	11-11.5	0.4	Brown, gravelly SILT and cobbles; wet - suspect frozen ground
* 10SB103	10B2-15	8/23/04	Boring 10B2	15-16.5	0.3	Brown, silty, gravelly SAND and cobbles; wet - frozen likely

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-6b)
**	The full sample number is preceded by "04NE", for example 10SB104 is sample 04NE10SB104
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
LOCID	Location Identification: "10B1-1" signifies Site 10, Boring 1 at 1-foot depth (depth is rounded to the nearest foot)

TABLE 5-6b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 10: BURIED DRUMS

Site 10 - Buried Drums **Soil Matrix**			Sample Type:	**BOREHOLE 10B1**			**BOREHOLE 10B2**		
			Location ID:	10B1-5	10B1-10	10B1-15	10B2-5	10B2-10	10B2-15
			Sample ID:	04NE10SB104	04NE10SB105	04NE10SB106	04NE10SB101	04NE10SB102	04NE10SB103
			Depth (ft):	5-6.5	10-11.5	15-16.5	5-6.5	10-11	15-16.5
			Sample Date:	8/23/2004	8/23/2004	8/23/2004	8/23/2004	8/23/2004	8/23/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**						
PID Headspace Reading	HNU HW101 PID	ppm	–	0.2	<0.2	<0.2	1.3	0.7	0.3
Percent Moisture	A2540G / E160.3M	%	–	7.8	6.8	19.3	10.2	10.4	10.9
Gasoline Range Organics (GRO)	AK101	mg/kg	300	[1.55] B	[1.62] B	[2.74] B	[1.64] B	[1.85] B	[1.76] B
Diesel Range Organics (DRO)	AK102	mg/kg	250	**619 J**	159 J	**275 J**	21.6 J	8.78 J	5.95 J
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	1,270 J	313 J	524 J	137 J	46.6 J	25 J
Aromatic Organic Compounds (BTEX)									
Benzene	SW8260B	µg/kg	20	[8.07]	[8.44]	[14.3]	[8.51]	[9.62]	[9.15]
Ethylbenzene	SW8260B	µg/kg	5,500	[15.5]	[16.2]	[27.4]	[16.4]	[18.5]	[17.6]
Toluene	SW8260B	µg/kg	5,400	[31.0]	[32.5]	[54.9]	[32.7]	[37.0]	[35.2]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[15.5]	[16.2]	[27.4]	[16.4]	[18.5]	[17.6]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[31.0]	[32.5]	[54.9]	[32.7]	[37.0]	[35.2]
Polynuclear Aromatic Hydrocarbons (PAH)									
Acenaphthene	PAH SIM	µg/kg	210,000	[54.4]	–	–	–	–	[5.62]
Acenaphthylene	PAH SIM	µg/kg	210,000	[54.4]	–	–	–	–	[5.62]
Anthracene	PAH SIM	µg/kg	4,300,000	[54.4]	–	–	–	–	[5.62]
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	[54.4]	–	–	–	–	[5.62]
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	[54.4]	–	–	–	–	[5.62]
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	[54.4]	–	–	–	–	[5.62]
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	[54.4]	–	–	–	–	[5.62]
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	[54.4]	–	–	–	–	[5.62]
Chrysene	PAH SIM	µg/kg	620,000	[54.4]	–	–	–	–	[5.62]
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	[54.4]	–	–	–	–	[5.62]
Fluoranthene	PAH SIM	µg/kg	2,100,000	[54.4]	–	–	–	–	[5.62]
Fluorene	PAH SIM	µg/kg	270,000	[54.4]	–	–	–	–	[5.62]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	[54.4]	–	–	–	–	[5.62]
Naphthalene	PAH SIM	µg/kg	21,000	[54.4]	–	–	–	–	[5.62]
Phenanthrene	PAH SIM	µg/kg	4,300,000	[54.4]	–	–	–	–	[5.62]
Pyrene	PAH SIM	µg/kg	1,500,000	[54.4]	–	–	–	–	[5.62]
Total Organic Carbon (TOC)	SGS SOP	mg/kg	–	6,600	–	–	–	–	[552]

KEY	**DESCRIPTION**
-	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[1.760] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup level
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)



Legend

ɦ Boring advanced by Shannon & Wilson, Inc. August/September 2004
Existing monitoring well installed by others
Former monitoring well installed by others
S Historical sample location, collected by others

— Former Buildings and Utilidors
— Topographic Contours (Interval: 5 ft)
🟨 Site 11 Former Tanks

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

0 20 40 80 120 160 Feet

1 inch equals 40 feet

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 10 - BURIED DRUMS

June 2005
32-1-16821

SHANNON & WILSON, INC.
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Fig. 5-6

5.7 Site 11: Fuel Storage Tanks

Two of four existing monitoring wells were scoped to be sampled based on observations of site conditions. Monitoring wells MW 11-3 and MW 10-1 were selected and sampled as part of the Site 11 field activities (see Figure 5-7 and Table 5-7a).

5.7.1 Site Description

Three large fuel storage tanks (~400,000 gallons each) were formerly located on the northeast corner of the Main Operations Complex, between the perimeter access road and Site 10, as shown in Figure 5-7. The tanks have been dismantled, and the steel is piled on two of the three oil sand foundations. The tanks sat on a constructed gravel pad, and the gravel embankment drops to a shallow tundra basin on the northeast. The center tank was punctured during snow removal operations in the late 1960s and approximately 180,000 gallons of diesel fuel were released to the surrounding area.

5.7.2 Data Collection Objectives

Two of the four existing monitoring wells were sampled to gather current information regarding the site's groundwater quality. The samples were analyzed for DRO, RRO, GRO, BTEX, metals (Cr, Pb, Zn, and Hg), and natural attenuation parameters.

5.7.3 Work Plan Variances

Groundwater from Site 11 was to be tested for natural attenuation parameters, including field measurements of alkalinity and ferrous iron. The Hach colorimeter display failed while testing water from Monitoring Well MW 10-1, and ferrous iron values were not obtained from either well.

5.7.4 Field Investigation

Monitoring Wells MW 10-1 and MW 11-3 were purged and sampled on September 5, 2004 using a Redi-Flo 2 submersible pump. Table 5-7a describes the samples, and a groundwater sampling log is attached as Table 5-7b. Groundwater sampling, equipment decontamination and IDW disposal were handled as described in Section 3.

5.7.4.1 Field Observations

Four monitoring wells had been installed at Site 10/Site 11 previously, and are located as shown on Figure 5-6. MW 10-1 exhibited frost damage. The PVC casing extended a few inches above the 4-inch-diameter stick-up monument, and the concrete anchoring the monument was broken, leaving a void at the ground surface. Monitoring Well MW 10-4 was frost-jacked to the point the well screen was exposed above ground. Both of these wells are located in the shallow wetland basin, where the frost level is shallow beneath the thick, intact tundra. MW 11-3 was intact. Well MW 11-2 was found broken off near the ground surface. Both of these wells are located on the gravel pad constructed for the ASTs.

5.7.5 Analytical Results

Laboratory results for Site 11 samples are presented in Table 5-7c. Groundwater Sample 11GW102, from Monitoring Well MW11-3 contained 15.2 mg/L DRO, which exceeds the ADEC Table C cleanup criterion by an order of magnitude.

TABLE 5-7a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 11: FUEL STORAGE TANKS

Sample Number**	LOCID	Date	Sample Location (See Figure 5-7)	Depth (feet)	Sample Classification
Groundwater Samples					
* 11GW101	MW10-1	9/5/04	Existing Monitoring Well MW10-1; installation date not determined	WL 2.3	Groundwater - remained turbid after purging
* 11GW102	MW11-3	9/5/04	Existing Monitoring Well MW11-3; installation date not determined	WL 7.0	Groundwater - weathered diesel odor, nearly clear

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-7b)
**	The full sample number is preceded by "04NE", for example 11GW102 is sample 04NE11GW102
WL	Approximate static water level in feet below ground surface
LOCID	Location Identification: "MW11-3" signifies Monitoring Well MW11-3

TABLE 5-7b GROUNDWATER SAMPLING LOG
SITE 11: FUEL STORAGE TANKS

MONITORING WELL INSTALLATION DATA

WELL ID	MW10-1	MW11-3
DATE WELL INSTALLED	Unknown	Unknown
GROUND SURFACE ELEVATION (ft)	68.87	69.63
WELL MP ELEVATION (ft)	71.42	72.33
INTERVAL OF SCREENED SECTION BELOW MP (ft)	Unknown	Unknown
TOTAL DEPTH OF WELL BELOW MP (ft)	11.52	20.30
DIAMETER OF WELL CASING (inches)	2	2

DEVELOPMENT DATA

DATE OF DEVELOPMENT	-	-
TIME DEVELOPMENT INITIATED	-	-
TIME DEVELOPMENT COMPLETED	-	-
DEPTH TO WATER BELOW MP (ft)	-	-
WATER COLUMN IN WELL (ft)	-	-
GALLONS PER FOOT	0.16	0.16
GALLONS IN WELL	-	-
DEVELOPMENT METHOD	-	-
VOLUME WATER REMOVED (gallons)	-	-

PURGING & SAMPLING DATA

LOCID	MW10-1	MW11-3
SAMPLE ID	04NE11GW101	04NE11GW102
DATE	9/5/04	9/5/04
TIME PURGING INITIATED	13:23	16:57
TIME SAMPLE INITIATED	13:50	17:25
DEPTH TO WATER BELOW MP (ft)	4.89	9.72
WATER COLUMN IN WELL (ft)	6.63	10.58
GALLONS IN WELL	1.06	1.69
PURGING METHOD	Redi-Flo 2	Redi-Flo 2
VOLUME WATER REMOVED (gallons)	5.0	5.0

WATER QUALITY DATA - YSI 556

DATE MEASURED	9/5/04	9/5/04
TIME MEASURED	16:18	17:34
TEMPERATURE (°C)	10.2	7.1
SPECIFIC CONDUCTANCE (mS/cm)	0.10	0.15
DISSOLVED OXYGEN (mg/L)	3.8	1.7
pH (Standard Units)	5.4	5.1
OXYGEN REDUCTION POTENTIAL (mV)	215	181
TURBIDITY (NTUs) - Oakton	86.3	18.6
ALKALINITY (mg/L) - Hach phenolpthalein titration	-	15-20

WATER LEVEL MEASUREMENT DATA

DATE WATER LEVEL MEASURED	9/13/04	9/13/04
TIME WATER LEVEL MEASURED	15:08	15:05
DEPTH TO WATER BELOW MP (ft)	5.27	9.80
WATER LEVEL ELEVATION (ft)	66.15	62.53

KEY	DESCRIPTION
-	Not developed or not measured
°C	Degrees Celsius
ft	Feet
mg/L	Milligrams per liter
MP	Measuring Point is Top of Well Casing
mV	Millivolts
NTUs	Nepholometric Turbidity Units
mS/cm	Millisiemens per centimeter

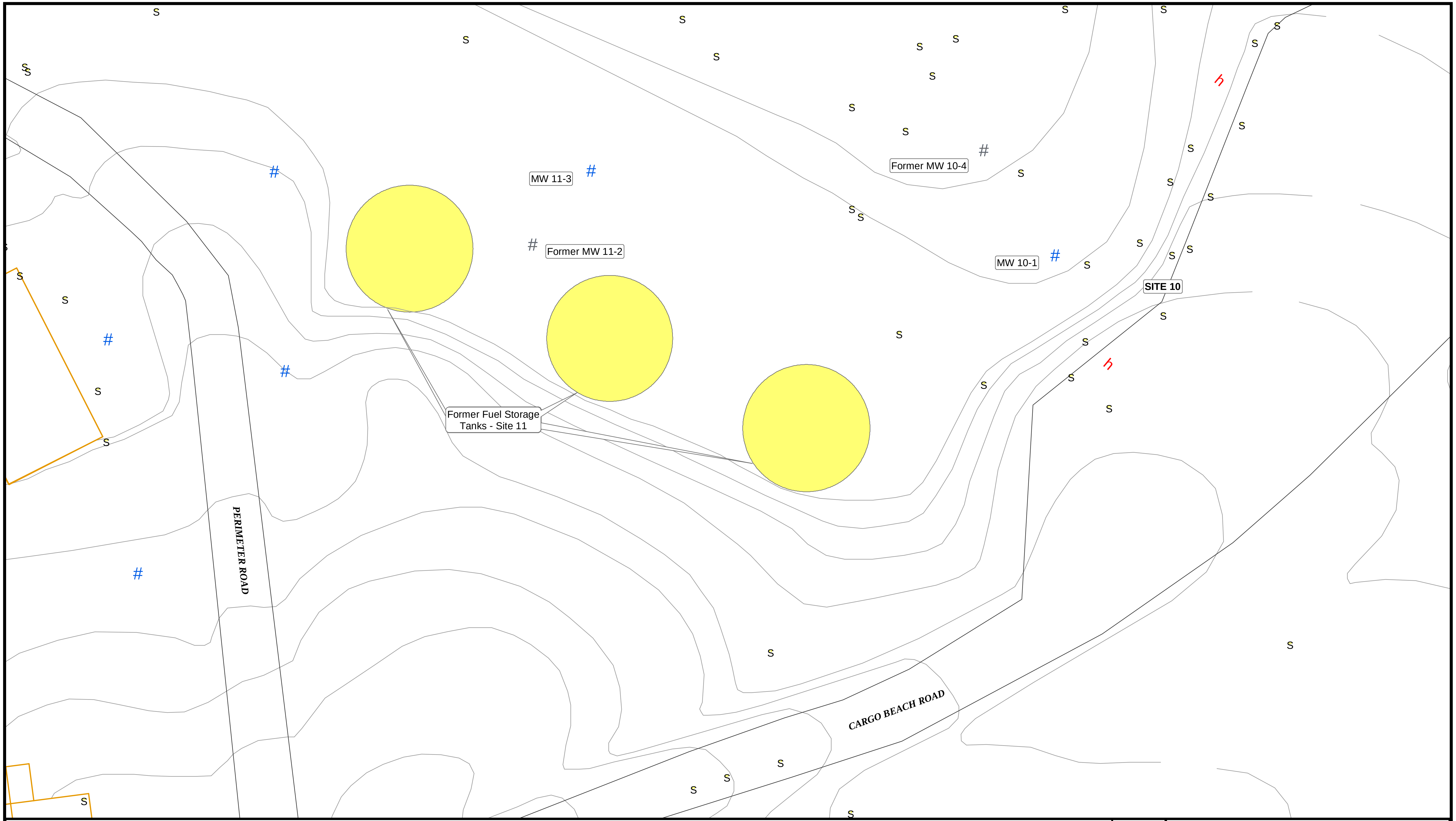
TABLE 5-7c SUMMARY OF WATER ANALYTICAL RESULTS - SITE 11: FUEL STORAGE TANKS

Site 11 - Fuel Storage Tanks

Water Matrix

			Sample Type:	GROUNDWATER	
			Location ID:	MW10-1	MW11-3
			Sample ID:	04NE11GW101	04NE11GW102
			Depth (ft):	WL 2.3	WL 7.0
			Sample Date:	9/5/2004	9/5/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	[0.090]	0.333
Diesel Range Organics (DRO)	AK102	mg/L	1.5	[0.333] B	**15.2**
Residual Range Organics (RRO)	AK103	mg/L	1.1	[0.556] B	0.940 B
Aromatic Organic Compounds (BTEX)					
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]
Toluene	SW8260B	µg/L	1,000	[1]	0.37 J
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)					
Acenaphthene	PAH SIM	µg/L	2,200	-	[5.26]
Acenaphthylene	PAH SIM	µg/L	2,200	-	[5.26]
Anthracene	PAH SIM	µg/L	11,000	-	[0.0526]
Benzo(a)anthracene	PAH SIM	µg/L	1	-	[0.0526]
Benzo(a)pyrene	PAH SIM	µg/L	0.2	-	[0.0526]
Benzo(b)fluoranthene	PAH SIM	µg/L	1	-	[0.0526]
Benzo(g,h,i)perylene	PAH SIM	µg/L	1,100	-	[0.0526]
Benzo(k)fluoranthene	PAH SIM	µg/L	10	-	[0.0526]
Chrysene	PAH SIM	µg/L	100	-	[0.0526]
Dibenzo(a,h)anthracene	PAH SIM	µg/L	0.1	-	[0.0526]
Fluoranthene	PAH SIM	µg/L	1,460	-	[0.105]
Fluorene	PAH SIM	µg/L	1,460	-	[5.26]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/L	1	-	[0.0526]
Naphthalene	PAH SIM	µg/L	700	-	2.09J
Phenanthrene	PAH SIM	µg/L	11,000	-	0.561
Pyrene	PAH SIM	µg/L	1,100	-	[0.0526]
Total Metals					
Chromium	SW6020	µg/L	100 (Total)	32.8	[4]
Lead	SW6020	µg/L	15	4.57	1.35 B
Mercury	SW7470A	µg/L	2	[0.2]	0.068 J
Zinc	SW6020	µg/L	11,000	18.7 J	19.2 J
Natural Attenuation Parameters					
Nitrate	E300.0	mg/L	–	[0.1]	[0.1]
Sulfate	E300.0	mg/L	–	9.83	13.5
Iron	SW6010B	mg/L	–	4.8	6.01

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
1.11 B	Analyte concentration biased due to detection in method, trip, or equipment blank
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup level
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
WL	Approximate depth to water below ground surface



Legend

ɦ Boring advanced by Shannon & Wilson, Inc. August/September 2004
Existing monitoring well installed by others
Former monitoring well installed by others

S Historical sample location, collected by others
— Former Buildings and Utilidors
— Topographic Contours (Interval: 5 ft)
🟨 Site 11 Former Tanks

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

0 20 40 80 120 160 Feet

1 inch equals 40 feet

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 11 - FUEL STORAGE TANKS

June 2005
32-1-16821

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Fig. 5-7

5.8 Site 13: Electrical Power Building

Twenty-eight soil samples from three areas were collected and analyzed by the laboratory for PCBs from Site 13 (see Figure 5-8 and Table 5-8a).

5.8.1 Site Description

This site contained the central heating and power generating facilities for the Main Operations Complex. Building 110 contained three transformer banks, diesel generators, and underground storage tanks. The building has been demolished to the concrete floor slab, and the tanks and transformers have been removed. An interim removal action removed 25 tons of PCB-contaminated soil from the site. At the time of the Phase IV RI, the concrete floor slab remained exposed, and rocky soil had been recently graded around the site (See Photograph 11 in Appendix A). The layout of Site 13 and the former sampling and excavation locations are shown in Figure 5-8.

5.8.2 Data Collection Objectives

Confirmation sampling indicates that soils adjacent to the building still contain elevated levels of PCBs. Historical sampling results indicate that other areas of PCB contamination may exist north of Building 110. The objective of the Phase IV effort was to gather additional data on the depth and extent of PCB soil contamination in three areas, which will help reduce uncertainties during the design phase of any future remedial actions.

5.8.3 Work Plan Variances

The Work Plan specified that near-surface samples would be collected from 1 foot bgs, and co-located subsurface samples would be collected from 3 feet bgs surrounding Transformer Pad #13-1. The Work Plan implied less specific sample depths for the other locations. Some of the surface soil at Site 13 appeared to be recently imported from the talus quarry, and same appeared to contain building demolition debris. In an effort to sample soil that had not been recently imported, sample depths were adjusted to compensate for the depth of new or disturbed soil on a location-specific basis.

Soil covered former Transformer Pad #13-2, therefore the location was estimated based on measurements from exposed site features and the Work Plan figure. Four soil samples were collected near the estimated 1998 Sample 98NE13SS802 location (see Figure 5-8). The surveyor later found the estimated location of the 1998 sample to be 24 feet from the surveyed coordinates. Analyses of three of the four samples (13SS121, 13SS122, and 13SS123) collected at the initial locations were cancelled. Sample 13SS120 had already been analyzed at the time the error was discovered, and the results are included in Table 5-8b. Replacement samples 13SS132, 13SS133, 13SS134, and 13SB135 were collected based on the surveyed location of 98NE13SS802. The location coordinates for Samples 13SS132, 13SS133, and 13SS134 were calculated using swing-ties from surveyed locations, and Sample 13SB135 was collected beneath the surveyed location of Sample 98NE13SS802. The supply of disposable booties had been depleted at the time of resampling, so samplers decontaminated their rubber boots at the edge of the study area.

5.8.4 Field Investigation

Field sampling was performed at Site 13 between August 27 and September 13, 2004. Sample descriptions are summarized in Table 5-8a, and locations are shown on Figure 5-8.

5.8.4.1 Soil Sampling

To further characterize the extent of PCB contamination surrounding the former Transformer Pad #13-1, ten near-surface soil samples and 5 co-located subsurface soil samples, plus three sets of QC/QA replicates, were collected. West of former transformer pad #13-2, surface soil samples were collected from three locations approximately 5 to 7 feet from previous sample location 98NE13SS802, and one subsurface soil sample (3 feet bgs) was collected from beneath the approximate location of 98NE13SS802. Five surface soil samples and three co-located subsurface samples were collected from an area north of Building 110, approximately 10 to 15 feet from previous Samples 96NW13SS108 and 96NE13SS107. The soil samples were analyzed for PCBs by Method SW 8082.

5.8.4.2 IDW

The augers and shovels used to access the samples, and the drillers boots were decontaminated with an Alconox solution and potable water rinse before leaving the site. The samplers wore disposable booties and gloves, which were placed in a polyethylene bag along with the sampling spoons.

5.8.4.3 Field Observations

The southwest corner of the west transformer pad (Pad #13-1) was partially exposed among the rocks from the recent fill, allowing measurements to be made to select locations for the Transformer Pad #13-1 samples. Concrete and re-bar debris were encountered when digging to collect samples. The rocky ground was very difficult to dig by hand, so co-located subsurface soil samples were collected using the drill rig to bring up soil on the auger flights. A peat lense was encountered approximately 3 feet bgs at the northeastern-most sample location (13SB131) suggesting that this corner of the site was built on fill.

5.8.5 Analytical Results

Fifteen project samples from around Transformer Pad#13-1 were analyzed. Aroclor 1260 was reported in samples from 13 of the 15 locations, and eight locations contained more than 1 mg/kg of the PCB (See Table 5-8b). The highest measured concentration is 574 mg/kg in Sample 13SS109, collected near the northwest corner of the former transformer pad. The second highest concentration is 12.4 mg/kg in Sample 13SS110, collected near the southwest corner of the transformer pad. The co-located sub-surface samples tended to have the lowest PCB concentrations.

The results for samples collected from five locations on the west side of former Transformer Pad #13-2 are summarized in Table 5-8b. Samples 13SS132 and 13SS133 contained estimated concentrations of 17.1 mg/kg and 14.1 mg/kg Aroclor 1260, respectively. These samples consisted of rounded beach gravel and sand similar to the aggregate observed in concrete across the complex, suggesting fill imported during the construction of the facility. Sample 13SS120, which was collected further west than scoped and analyzed before the cancellation request was received, contained 2.51 mg/kg Aroclor 1260, exceeding the 1 mg/kg cleanup criterion.

Eight samples were collected from the area north of Building 110, between Monitoring Wells MW 88-5 and MW 88-6. Only Sample 13SS117 contained greater than 1 mg/kg PCBs (See Table 5-8b). Sample 13SS117 was collected in beach gravel and sand at a depth of 1 foot bgs, and contained 15.7 mg/kg Aroclor 1260.

TABLE 5-8a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 13: ELECTRICAL POWER BUILDING

Sample Number**	LOCID	Date	Sample Location (See Figure 5-8)	Depth (feet)	Sample Classification†
Soil Samples					
* 13SS105	13SS105-1	8/27/04	Approx. 24 ft. N of Transformer Pad 13-1 (west	1.5	Brown, gravelly, silty SAND; moist
* 13SS106	13SS106-1	8/27/04	Approx. 10 ft. N of Transformer Pad 13-1	1.2	Brown, slightly gravelly, silty SAND; moist; debris in test pit
* 13SS107	13SS107-1	8/27/04	Approx. 5 ft. from SW building corner, S of Pad 13-1	1.2	Brown, slightly gravelly, silty SAND; moist; scattered roots
* 13SS108	13SS108-1	8/27/04	Approx. 18 ft. NW of corner Transformer Pad 13-1	1.3	Brown, slightly gravelly, silty SAND; moist
* 13SS109	13SS109-1	8/27/04	Approx. 7 ft. W of N end Transformer Pad 13-1	1.4	Brown, slightly gravelly, silty SAND; moist; trace glass and tile
* 13SS110	13SS110-1	8/27/04	Approx. 6 ft. W of S end Transformer Pad 13-1	1.2	Brown, slightly gravelly, silty SAND; moist
* 13SS111	13SS111-1	8/27/04	Approx. 9 ft. SSW of Transformer Pad 13-1	1.1	Brown, silty, gravelly SAND; trace roots; moist
* 13SS112	13SS112-1	8/27/04	Approx. 18 ft. WNW of corner Transformer Pad 13-	1.1	Brown, silty, gravelly SAND; moist
* 13SS113	13SS113-1	8/27/04	Approx. 14 ft. W of W-center Transformer Pad 13-1	1.1	Brown, silty, sandy GRAVEL; moist
* 13SS114	13SS114-1	8/27/04	Approx. 15 ft. SW of SW corner Transformer Pad 13-	1-1.2	Brown, silty, gravelly SAND; trace roots; moist
* 13SS214	13SS114-1	8/27/04	QC replicate of Sample 13SS114-1	1-1.2	Brown, silty, gravelly SAND; trace roots; moist
* 13SS314	13SS114-1	8/27/04	QA replicate of Sample 13SS114-1	1-1.2	Brown, silty, gravelly SAND; trace roots; moist
* 13SS115	13SS115-1	8/27/04	North of Building 110, SE of 96NE13SS107	0.65	Gray-brown, rounded gravelly SAND; moist; dark, oily stain
* 13SS116	13SS116-1	8/27/04	North of Building 110, N of 96NE13SS108	0.95	Brown, slightly silty, sandy GRAVEL; moist; scattered roots
* 13SS117	13SS117-1	8/27/04	North of Building 110, SW of 96NE13SS107	1.15	Gray-brown, rounded gravelly SAND; moist
* 13SS118	13SS118-1	8/27/04	North of Building 110, NW of 96NE13SS108	1	Brown, silty, gravelly SAND; moist
* 13SS119	13SS119-1	8/27/04	North of Building 110, WSW of 96NE13SS108	1.1	Brown, silty, gravelly SAND; moist
* 13SS120	13SS120-1	8/29/04	Cancelled - Wrong location W of 98NEC13SS802[a]	1.2-1.3	Brown, slightly silty, sandy GRAVEL; moist [Fill]
13SS121	13SS121-1	8/29/04	Cancelled - Wrong location W of 98NEC13SS802	1-1.3	Brown, slightly silty, sandy GRAVEL; moist [Fill]
13SS221	13SS121-1	8/29/04	Cancelled QC replicate of 13SS121	1-1.3	Brown, slightly silty, sandy GRAVEL; moist [Fill]
13SS321	13SS121-1	8/29/04	Cancelled QA replicate of 13SS121	1-1.3	Brown, slightly silty, sandy GRAVEL; moist [Fill]
13SS122	13SS122-1	8/29/04	Cancelled - Wrong location W of 98NEC13SS802	1.3-1.4	Brown, slightly silty, sandy GRAVEL; moist [Fill]
13SS123	13SS123-1	8/29/04	Cancelled - Wrong location W of 98NEC13SS802	3-3.2	Dark brown, medium SAND and cobbles; moist; with debris
* 13SB124	13SS107-4	9/1/04	Beneath Sample 13SS107	4	Brown, slightly silty, sandy GRAVEL; moist
* 13SB224	13SS107-4	9/1/04	QC replicate of Sample 13SS124	4	Brown, slightly silty, sandy GRAVEL; moist
* 13SB324	13SS107-4	9/1/04	QA replicate of Sample 13SS124	4	Brown, slightly silty, sandy GRAVEL; moist
* 13SB125	13SS110-4	9/1/04	Beneath Sample 13SS110	3.8-4	Brown, slightly silty, sandy GRAVEL; moist
* 13SB126	13SS113-3	9/1/04	Beneath Sample 13SS113	3.5-3.8	Brown, slightly silty, sandy GRAVEL; moist
* 13SB127	13SS112-4	9/1/04	Beneath Sample 13SS112	3.5-3.8	Brown, slightly silty, sandy GRAVEL; moist
* 13SB128	13SS105-4	9/1/04	Beneath Sample 13SS105	3.6-3.9	Brown, slightly silty, sandy GRAVEL; moist
* 13SB228	13SS105-4	9/1/04	QC replicate of Sample13SS128	3.6-3.9	Brown, slightly silty, sandy GRAVEL; moist
* 13SB328	13SS105-4	9/1/04	QA replicate of Sample13SS128	3.6-3.9	Brown, slightly silty, sandy GRAVEL; moist

TABLE 5-8a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 13: ELECTRICAL POWER BUILDING

Sample Number**	LOCID	Date	Sample Location (See Figure 5-8)	Depth (feet)	Sample Classification†
Soil Samples					
* 13SB129	13SS119-4	9/1/04	Beneath Sample 13SS119	3.4-3.6	Gray, sandy GRAVEL; trace silt; moist
* 13SB130	13SS116-3	9/1/04	Beneath Sample 13SS116	3.3-3.5	Brown, slightly silty, sandy GRAVEL; moist
* 13SB131	13SS115-3	9/1/04	Beneath Sample 13SS115	3-3.2	Dark brown, fibrous PEAT; moist - strong weathered diesel odor
* 13SS132	13SS132-1	9/12/04	Approx. 5 ft. N of 98NEC13SS802 location	1-1.1	Gray-brown, rounded gravelly SAND; moist
* 13SS232	13SS132-1	9/12/04	QC replicate of Sample 13SS132	1-1.1	Gray-brown, rounded gravelly SAND; moist
* 13SS332	13SS132-1	9/12/04	QA replicate of Sample 13SS132	1-1.1	Gray-brown, rounded gravelly SAND; moist
* 13SS133	13SS133-1	9/12/04	Approx. 7 ft. NW of 98NEC13SS802 location	1-1.1	Gray-brown, rounded gravelly SAND; moist
* 13SS134	13SS134-1	9/12/04	Approx. 7 ft. SW of 98NEC13SS802 location	1-1.1	Gray-brown, rounded gravelly SAND; moist
* 13SB135	13SB135-	9/13/04	At former 98NEC13SS802 location	2.8-3.1	Brown, gravelly SAND; trace silt; moist - below concrete

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-8b)
**	The full sample number is preceded by "04NE", for example 13SS105 is sample 04NE13SS105
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
LOCID	Location Identification: "13SS119-4" signifies Site 13, Surface Sample 119 at 4-foot depth (depth is rounded to the nearest foot)
a	Sample analyzed by laboratory before cancel request received. Results included in table 5-8b.

TABLE 5-8b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 13: ELECTRICAL POWER BUILDING

Site 13 - Electrical Power Building

Soil Matrix

			Sample Type:	TRANSFORMER PAD # 13-1													
			Location ID:	13SS105-1	13SS105-4			13SS106-1	13SS107-1	13SS107-4			13SS108-1	13SS109-1	13SS110-1	13SS110-4	13SS111-1
			Sample ID:	04NE13SS105	04NE13SB128	04NE13SB228 *	04NE13SB328	04NE13SS106	04NE13SS107	04NE13SB124	04NE13SB224	04NE13SB324	04NE13SS108 *	04NE13SS109	04NE13SS110	04NE13SB125	04NE13SS111
			Depth (ft):	1.5	3.6-3.9	3.6-3.9	3.6-3.9	1.2	1.2	4.0	4.0	4.0	1.3	1.4	1.2	3.8-4	1.1
			Sample Date:	8/27/2004	9/1/2004	9/1/2004	9/1/2004	8/27/2004	8/27/2004	9/1/2004	9/1/2004	9/1/2004	8/27/2004	8/27/2004	8/27/2004	9/1/2004	8/27/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		*Primary*	*Duplicate*	*Triplicate*			*Primary*	*Duplicate*	*Triplicate*					
Percent Moisture	A2540G / E160.3M	%	-	3.7	7.8	10.2	9.6	6.1	12	10.6	7.6	10.4	8.0	8.8	9.6	5.4	9.5
Polychlorinated Biphenyls (PCBs)			Sum of congeners:														
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.0529]	[0.0546]	[0.0533]	[0.025]	[0.0533]	[0.0572]	[0.0546]	[0.0554]	[0.025]	[0.0553]	[0.0547]	[0.0564]	[0.0576]	[0.0546]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.0529]	[0.0546]	[0.0533]	[0.050]	[0.0533]	[0.0572]	[0.0546]	[0.0554]	[0.050]	[0.0553]	[0.0547]	[0.0564]	[0.0576]	[0.0546]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.0529]	[0.0546]	[0.0533]	[0.025]	[0.0533]	[0.0572]	[0.0546]	[0.0554]	[0.025]	[0.0553]	[0.0547]	[0.0564]	[0.0576]	[0.0546]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.0529]	[0.0546]	[0.0533]	[0.025]	[0.0533]	[0.0572]	[0.0546]	[0.0554]	[0.025]	[0.0553]	[0.0547]	[0.0564]	[0.0576]	[0.0546]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.0529]	[0.0546]	[0.0533]	[0.025]	[0.0533]	[0.0572]	[0.0546]	[0.0554]	[0.025]	[0.0553]	[0.0547]	[0.0564]	[0.0576]	[0.0546]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.0529]	[0.0546]	[0.0533]	[0.025]	[0.0533]	[0.0572]	[0.0546]	[0.0554]	[0.025]	[0.0553]	[0.0547]	[0.0564]	[0.0576]	[0.0546]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	**1.15**	0.575	0.68	0.671	**8.57**	**8.3**	**5.34**	0.411 J	0.330	0.0668	**547**	**12.4**	0.0450 J	**4.09**
PCB-1262 (Aroclor 1262)	SW8082	mg/kg	"	-	-	-	[0.025]	-	-	-	-	[0.025]	-	-	-	-	-
PCB-1268 (Aroclor 1268)	SW8082	mg/kg	"	-	-	-	[0.025]	-	-	-	-	[0.025]	-	-	-	-	-

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
%	percent
mg/kg	milligrams per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-8b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 13: ELECTRICAL POWER BUILDING

Site 13 - Electrical Power Building

Soil Matrix

			Sample Type:	**TRANSFORMER PAD # 13-1**							**TRANSFORMER PAD # 13-2**						
			Location ID:	13SS112-1	13SS112-4	13SS113-1	13SS113-3	13SS114-1			13SS132-1			13SS133-1	13SS134-1	13SB135-3	13SS120-1
			Sample ID:	04NE13SS112	04NE13SB127	04NE13SS113	04NE13SB126	04NE13SS114	04NE13SS214	04NE13SS314	04NE13SS132	04NE13SS232	04NE13SS332	04NE13SS133	04NE13SS134	04NE13SB135	04NE13SS120
			Depth (ft):	1.1	3.5-3.8	1.1	3.5-2.8	1.0-1.2	1.0-1.2	1.0-1.2	1.0-1.1	1.0-1.1	1.0-1.1	1.0-1.1	1.0-1.1	2.8-3.1	1.2-1.3
			Sample Date:	8/27/2004	9/1/2004	8/27/2004	9/1/2004	8/27/2004	8/27/2004	8/27/2004	9/12/2004	9/12/2004	9/12/2004	9/12/2004	9/12/2004	9/13/2004	8/29/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**					*Primary*	*Duplicate*	*Triplicate*	*Primary*	*Duplicate*	*Triplicate*				
Percent Moisture	A2540G / E160.3M	%	-	6.6	7.5	9.4	11.2	9.8	9.1	10.3	7.3	6.5	8.4	12.2	5.1	5.6	2.9
Polychlorinated Biphenyls (PCBs)			Sum of congeners:														
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.0547]	[0.0541]	[0.0556]	[0.0559]	[0.0564]	[0.0549]	[0.025]	[0.053]	[0.0545]	[0.025]	[0.0572]	[0.0535]	[0.0519]	[0.0555]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.0547]	[0.0541]	[0.0556]	[0.0559]	[0.0564]	[0.0549]	[0.050]	[0.053]	[0.0545]	[0.050]	[0.0572]	[0.0535]	[0.0519]	[0.0555]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.0547]	[0.0541]	[0.0556]	[0.0559]	[0.0564]	[0.0549]	[0.025]	[0.053]	[0.0545]	[0.025]	[0.0572]	[0.0535]	[0.0519]	[0.0555]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.0547]	[0.0541]	[0.0556]	[0.0559]	[0.0564]	[0.0549]	[0.025]	[0.053]	[0.0545]	[0.025]	[0.0572]	[0.0535]	[0.0519]	[0.0555]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.0547]	[0.0541]	[0.0556]	[0.0559]	[0.0564]	[0.0549]	[0.025]	[0.053]	[0.0545]	[0.025]	[0.0572]	[0.0535]	[0.0519]	[0.0555]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.0547]	[0.0541]	[0.0556]	[0.0559]	[0.0564]	[0.0549]	[0.025]	[0.053]	[0.0545]	[0.025]	[0.0572]	[0.0535]	[0.0519]	[0.0555]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	0.761	[0.0541]	0.919	[0.0559]	**2.15**	**2.82**	**1.56**	**17.1 J**	**8.13 J**	**12.2 J**	**14.1 J**	0.0323 J	0.142 J	**2.51**
PCB-1262 (Aroclor 1262)	SW8082	mg/kg	"	-	-	-	-	-	-	[0.025]	-	-	[0.025]	-	-	-	-
PCB-1268 (Aroclor 1268)	SW8082	mg/kg	"	-	-	-	-	-	-	[0.025]	-	-	[0.025]	-	-	-	-

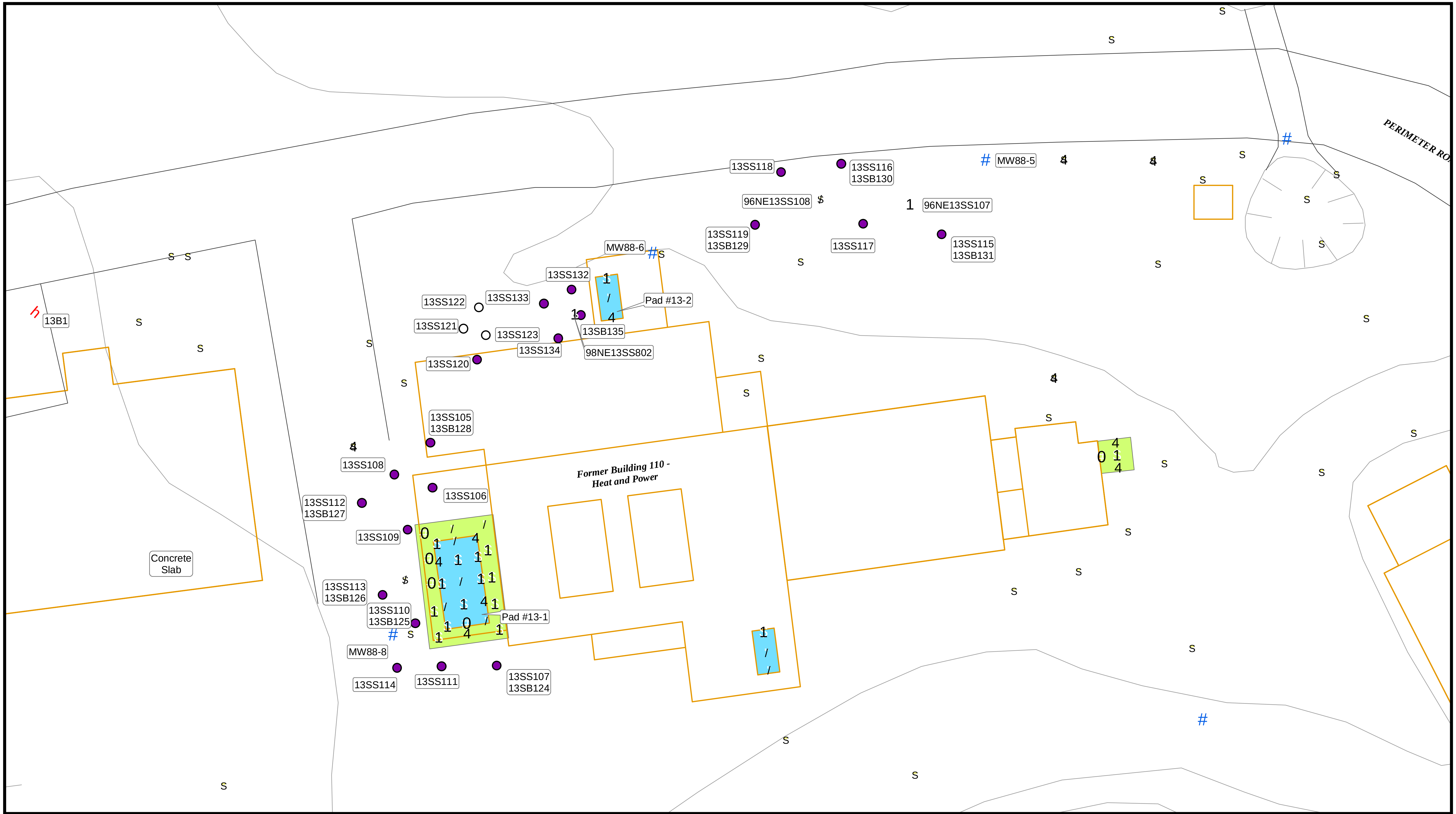
KEY	DESCRIPTIONS
–	Measurement not recorded or not applicable
%	percent
mg/kg	milligrams per kilogram (ppm)
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-8b - SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 13: ELECTRICAL POWER BUILDING

Site 13 - Electrical Power Building
Soil Matrix

			Sample Type:	NORTHERN AREA							
			Location ID:	13SS115-1	13SS115-3	13SS116-1	13SS116-3	13SS117-1	13SS118-1	13SS119-1	13SS119-4
			Sample ID:	04NE13SS115	04NE13SB131	04NE13SS116	04NE13SB130	04NE13SS117	04NE13SS118	04NE13SS119	04NE13SB129
			Depth (ft):	0.65	3.0-3.2	0.95	3.3-3.5	1.15	1.0	1.1	3.4-3.6
			Sample Date:	8/27/2004	9/1/2004	8/27/2004	9/1/2004	8/27/2004	8/27/2004	8/27/2004	9/1/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**								
Percent Moisture	A2540G / E160.3M	%	-	1.8	29.8	11.7	6.0	9.1	8.2	2.0	2.9
Polychlorinated Biphenyls (PCBs)			Sum of congeners:								
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.0515]	[0.0701]	[0.0576]	[0.0533]	[0.0562]	[0.0538]	[0.0503]	[0.0506]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.0515]	[0.0701]	[0.0576]	[0.0533]	[0.0562]	[0.0538]	[0.0503]	[0.0506]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.0515]	[0.0701]	[0.0576]	[0.0533]	[0.0562]	[0.0538]	[0.0503]	[0.0506]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.0515]	[0.0701]	[0.0576]	[0.0533]	[0.0562]	[0.0538]	[0.0503]	[0.0506]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.0515]	[0.0701]	[0.0576]	[0.0533]	[0.0562]	[0.0538]	[0.0503]	[0.0506]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.0515]	[0.0701]	[0.0576]	[0.0533]	[0.0562]	[0.0538]	[0.0503]	[0.0506]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	0.363	0.102	0.0937	0.0213 J	**15.7**	0.156	[0.0503]	0.0738
PCB-1262 (Aroclor 1262)	SW8082	mg/kg	"	-	-	-	-	-	-	-	-
PCB-1268 (Aroclor 1268)	SW8082	mg/kg	"	-	-	-	-	-	-	-	-

KEY	DESCRIPTIONS
–	Measurement not recorded or not applicable
%	percent
mg/kg	milligrams per kilogram (ppm)
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)



Legend

● Near-surface (SS) and/or subsurface (SB) soil sample collected by Shannon & Wilson, Inc. August/September 2004

○ Surface and/or subsurface soil sample collected, but analysis canceled by Shannon & Wilson, Inc. August/September 2004

4 Historical PCB sample location, collected by others, concentration less than 1 ppm

1 Historical PCB sample location, collected by others, concentration between 1 ppm and 10 ppm

/ Historical PCB sample location, collected by others, concentration between 10 ppm and 100 ppm

0 Historical PCB sample location, collected by others, concentration greater than 100 ppm

ϟ Boring advanced by Shannon & Wilson, Inc. August/September 2004

Existing monitoring well installed by others

S Historical sample location collected by others

— Former Buildings and Utilidors

— Topographic Contours (Interval: 5 ft)

🟩 Former Soil Excavations

🟦 Concrete Tranformer Pads

0 10 20 40 60 80 Feet

1 inch equals 20 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 13 - ELECTRICAL POWER BUILDING

June 2005
32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-8

5.9 Main Operations Complex

Three new monitoring wells (17MW-1, 18MW-1 and 20MW-1) and two soil borings (13B1 and 19B1) were completed within the MOC. Twenty-seven subsurface soil samples from the boreholes were field screened and 16 sample locations were selected for laboratory analysis. Groundwater samples were collected from three new and eight existing monitoring wells at the MOC (see Figure 5-9 and Table 5-9a).

5.9.1 Site Description

The MOC was a compact area of barracks, troop services, maintenance shops, and power generating facilities in an area covering roughly 900 feet east to west and 700 feet north to south. Separately identified sites, including Sites 13, 14, 15, 16, 17, 18, 19, and 20, are within the MOC boundaries. Sites 11, 22, and 27 are at the outside boundary of the MOC, and were integral to its operation. The general layout of the area is depicted on Figure 5-9. The MOC sits on a broad depositional feature that appears to be a moraine, and is north and west of the mouth of a steep glacial valley. When viewed as a whole, the MOC has retained the general topography and elevation that existed in 1950 before construction began. It has a general slope to the northwest, with small drainages along the southwestern and northeastern sides. At an individual site level (say 200 feet in extent) a complex history of shallow soil excavation, filling, and grading has occurred. Currently a number of concrete floor slabs, a perimeter road, and over a dozen groundwater monitoring wells remain at the site. Previous phases of the remedial investigation have focused on areas at the northern and eastern edges of the MOC.

5.9.2 Data Collection Objectives

Soil boring locations were specified to determine the maximum depth of fuel contamination above bedrock within, but near the perimeter of, previously identified petroleum impacts. Monitoring well locations were specified to help delineate contaminant extent beyond the locations of existing monitoring wells, outside of previously identified impacts. Groundwater samples were also collected from the existing monitoring wells installed in 2002 to document current conditions and facilitate assessment of changes. To characterize potential contaminants, soil and groundwater samples were selectively analyzed for GRO, DRO, RRO, BTEX, PAHs, TOC, and metals. Natural attenuation parameters were measured in soil and water at select locations to support the future feasibility study. Also in support of the feasibility study, soil samples were collected for grainsize analysis.

5.9.3 Work Plan Variances

The scope of work was to complete two soil borings to an average depth of 40 feet bgs. Eight samples were to be submitted for laboratory analysis. Boring 13B1 was completed to 41.5

feet bgs and did not encounter bedrock, but did extend beyond the apparent depth of fuel contamination. Boring 19B1 was advanced to 29.5 feet bgs, the presence of bedrock was unconfirmed, and no analytical samples were recovered beyond 19 feet to confirm the maximum extent of fuel contamination. Only three samples were recovered from Boring 19B1 for chemical laboratory analysis. Boring 19B1 is discussed further in Section 5.9.4.4. Four sieve samples (2 per boring) were to be collected from representative soil types underlying the Main Complex. Only one sieve sample was recovered from these borings due to the predominance of rock in the subsurface. To obtain more samples representative of the MOC subsurface, sieve samples were collected where recovery was adequate during the installation of monitoring wells 20MW1 and 22MW3 (Site 22).

One bulk soil sample was to be collected "from the overlying gravel fill comprising the Main Operations Complex pad" for grain size and moisture content analysis. A number of soil types were found near the surface of the site, and two bulk samples were collected to represent prominent material types.

The Work Plan called for sampling the ten monitoring wells installed in 2001. Two of the monitoring wells were not found, and one was damaged. No evidence of Monitoring Well MW 88-7 was found after hand digging to 1 foot bgs at several locations identified using various methods, including surveying. The crushed monument for MW 88-9 was found in the recently graded surface material, but the PVC well casing was not found. The monument for MW 88-10 was damaged, and the PVC casing open. MW 88-10 was repaired and sampled.

5.9.4 Field Investigation

Field activities commenced on August 24, 2004 with drilling for Monitoring Well 18MW1, and were completed on September 13, 2004 with the collection of bulk soil samples and measurement of site-wide groundwater elevations.

5.9.4.1 Soil Sampling

Soil samples were collected during the advancement of two borings and three monitoring wells at the MOC. Photograph 10 shows the general method for subsurface soil sampling at the site, and boring and monitoring well locations are shown in Figure 5-9. Boring depths ranged from 21.5 feet bgs for Monitoring Well 17MW1, to 41.5 feet bgs for Boring 13B1. Soil samplers were driven to recover field screening and potential laboratory samples at approximately 5-foot intervals. The rocky nature of the subsurface required adjusting sample intervals to maximize soil recovery. Three samples were selected for laboratory analysis from the boreholes for wells 17MW1, 18MW1, 20MW1, and Boring 19B1. Four analytical samples were selected from Boring 13B1. Sample 13SB101, collected at 5 feet bgs, and Sample 19SB103, collected approximately 18 feet bgs, were selected for the additional natural attenuation parameter, BTEX, PAH and TOC analyses. These locations seemed to represent the upper and lower zones of petroleum impacts. Table 5-9a includes headspace screening results, sample descriptions, and collection depths. Boring Logs are included in Appendix B for each location (Figures B-12a through B 16a).

Bulk Soil Sample 88SS101 was collected from the bedding material placed beneath the Site 19 foundation. The sample was collected by shoveling material from under the concrete slab into two 5-gallon poly buckets. Bulk Soil Sample 88SS102 was collected from adjacent to a concrete slab between Site 18 and Site 19, and appeared to represent the natural soil existing before installation construction. Sample 88SS102 was loosened with a pick and shoveled into two plastic lined sand bags.

5.9.4.2 Groundwater Sampling

New Monitoring Wells 17MW1, 18MW1 and 20MW1 were constructed as shown in Figures B-13b, B-14b, and B-16b in Appendix B. The new wells were developed using a submersible purge pump and new polyethylene tubing. Monitoring Well MW 88-10 was re-developed using a polyethylene bailer. Well development, purging, and sampling information is included in Table 5-9c, and Photograph 11 shows post-sampling decontamination at MW 88-8. Groundwater samples were collected from the three new wells and 2001 Monitoring Wells MW 88-1 through MW 88-6, MW 88-8, and MW 88-10. Development and purge water was transferred to open-top 55-gallon drums and treated at the MOC. Groundwater samples from wells MW 88-2, MW 88-5, MW 88-8 MW 88-10, 17MW1, and 20MW1 were tested for natural attenuation parameters. Samples from wells MW 88-2, MW 88-6, and MW 88-8 were analyzed for PAHs, in addition to GRO, DRO, RRO, BTEX, Cr, Pb, Hg, and Zn, based on spatial distribution and the presence of hydrocarbon odors. Depths to groundwater were measured in the sampled MOC wells and the wells at Sites 11, 16, 22, and 26 in a two-hour period, one day after the last sample was collected.

5.9.4.3 IDW

Investigation derived waste was handled as described in Section 3.7. Development and purge water was placed in drums staged at four locations across the site for later treatment at each staging location. Soil cuttings were used as backfill or spread at each boring location.

5.9.4.4 Field Observations

The re-grading of the site in 2003 damaged some existing monitoring wells, including those installed in 2002. The concrete around MW 88-8 had been cracked by heavy equipment, and the steel monument was partially lifted out of the concrete. The PVC casing and expansion plug were intact. The MW 88-8 monument was driven back down, nearly flush with the ground surface. The PVC casing for MW 88-10 was found under a thin layer of soil with no cap. The expansion cap and crushed steel monument were found a few feet from the casing. MW 88-10 was cleaned out and redeveloped using a bailer, and the turbidity decreased with nominal purging. The outside of the bailer was wiped off between immersions to help remove soil from the sidewalls of the casing, and 4.5 gallons of water with a diesel odor were purged. A new steel monument was set in concrete over the casing using a leftover bag of concrete mix.

The soil types and stratigraphy suggested in the scope of work were often misleading. The near-surface soil is indeed a complex mix due to the development and demolition of the site. However, at greater depths (generally over 5 feet bgs) the material was fairly consistent. The material appears to have been glacially deposited, and contains a large percentage of angular boulders and cobbles (rocks). The majority of the soil encountered was thought to be from moraines and melt-out rubble due to the low percentages of silt commonly associated with basal till. The finer gravels and sands encountered between the rocks were typically loose to medium dense if no cobbles were being pushed and broken by the split-spoon, suggesting that aggregate interlock between the rocks restrict consolidation of the finer soil. Soil particles larger than roughly 2-inches will not fit in a split-spoon sampler, so soil descriptions are typically biased to the finer material. Poorly graded sand (SP) and silty sand (SM) are some of the soil types encountered in the spaces between the rocks. Gravel content could be misleading because it was difficult to differentiate between freshly fractured pieces of rock and angular gravel. Poor soil recovery, and fractured cobbles in the split spoon, were the norm.

Frozen ground was likely at greater depths (in the 20 feet bgs range) in the borings, and made sampling and stratigraphic characterization more difficult. The Boring 19B1 location seemed to be particularly rocky. No soil was recovered below 19 feet bgs. Drilling was stopped at 29.5 feet due to the lack of sample recovery and to avoid carrying the obvious petroleum impacts observed at 12 to 19 feet further downward. Bedrock was suspected, but after more experience drilling in the area, the material was likely frozen rocks and sand beyond 21 feet bgs. Boring 13B1 is located at a lower elevation than 19B1. Drill action in 13B1 suggested frozen ground around 23 feet, where contaminant levels reduced significantly (based on field screening). Boring 13B1 was extended to 41.5 feet bgs, and basal till (gray/green silt with gravel and cobbles) was suspected at 38 feet (no recovery) and observed at 40 feet bgs. The drillers expressed concern about carrying the obvious impacts encountered above 20 feet bgs downward. Bentonite chips were used in the backfill to help seal this section of the boring.

The statement of work noted that the subsurface geology and hydrology do not appear to mimic the ground surface. A groundwater contour map was made, with krieging for interpolation, using the September 13th data from all the wells in the area. The phreatic surface of the aquifer above the basal till corresponded well to the general northwestern slope of the land surface and the sampler's general perception of regional flow.

5.9.5 Analytical Results

Soil sample chemical laboratory results are summarized in Table 5-9b, and groundwater results are summarized in Table 5-9d. Field groundwater quality parameters are included on Table 5-9c. Grainsize classification curve B-22 in Appendix B includes samples from Boring 13B1 and Monitoring Wells 20MW1 and 22MW1. The grainsize classifications for MOC bulk samples are presented graphically on Figure B-23.

5.9.5.1 Soil

The subsurface soil samples from 5 to 6.5, 15 to 18, and 18 to 19.5 feet bgs in Boring 13B1 contained DRO concentrations that exceed the 250 mg/kg Method Two cleanup criterion by over an order of magnitude. The highest DRO concentration is 11,700 mg/kg, measured in Sample 13SB101 collected at 5 to 6 feet bgs. The Boring 13B1 samples from 5 and 15 feet bgs also contained estimated GRO concentrations that exceed the ADEC cleanup criterion. The GRO, DRO, and RRO results from Sample 13SB104 (40 to 41.5 feet bgs) were at least an order of magnitude less than the cleanup criteria. Boring 19B1 samples collected from 12 to 13.5 and 17.5 to 19 feet bgs contained estimated DRO concentrations of 3,590 mg/kg and 3,080 mg/kg, respectively. BTEX was not detected, and metals results were all less than cleanup criterion in the MOC borings and wells.

5.9.5.2 Groundwater

The concentrations of DRO measured in groundwater from Monitoring Wells MW 88-4, MW 88-5, MW 88-6, MW 88-8, and MW 88-10 are greater than the ADEC groundwater cleanup criterion. Samples from Monitoring Wells MW 88-4 and MW 88-5 also contain RRO and benzene concentrations that exceed cleanup criteria. The GRO concentration measured in MW 88-5 is an estimated value that exceeds the cleanup criterion. The petroleum-impacted wells are grouped along the northern and eastern portions of the site. Lead concentrations in excess of the 15 µg/L groundwater cleanup criterion were measured in samples from Monitoring Wells MW 88-2, MW 88-10, and 20MW1. The elevated lead concentrations ranged from 37.6 µg/L to 54.6 µg/L and are significantly higher than the concentrations measured across the rest of the site.

TABLE 5-9a SAMPLE LOCATIONS AND DESCRIPTIONS - MAIN OPERATIONS COMPLEX

Sample Number**	LOCID	Date	Sample Location (See Figure 5-9 for borehole and well location	Depth (feet)	Screening (ppm) ^	Sample Classification†
Soil Samples						
* 13SB101	13B1-5	8/26/04	Boring 13B1	5-6.5	110	Brown, slightly silty sandy GRAVEL and cobbles; moist - strong weathered diesel odor
B13S1	13B1-10	8/26/04	Boring 13B1	10-11.5	50	Dark brown, sl. silty sandy GRAVEL and cobbles; moist - diesel
* 13SB102	13B1-15	8/26/04	Boring 13B1. Two split spoons combined	15-18	180	Dark gray, sandy, gravelly SILT and cobbles; moist to wet - diesel
* 13SB202	13B1-15	8/26/04	QC replicate of Sample 13SB102	15-18	180	Dark gray, sandy, gravelly SILT and cobbles; moist to wet - diesel
* 13SB302	13B1-15	8/26/04	QA replicate of Sample 13SB102	15-18	180	Dark gray, sandy, gravelly SILT and cobbles; moist to wet - diesel
* 13SB103	13B1-18	8/26/04	Boring 13B1. Grain size sample	18-19.5	55	Gray, silty, sandy GRAVEL and cobbles; wet - strong diesel odor
B13S5	13B1-25	8/26/04	Boring 13B1	25-26.5	6.0	Brown, gravelly SAND and cobbles; wet - very little odor
B13S6	13B1-32	8/26/04	Boring 13B1	32-33.5	0.2	Olive brown, clean medium SAND and cobbles; wet
* 13SB104	13B1-40	8/26/04	Boring 13B1 - bottom of borehole	40-41.5	0.2	Olive gray/green gravelly, clayey SILT and cobbles; wet [Till]
* 17SB101	17MW1-6	8/29/04	Monitoring Well 17MW1	6-7.5	<0.02	Redish brown, gravelly SAND; with cobbles; moist
* 17SB102	17MW1-	8/29/04	Monitoring Well 17MW1	10-11.5	0.2	Gray, silty, sandy GRAVEL; wet
B17S3	17MW1-	8/29/04	Monitoring Well 17MW1	16-17.5	0.3	Brown sandy GRAVEL; with cobbles; wet
* 17SB103	17MW1-	8/29/04	Monitoring Well 17MW1	20-21.5	0.5	Brown sandy GRAVEL; with cobbles; wet - possibly frozen
* 18SB101	18MW1-5	8/24/04	Monitoring Well 18MW1	5-6.5	<0.02	Light brown, silty, gravelly SAND and cobbles; moist
B18S2	18MW1-	8/24/04	Monitoring Well 18MW1	10-11.5	1.2	1 inch light brown, silty, GRAVEL; moist, 3 inches crushed rock
* 18SB102	18MW1-	8/24/04	Monitoring Well 18MW1	15-16.5	0.3	Light brown, silty, gravelly SAND and cobbles; moist
B18S4	18MW1-	8/24/04	Monitoring Well 18MW1	20-21.5	0.6	Brown, silty GRAVEL and cobbles; wet
* 18SB103	18MW1-	8/24/04	Monitoring Well 18MW1	25-26.5	0.3	Brown, silty GRAVEL and cobbles; wet - potentially frozen
* 19SB101	19B1-5	8/25/04	Boring 19B1	5-6.5	0.2	Gray, slightly sandy, gravelly SILT; moist
* 19SB102	19B1-12	8/25/04	Boring 19B1	12-13.5	17	Brown, silty, gravelly SAND; moist - moderate weathered diesel od
* 19SB103	19B1-18	8/25/04	Boring 19B1	17.5-19	24	Brown, silty, sandy GRAVEL; wet - strong weathered diesel odor
B19S4	19B1-21	8/25/04	Boring 19B1	21-21.5	13	Crushed rock
B19S6	19B1-28	8/26/04	Boring 19B1	28-29.5	21	Crushed rock - bedrock or frozen material
* 20SB101	20MW1-3	8/25/04	Monitoring Well 20MW1	3-4.5	<0.02	Brown, slightly silty, sandy angular GRAVEL; with cobbles; moist
B20S2	20MW1-5	8/25/04	Monitoring Well 20MW1	5-6.5	<0.02	Brown, slightly silty, sandy angular GRAVEL; with cobbles; moist
* 20SB102	20MW1-	8/25/04	Monitoring Well 20MW1	10-11.5	<0.02	Brown / rusty, silty gravelly SAND; moist
B20S4	20MW1-	8/25/04	Monitoring Well 20MW1	15-16.5	<0.02	Brown, gravelly, silty SAND; moist
* 20SB103	20MW1-	8/25/04	Monitoring Well 20MW1	20-21.5	<0.02	Brown, silty, gravelly SAND and cobbles; moist
B20S6	20MW1-	8/25/04	Monitoring Well 20MW1	25-26.5	<0.02	Gray, silty SAND and cobbles; wet - potentially frozen
88SS101	88SS101-1	9/13/04	Beneath Site 19 building concrete slab	0.6-1	-	Brown, gravelly SAND and angular cobbles; moist
88SS102	88SS102-1	9/13/04	Near center of MOC, adjacent to concrete slab	0.6-1.2	-	Redish brown, silty, gravelly SAND; moist

TABLE 5-9a SAMPLE LOCATIONS AND DESCRIPTIONS - MAIN OPERATIONS COMPLEX

Sample Number**	LOCID	Date	Sample Location (See Figure 5-9 for borehole and well location	Depth (feet)	Screening (ppm) ^	Sample Classification†
Groundwater Samples						
* 17GW104	17MW1	9/9/04	Monitoring Well 17MW1	WL 10	-	Groundwater - slight turbidity
* 18GW104	18MW1	9/10/04	Monitoring Well 18MW1	WL 19	-	Groundwater - clear
* 20GW104	20MW1	9/11/04	Monitoring Well 20MW1	WL 23	-	Groundwater - slightly turbid clearing from rusty color
* 88GW101	MW 88-1	9/6/04	Monitoring Well MW88-1 (installed in 2001)	WL 16	-	Groundwater - clear
* 88GW102	MW 88-2	9/7/04	Monitoring Well MW88-2 (installed in 2001)	WL 8	-	Groundwater - slight turbidity and hydrocarbon odor
* 88GW103	MW 88-3	9/7/04	Monitoring Well MW88-3 (installed in 2001)	WL 12	-	Groundwater - clear
* 88GW104	MW 88-4	9/8/04	Monitoring Well MW88-4 (installed in 2001)	WL 8	-	Groundwater - weathered diesel odor, yellowish tint
* 88GW204	MW 88-4	9/8/04	QC replicate of Sample 88GW104	WL 8	-	Groundwater - weathered diesel odor, yellowish tint
* 88GW304	MW 88-4	9/8/04	QA replicate of Sample 88GW104	WL 8	-	Groundwater - weathered diesel odor, yellowish tint
* 88GW105	MW 88-5	9/8/04	Monitoring Well MW88-5 (installed in 2001)	WL 7.5	-	Groundwater - slight sheen initially, weathered diesel odor, yellowis
* 88GW106	MW 88-6	9/8/04	Monitoring Well MW88-6 (installed in 2001)	WL 8.5	-	Groundwater - slightly turbid (gray), weathered diesel odor
* 88GW107	MW 88-8	9/9/04	Monitoring Well MW88-8 (installed in 2001)	WL	-	Groundwater - clear, slight hydrocarbon odor
* 88GW108	MW 88-	9/11/04	Monitoring Well MW88-10 (installed in 2001)	WL 20	-	Groundwater - moderate weathered diesel odor, clear (from brown)

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Tables 5-9b and 5-9d)
**	The full sample number is preceded by "04NE", for example 13SB101 is sample 04NE13SB101
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
WL	Approximate water level in feet below ground surface at time of sampling
LOCID	Location Identification: "17MW1" signifies Monitoring Well 17MW1; "13B1-5" signifies Site 13, Boring 1 at 5-foot depth (depth is rounded

TABLE 5-9b - SUMMARY OF SOIL ANALYTICAL RESULTS - MAIN OPERATIONS COMPLEX

Main Operations Complex Soil Matrix			Sample Type:	BOREHOLE 13B1						BOREHOLE 19B1		
			Location ID:	13B1-5	13B1-15			13B1-18	13B1-40	19B1-5	19B1-12	19B1-18
			Sample ID:	04NE13SB101	04NE13SB102	04NE13SB202	04NE13SB302	04NE13SB103	04NE13SB104	04NE19SB101	04NE19SB102	04NE19SB103
			Depth (ft):	5-6.5	15-18	15-18	15-18	18-19.5	40-41.5	5-6.5	12-13.5	17.5-19
			Sample Date:	8/26/2004	8/26/2004	8/26/2004	8/26/2004	8/26/2004	8/26/2004	8/25/2004	8/25/2004	8/25/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		*Primary*	*Duplicate*	*Triplicate*					
PID Headspace Reading	HNU HW101 PID	ppm	-	110	180	180	180	55	0.2	0.2	17	24
Percent Moisture	A2540G / E160.3M	%	-	10.0	7.6	11.6	13.7	10.5	11.5	9.1	5.9	9.9
Gasoline Range Organics (GRO)	AK101	mg/kg	300	**513 J**	**348 J**	**365 J**	276 J	177 J	[2.17] B	[1.39] B	91.6 J	4.90 J
Diesel Range Organics (DRO)	AK102	mg/kg	250	**11,700 J**	**5,290 J**	**7,500 J**	**6,780**	**1,130 J**	15.8 J	4.68 J	**3,590 J**	**3,080 J**
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	328 J	320 J	305 J	255 J	181 J	67.8 J	23.8 J	489 J	109 J
Aromatic Organic Compounds (BTEX)												
Benzene	SW8260B	µg/kg	20	[12.2]	-	-	-	-	-	-	-	[7.97]
Ethylbenzene	SW8260B	µg/kg	5,500	[23.5]	-	-	-	-	-	-	-	[15.3]
Toluene	SW8260B	µg/kg	5,400	[47]	-	-	-	-	-	-	-	[30.7]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[47]	-	-	-	-	-	-	-	[30.7]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[23.5]	-	-	-	-	-	-	-	[15.3]
Polynuclear Aromatic Hydrocarbons (PAH)												
Acenaphthene	PAH SIM	µg/kg	210,000	[5630]	-	-	-	-	-	-	-	[557]
Acenaphthylene	PAH SIM	µg/kg	-	[5630]	-	-	-	-	-	-	-	[557]
Anthracene	PAH SIM	µg/kg	4,300,000	[5.63]	-	-	-	-	-	-	-	[5.57]
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	[5.63]	-	-	-	-	-	-	-	[5.57]
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	[5.63]	-	-	-	-	-	-	-	[5.57]
Benzo(b)fluoranthene	PAH SIM	µg/kg	20,000	[5.63]	-	-	-	-	-	-	-	[5.57]
Benzo(g,h,i)perylene	PAH SIM	µg/kg	-	[5.63]	-	-	-	-	-	-	-	[5.57]
Benzo(k)fluoranthene	PAH SIM	µg/kg	-	[5.63]	-	-	-	-	-	-	-	[5.57]
Chrysene	PAH SIM	µg/kg	620,000	4.88 J	-	-	-	-	-	-	-	[5.57]
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	[5.63]	-	-	-	-	-	-	-	[5.57]
Fluoranthene	PAH SIM	µg/kg	2,100,000	[5.63]	-	-	-	-	-	-	-	[5.57]
Fluorene	PAH SIM	µg/kg	270,000	[5630]	-	-	-	-	-	-	-	[557]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	[5.63]	-	-	-	-	-	-	-	[5.57]
Naphthalene	PAH SIM	µg/kg	21,000	[5630]	-	-	-	-	-	-	-	[557]
Phenanthrene	PAH SIM	µg/kg	-	[5.63]	-	-	-	-	-	-	-	[5.57]
Pyrene	PAH SIM	µg/kg	1,500,000	10.9	-	-	-	-	-	-	-	[5.57]
Total Metals												
Chromium	SW6020	mg/kg	26 (total Cr)	12.3	-	-	-	-	-	-	-	4.14 J
Lead	SW6020	mg/kg	400 (ing/inh)	16.6	-	-	-	-	-	-	-	38.9 J
Mercury	SW7471A	mg/kg	1.4	0.0156 J	-	-	-	-	-	-	-	[0.0437]
Zinc	SW6020	mg/kg	9,100	41.8 J	-	-	-	-	-	-	-	64.5 J
Total Organic Carbon (TOC)	SGS SOP	mg/kg	-	29,400	-	-	-	-	-	-	-	2490
Natural Attenuation Parameters												
Nitrate	E300.0	mg/kg	-	[1.04]	-	-	-	-	-	-	-	[1.04]
Ammonia	SM4500	mg/kg	-	[54.7]	-	-	-	-	-	-	-	[8.84]
Total Kjeldal Nitrogen (TKN)	SM4500	mg/kg	-	665	-	-	-	-	-	-	-	62.3
Orthophosphate	ASA 24-5	mg/kg	-	28.2	-	-	-	-	-	-	-	19.4
Potassium	SW6020	mg/kg	-	869	-	-	-	-	-	-	-	1,080
Heterotrophic Plate Count	SM9215B	MPN/g	-	880,000	-	-	-	-	-	-	-	6,000
Oil Degrading Bacteria	Sheen Screen	MPN/g	-	370	-	-	-	-	-	-	-	260

KEY	DESCRIPTION
-	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
MPN/g	Most probable number per gram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup level
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)

TABLE 5-9b - SUMMARY OF SOIL ANALYTICAL RESULTS - MAIN OPERATIONS COMPLEX

Main Operations Complex **Soil Matrix**			Sample Type:	**BOREHOLE 17MW1**			**BOREHOLE 18MW1**			**BOREHOLE 20MW1**		
			Location ID:	17MW1-6	17MW1-10	17MW1-20	18MW1-5	18MW1-15	18MW1-25	20MW1-3	20MW1-10	20MW1-20
			Sample ID:	04NE17SB101	04NE17SB102	04NE17SB103	04NE18SB101	04NE18SB102	04NE18SB103	04NE20SB101	04NE20SB102 *	04NE20SB103
			Depth (ft):	6-7.5	10-11.5	20-21.5	5-6.5	15-16.5	25-26.5	3-4.5	10-11.5	20-21.5
			Sample Date:	8/29/2004	8/29/2004	8/29/2004	8/24/2004	8/24/2004	8/24/2004	8/25/2004	8/25/2004	8/25/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**									
PID Headspace Reading	HNU HW101 PID	ppm	-	<0.2	0.2	0.5	<0.2	0.3	0.3	<0.2	<0.2	<0.2
Percent Moisture	A2540G / E160.3M	%	-	9.5	19.8	19.9	3.7	3.8	8.1	6.4	10.6	7.5
Gasoline Range Organics (GRO)	AK101	mg/kg	300	11.5	[1.69] B	[2.17] B	[1.76] B	[1.72] B	[2.94] B	[2.03] B	[1.76] B	[1.50] B
Diesel Range Organics (DRO)	AK102	mg/kg	250	17.9 J	28.4 J	7.00 J	14.8 J	9.23 J	8.91 J	7.83 J	14.8 J	7.87 J
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	142 J	185 J	20.1 J	59.7 J	34.3 J	30.3 J	30.0 J	29.9 J	20.9 J
Aromatic Organic Compounds (BTEX)												
Benzene	SW8260B	µg/kg	20	[11.9]	[8.78]	[11.3]	[9.16]	[8.93]	[15.3]	[10.6]	[9.15]	[7.82]
Ethylbenzene	SW8260B	µg/kg	5,500	[23]	[16.9]	[21.7]	[17.6]	[17.2]	[29.4]	[20.3]	[17.6]	[15]
Toluene	SW8260B	µg/kg	5,400	[45.9]	[33.8]	[43.4]	[35.2]	[34.3]	[58.8]	[40.6]	[35.2]	[30.1]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[45.9]	[33.8]	[43.4]	[35.2]	[34.3]	[58.8]	[40.6]	[35.2]	[30.1]
Xylene, Isomers m & p	SW8260B	µg/kg	78,000 (total Xylenes)	[23]	[16.9]	[21.7]	[17.6]	[17.2]	[29.4]	[20.3]	[17.6]	[15]
Total Metals												
Chromium	SW6020	mg/kg	26 (total Cr)	7.67	12.4	2.11	7.37 J	5.58 J	7.9 J	10.6	8.82	6.66 J
Lead	SW6020	mg/kg	400 (ing/inh)	20.9	20.6	7.21	12.1 J	11.8 J	31.9 J	17.6	19.2	14.6 J
Mercury	SW7471A	mg/kg	1.4	[0.0441]	[0.0496]	[0.0498]	[0.0410]	[0.04110]	[0.0431]	[0.0423]	[0.0447]	[0.0430]
Zinc	SW6020	mg/kg	9,100	37.2	50.4	22.4	28.2 J	30.9 J	93.6 J	37.0	42.9	34.4 J
Total Organic Carbon (TOC)	SGS SOP	mg/kg	-	3,870	6,690	[618]	1,180	712	[543]	2,160	1,370	603

KEY	DESCRIPTION
-	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup level
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-9c GROUNDWATER SAMPLING LOG
MAIN OPERATIONS COMPLEX

MONITORING WELL INSTALLATION DATA

WELL ID	17MW1	18MW1	20MW1	MW 88-1	MW 88-2	MW 88-3	MW 88-4	MW 88-5	MW 88-6	MW 88-8	MW 88-10
DATE WELL INSTALLED	8/29/04	8/24/04	8/25/04	2001	2001	2001	2001	2001	2001	2001	2001
GROUND SURFACE ELEVATION (ft)	71.5	83.3	89.4	82.2 (est.)	70.4	77.8 (est.)	68.55 (est.)	68.2 (est.)	69.2 (est.)	73.6 (est.)	
WELL MP ELEVATION (ft)	71.20	83.09	89.06	81.91	70.88	77.32	68.24	67.83	68.83	73.39	86.53
TOP OF SCREENED SECTION, BELOW MP (ft)	7.3	16.00	19.2	-	-	-	-	-	-	-	-
TOTAL DEPTH OF WELL BELOW MP (ft)	17.1	25.80	28.98	24.16	19.45	19.6	16.1	14.9	15.18	18.61	25.55
DIAMETER OF WELL CASING (inches)	2	2	2	2	2	2	2	2	2	2	2

DEVELOPMENT DATA

DATE OF DEVELOPMENT	9/7/04	9/9/04	9/10/04	-	-	-	-	-	-	-	9/10/2004
TIME DEVELOPMENT INITIATED	15:42	18:30	13:50	-	-	-	-	-	-	-	14:20
TIME DEVELOPMENT COMPLETED	15:55	19:30	14:35	-	-	-	-	-	-	-	15:30
DEPTH TO WATER BELOW MP (ft)	9.59	18.54	22.48	-	-	-	-	-	-	-	20.30
WATER COLUMN IN WELL (ft)	7.51	7.26	6.50	-	-	-	-	-	-	-	5.20
GALLONS PER FOOT	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
GALLONS IN WELL	1.20	1.16	1.04	-	-	-	-	-	-	-	0.83
DEVELOPMENT METHOD	GeoSquirt	GeoSquirt	GeoSquirt	-	-	-	-	-	-	-	Bailer
VOLUME WATER REMOVED (gallons)	18	30.0	48.0	-	-	-	-	-	-	-	4.0

PURGING & SAMPLING DATA

LOCID	17MW1	18MW1	20MW1	MW 88-1	MW 88-2	MW 88-3	MW 88-4	MW 88-5	MW 88-6	MW 88-8	MW 88-10
SAMPLE ID	04NE17GW104	04NE18GW104	04NE20GW104	04NE88GW101	04NE88GW102	04NE88GW103	04NE88GW104	04NE88GW105	04NE88GW106	04NE88GW107	04NE88GW108
DATE	9/9/04	9/10/04	9/11/04	9/6/04	9/7/04	9/7/04	9/8/04	9/8/04	9/8/04	9/9/04	9/11/04
TIME PURGING INITIATED	16:20	18:15	10:42	17:15	11:59	13:43	11:01	12:44	17:38	13:16	12:20
TIME SAMPLE INITIATED	17:00	18:35	11:05	18:30	12:30	16:15	11:25	13:25	18:35	13:30	13:00
DEPTH TO WATER BELOW MP (ft)	9.63	19.68	22.58	15.87	7.61	11.46	7.62	7.28	8.05	12.01	20.36
WATER COLUMN IN WELL (ft)	7.47	6.12	6.40	8.29	11.84	8.14	8.48	7.62	7.13	6.60	5.19
GALLONS IN WELL	1.20	0.98	1.02	1.33	1.89	1.30	1.36	1.22	1.14	1.06	0.83
PURGING METHOD	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2	Redi-Flo 2
VOLUME WATER REMOVED (gallons)	4.0	4.0	5.0	5.5	5.5	1.5	5.0	4.0	6.0	3.0	3.0

WATER QUALITY DATA - YSI 556

DATE MEASURED	9/9/04	9/10/04	9/11/04	9/6/04	9/7/04	9/7/04	9/8/04	9/8/04	9/8/04	9/9/04	9/11/04
TIME MEASURED	17:07	18:31	11:04	17:35	12:37	16:16	11:30	13:20	18:35	13:42	12:56
TEMPERATURE (^{o}C)	5.1	5.3	5.3	5.4	5.0	7.2	5.5	5.0	5.8	7.4	5.9
SPECIFIC CONDUCTANCE (mS/cm)	0.08	0.09	0.19	0.15/0.07	0.16	0.16	0.37	0.39	0.46	0.32	0.11
DISSOLVED OXYGEN (mg/L)	10.7*	14.6*	12.9*	3.4	0.6	1.3	0.2	1.2	0.2	0.8	2.9
pH (Standard Units)	5.4	6.0	6.0	5.8	6.0	6.2	6.4	6.1	6.6	6.4	6.0
OXYGEN REDUCTION POTENTIAL (mV)	238	218	218	202	83	80	-60	-28	-50	-51	126
TURBIDITY (NTUs) - Oakton	43.5	24.6	84.8	5.3 - 4.9	93	13.2	13.2	289	105	24.3	69.8
ALKALINITY (mg/L) - Hach phenolpthalein titration	5	-	15	15	40	-	-	125	-	90	30
FERROUS IRON (mg/L) - Hach colorimeter	0.11	-	0.18	-	1.34	-	-	1.79	-	3.3	0.48

WATER LEVEL MEASUREMENT DATA

DATE WATER LEVEL MEASURED	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04	9/13/04
TIME WATER LEVEL MEASURED	16:05	14:25	14:30	14:50	15:20	15:00	15:28	15:37	15:43	15:50	14:40
DEPTH TO WATER BELOW MP (ft)	9.81	19.85	22.76	16.28	7.81	11.82	7.71	7.49	8.25	12.21	20.55
WATER LEVEL ELEVATION (ft)	61.39	63.24	66.30	65.63	63.07	65.50	60.53	60.34	60.58	61.18	65.98

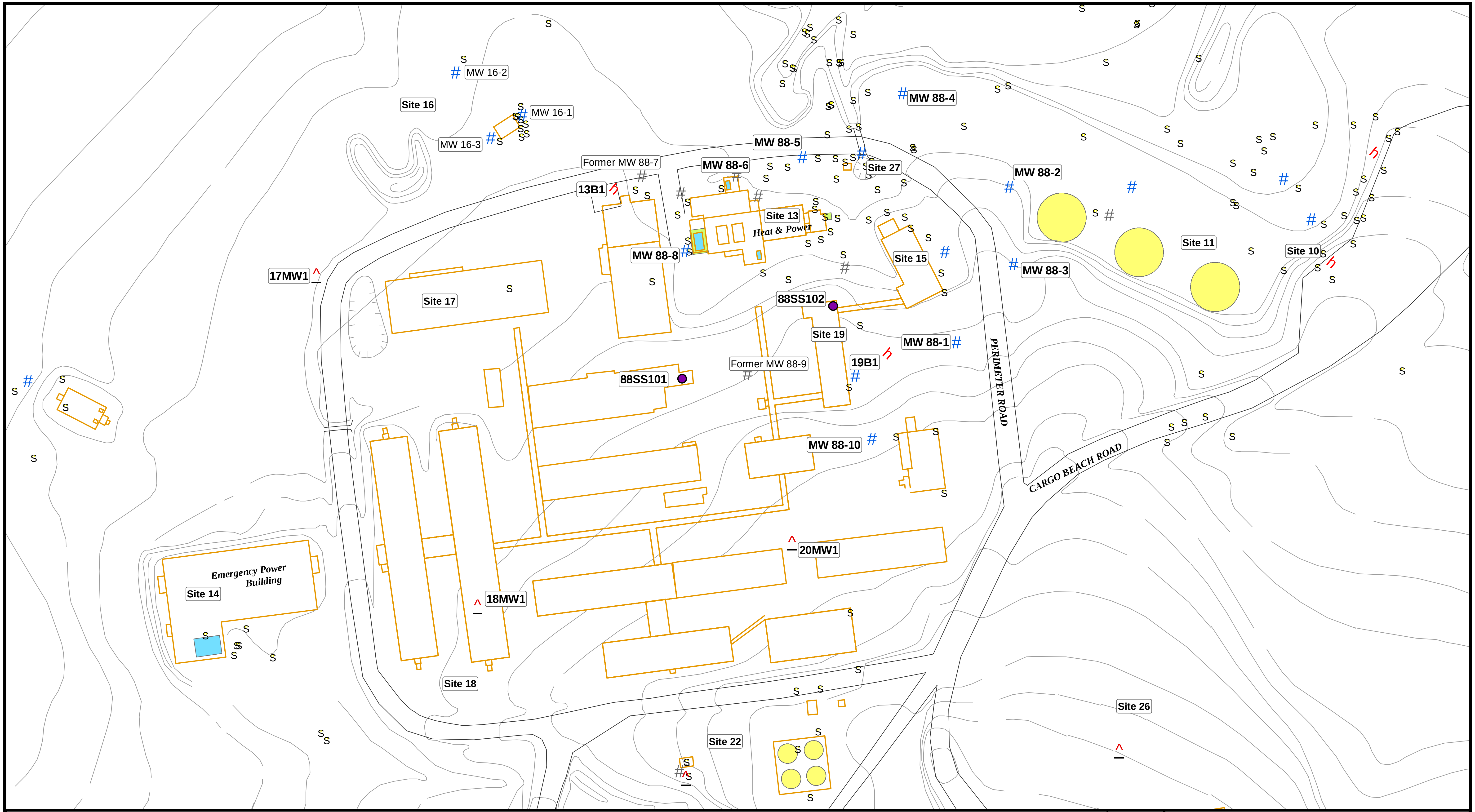
* unusually high DO readings may be due to instrument malfunction

KEY	DESCRIPTION
-	Not developed or not measured
^{o}C	Degrees Celsius
ft	Feet
mg/L	Milligrams per liter
MP	Measuring Point is Top of Well Casing
mV	Millivolts
NTUs	Nephelometric Turbidity Units
mS/cm	Millisiemens per centimeter

TABLE 5-9d SUMMARY OF WATER ANALYTICAL RESULTS - MAIN OPERATIONS COMPLEX

Main Operations Complex **Water Matrix**			Sample Type:	**GROUNDWATER**												
			Location ID:	17MW1	18MW1	20MW1	MW 88-1	MW 88-2	MW 88-3	MW 88-4			MW 88-5	MW 88-6	MW 88-8	MW 88-10
			Sample ID:	04NE17GW104	04NE18GW104	04NE20GW104	04NE88GW101	04NE88GW102	04NE88GW103	04NE88GW104 *	04NE88GW204	04NE88GW304	04NE88GW105	04NE88GW106	04NE88GW107	04NE88GW108
			Cooler Number:	27	25	26	24	24	24	25	25	29	25	32, 35	27	26
			Depth (ft):	10	19	23	16	8	12	8	8	8	7.5	8.5	12.3	20
			Sample Date:	9/9/2004	9/10/2004	9/11/2004	9/6/2004	9/7/2004	9/7/2004	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/9/2004	9/11/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**							*Primary*	*Duplicate*	*Triplicate*				
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	[0.090]	0.0191 J	0.0194 J	0.0141 J	0.0492 J	0.104	0.917	1.09 J	1.25	**1.5 J**	1.02	0.415	0.0357 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	[0.337] B	[0.341] B	[0.333] B	[0.345] B	0.421 B	0.768 B	**3.82 J**	**3.49**	**3.89**	**11.3**	**4.56 J**	**3.37**	1.38
Residual Range Organics (RRO)	AK103	mg/L	1.1	[0.562] B	[0.568] B	[0.556] B	0.168 J	[0.543] B	[0.549] B	**1.46 B**	**1.11 B**	[0.750] B	**2.28 B**	0.651 B	0.816 B	[0.549] B
Aromatic Organic Compounds (BTEX)																
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]	[0.4]	[0.4]	0.26 J	[0.4]	**27.6**	**33.7**	**30.0**	**29.7**	1.18	[0.4]	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	[1]	1.65	5.65	87.8	87.4	98.0	40.5	47	12.7	[1]
Toluene	SW8260B	µg/L	1000	[1]	[1]	[1]	[1]	[1]	[1]	5.78	9.41	10.5	82.2	[1]	[1]	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	[1]	[1]	[1]	25.4	45.8	49.9	111	1.03	0.45 J	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	[2]	0.69 J	4.83	72.8	94	98	142	35.2	11.6	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)																
Acenaphthene	PAH SIM	µg/L	2,200	–	–	–	–	[0.0549]	–	–	–	–	–	0.948	1.65	–
Acenaphthylene	PAH SIM	µg/L	2,200	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Anthracene	PAH SIM	µg/L	11,000	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Benzo(a)anthracene	PAH SIM	µg/L	1	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Benzo(a)pyrene	PAH SIM	µg/L	0.2	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Benzo(b)fluoranthene	PAH SIM	µg/L	1	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Benzo(g,h,i)perylene	PAH SIM	µg/L	1,100	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Benzo(k)fluoranthene	PAH SIM	µg/L	10	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Chrysene	PAH SIM	µg/L	100	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Dibenzo(a,h)anthracene	PAH SIM	µg/L	0.1	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Fluoranthene	PAH SIM	µg/L	1,460	–	–	–	–	[0.11]	–	–	–	–	–	[0.105]	[0.108]	–
Fluorene	PAH SIM	µg/L	1,460	–	–	–	–	[0.0549]	–	–	–	–	–	1.62	3.01	–
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/L	1	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Naphthalene	PAH SIM	µg/L	700	–	–	–	–	[0.0549] B	–	–	–	–	–	112	137	–
Phenanthrene	PAH SIM	µg/L	11,000	–	–	–	–	[0.11]	–	–	–	–	–	0.27	0.484	–
Pyrene	PAH SIM	µg/L	1,100	–	–	–	–	[0.0549]	–	–	–	–	–	[0.0526]	[0.0538]	–
Total Metals																
Chromium	SW6020	µg/L	100 (Total)	1.49J	1.39J	39.7	[4]	62.4	[4]	3.97 J	2.28 J	4.4	4.58	10.7	[4]	25
Lead	SW6020	µg/L	15	7.08	1.21 B	**51.7**	[1.00] B	**54.6**	[1.00] B	5.02	4.09 B	4.23 B	12	8.87	4.07 B	**37.6**
Mercury	SW7470A	µg/L	2	[0.200]B	0.084 J	[0.200] B	[0.2]	[0.2]	[0.2]	[0.200] B	0.08 J	[0.2]	0.076 J	[0.200] B	[0.200] B	0.1 J
Zinc	SW6020	µg/L	11,000	35	[25]	109	[25]	128	[25]	47.4	22.8 J	36	9.64 J	24.3 J	[25]	94.5
Natural Attenuation Parameters																
Nitrate	E300.0	mg/L	–				–	[0.1]	–	–	–	–		–		
Nitrogen, Nitrate-Nitrite	E300.0	mg/L	–	0.272	–	0.855	–		–	–	–	–	[0.1]	–	[0.1]	[0.1]
Sulfate	E300.0	mg/L	–	14.1	–	14.3	–	8.12	–	–	–	–	2.82	–	0.323	9.74
Iron	SW6010B	mg/L	–	3.01	–	31.7	–	69.4	–	–	–	–	48	–	50.6	14.2

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
1.11 B	Analyte concentration biased due to detection in method, trip, or equipment blank
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup level
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)
WL	Approximate depth to water below ground surface



Legend

● Surface soil sample collected by Shannon & Wilson, Inc. August/September 2004

ϟ Boring advanced by Shannon & Wilson, Inc. August/September 2004

^ Monitoring well installed by Shannon & Wilson, Inc. August/September 2004

Existing monitoring well, installed by others

Former monitoring well, installed by others

S Historical sample location, collected by others

— Former Buildings

— Topographic Contours (Interval: 5 ft)

▭ Demolished Buildings

🟦 Concrete tranformer pads

🟨 Former aboveground storage tanks

🟩 Former soil excavations

0 50 100 200 300 400 Feet

1 inch equals 100 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MAIN OPERATIONS COMPLEX

June 2005
32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-9

5.10 Site 14: Emergency Power/Operations Building

Two surface soil (14SS101 and 14SS102) and two subsurface soil (14SB103 and 14SB104) samples were collected for PCB analysis adjacent to the former Building 98 (see Figure 5-10 and Table 5-10a).

5.10.1 Site Description

Site 14 is located on the western edge of the Main Operations Complex, and contained electronic communication equipment and an emergency power generating facility. A transformer bank was located in the southwest portion of the former Building 98. The layout of the site is shown on Figure 5-10. The concrete floor slab of the building remains on a bench that slopes away steeply to the north and west. The eastern approach to the building has been regraded recently.

5.10.2 Data Collection Objectives

Previous investigations detected PCBs adjacent to the building at concentrations up to 19 mg/kg. Additional samples were collected to help resolve whether or not the contamination extends to the south beyond the previous sampling effort.

5.10.3 Field Investigation

Two surface soil samples and two co-located subsurface soil samples were collected approximately 10 feet southeast and 10 feet southwest of previous sample location 01NE14SS102. The sample locations were along an embankment of recently placed rocky fill, visible in Photograph 12 of Appendix A. The shallow samples were collected in older fill beneath the recent fill. The deeper samples were collected just below the apparent contact between older fill and native soil. The sample depths were achieved using hand tools, and the samples were analyzed for PCBs. Sample descriptions are included in Table 5-10a and sample locations are shown on Figure 5-10.

5.10.4 Analytical Results

Table 5-10B summarizes the results of PCB analysis. The PCB Aroclor 1260 was the only congener detected, and none of the results exceed the 1 mg/kg surface soil criterion.

TABLE 5-10a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 14: EMERGENCY POWER/OPERATIONS BUILDING

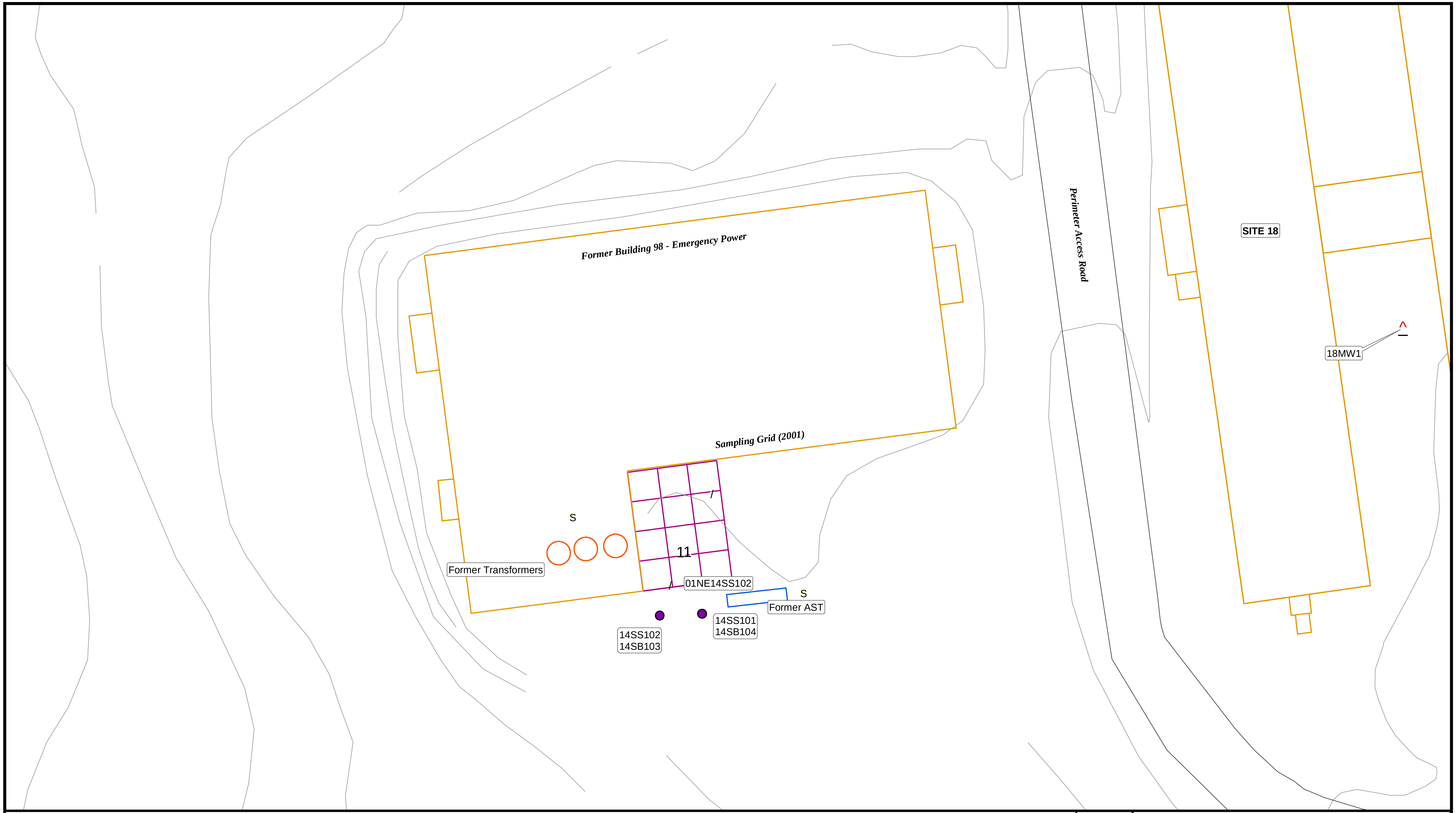
Sample Number**	LOCID	Date	Sample Location (See Figure 5-10)	Depth (feet)	Sample Classification†
Soil Samples					
* 14SS101	14SS101-1	8/30/04	East sample South of 2001 sampling grid, Building 98	1.4-1.6	Dark brown, slightly silty, sandy GRAVEL and cobbles; moist; trace organics - under recent fill, just beneath old vegetation layer
* 14SS102	14SS102-1	8/30/04	West sample South of 2001 sampling grid, Building 98	1.6	Dark brown, slightly silty, sandy GRAVEL and cobbles; moist; trace organics - under recent fill, just beneath old vegetation layer
* 14SB103	14SS102-2	8/30/04	West sample South of 2001 sampling grid, Building	2-2.2	Dark brown, slightly silty, sandy GRAVEL; moist
* 14SB104	14SS101-2	8/30/04	East sample South of 2001 sampling grid, Building	2-2.2	Brownish gray, sandy SILT and cobbles; moist
* 14SB204	14SS101-2	8/30/04	QC replicate of Sample 14SS104	2-2.2	Brownish gray, sandy SILT and cobbles; moist
* 14SB304	14SS101-2	8/30/04	QA replicate of Sample 14SS104	2-2.2	Brownish gray, sandy SILT and cobbles; moist

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-10b)
**	The full sample number is preceded by "04NE", for example 14SS101 is sample 04NE14SS101
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
LOCID	Location Identification: "14SS101-1" signifies Site 14, Surface Sample 101 at 1-foot depth (depth is rounded to the nearest foot)

TABLE 5-10b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 14: EMERGENCY POWER/OPERATIONS BUILDING

Site 14 - Emergency Power/Operations Building Soil Matrix			Sample Type:	**SUBSURFACE SOIL SAMPLES**					
			Location ID:	14SS101-1	14SS101-2			14SS102-1	14SS102-2
			Sample ID:	04NE14SS101	04NE14SB104	04NE14SB204	04NE14SB304	04NE14SS102	04NE14SB103
			Depth (ft):	1.4-1.6	2.0-2.2	2.0-2.2	2.0-2.2	1.6	2.0-2.2
			Sample Date:	8/30/2004	8/30/2004	8/30/2004	8/30/2004	8/30/2004	8/30/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		*Primary*	*Duplicate*	*Triplicate*		
Percent Moisture	A2540G / E160.3M	%	–	14.0	16.3	17.0	16.2	10.8	11.8
Polychlorinated Biphenyls (PCBs)			Sum of congeners:						
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.0571]	[0.0586]	[0.0608]	[0.025]	[0.0554]	[0.0562]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.0571]	[0.0586]	[0.0608]	[0.050]	[0.0554]	[0.0562]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.0571]	[0.0586]	[0.0608]	[0.025]	[0.0554]	[0.0562]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.0571]	[0.0586]	[0.0608]	[0.025]	[0.0554]	[0.0562]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.0571]	[0.0586]	[0.0608]	[0.025]	[0.0554]	[0.0562]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.0571]	[0.0586]	[0.0608]	[0.025]	[0.0554]	[0.0562]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	0.248	0.0537 J	[0.0608]	0.0114 J	0.244	0.129

KEY	**DESCRIPTION**
–	Analysis not requested or cleanup level not established
%	percent
mg/kg	milligrams per kilogram
Cleanup Level	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
0.248	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)



Legend

- ● Surface (SS) and subsurface (SB) soil sample collected by Shannon & Wilson, Inc. August/September 2004
- ^ Monitoring well installed by Shannon & Wilson, Inc. August/September 2004
- 1 Historical PCB sample location, collected by others, concentration between 1 ppm and 10 ppm
- / Historical PCB sample location, collected by others, concentration between 10 ppm and 100 ppm
- S Historical sample location, collected by others
- — Former buildings
- — Topographic Contours (Interval: 5 ft)
- — Former transformers
- — Former AST
- — Former PCB sampling grid

0 15 30 60 90 120
Feet

1 inch equals 30 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 14 - EMERGENCY POWER BUILDING

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32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-10

5.11 Site 16: Paint and Dope Storage Building

Groundwater samples from three existing monitoring wells were to be collected and analyzed at Site 16. No samples were collected however, due to insufficient water in these wells.

5.11.1 Site Description

Site 16 is located along the north edge of the Main Operations Complex, as shown on Figure 5-9. A building, fuel storage tank, miscellaneous debris, and contaminated soil were removed from the site during prior interim removal actions. Three monitoring wells with above ground monuments were present in an area capped with mixed soil types and sparse vegetation in 2004.

5.11.2 Data Collection Objectives

The Site 16 monitoring wells (MW 16-1, MW 16-2, and MW 16-3) are located in a general down-gradient direction from former Monitoring Well MW 88-7, which showed elevated levels of diesel in 2002. To characterize groundwater conditions, the three existing Site 16 monitoring wells were to be sampled and analyzed for DRO, RRO, GRO, BTEX, chromium, lead, zinc, and mercury. An assessment of the biogenic influence on DRO and RRO results was to be performed, and one sample was to be analyzed for PAHs and natural attenuation indicators.

5.11.3 Work Plan Variances

The three existing monitoring wells at Site 16 were observed to contain between 0.8 and 1.1 feet of water on September 9, and slightly less on September 12, 2004. The volume of water in the wells was found to be approximately the same as the volume of the tubing available to pump the wells. Bailing resulted in little recovery and turbid water. The insufficient water column precluded collecting samples that would be representative of the groundwater formation. The USACE Project Manager was consulted and a decision was made to not sample the wells. Groundwater levels were observed to drop across NE Cape during our field effort.

5.11.4 Field Activities

No petroleum odors or sheens were noted in the minimal volume of water recovered from the Site 16 wells. Water levels were measured in the Site 16 monitoring wells on September 13, 2004, along with the other wells in the MOC area. Table 5.11a summarizes the groundwater elevation data.

TABLE 5-11a GROUNDWATER SAMPLING LOG
SITE 16: PAINT AND DOPE STORAGE BUILDING

MONITORING WELL INSTALLATION DATA

WELL ID	MW 16-1	MW 16-2	MW 16-3
DATE WELL INSTALLED	unknown	unknown	unknown
GROUND SURFACE ELEVATION (ft)	-	-	-
WELL MP ELEVATION (ft)	75.11	74.87	75.28
TOP OF SCREENED SECTION, BELOW MP (ft)	-	-	-
TOTAL DEPTH OF WELL BELOW MP (ft)	16.7	16.65	16.61
DIAMETER OF WELL CASING (inches)	2	2	2

WATER LEVEL MEASUREMENT DATA

DATE WATER LEVEL MEASURED	9/13/2004	9/13/2004	9/13/2004
TIME WATER LEVEL MEASURED	15:55	15:58	16:01
WATER LEVEL ELEVATION (ft)	59.23	59.24	59.31
DEPTH TO WATER BELOW MP (ft)	15.88	15.63	15.97
WATER COLUMN IN WELL (ft)	0.82	1.02	0.64
GALLONS PER FOOT	0.16	0.16	0.16
GALLONS IN WELL	0.13	0.16	0.10

KEY	DESCRIPTION
-	Not developed or not measured
ft	Feet
MP	Measuring Point is Top of Well Casing

5.12 Site 22: Water Storage Building

Three soil borings (22B1, 22MW2, and 22MW3) were advanced at Site 22 and groundwater monitoring wells were installed in two of the borings. Thirteen project soil samples were collected from the borings, and groundwater was sampled from each of the new wells.

5.12.1 Site Description

This site is located on the southeastern edge of the Main Operations Complex, and sits higher on the same broad depositional feature as the MOC. The pumphouse, potable water wells, storage building and tanks were removed under previous interim removal actions. The former locations of these features are depicted in Figure 5-12. The area has been re-graded in the same manner as the MOC, and Figure 5-13 shows the position of Site 22 relative to the MOC.

5.12.2 Data Collection Objectives

A groundwater sample collected before decommissioning Potable Well PW-2 at the pumphouse contained 2.8mg/L RRO. To assess possible petroleum impacts to the ground water in the vicinity of PW-2, installation and sampling of a groundwater monitoring well was specified. A second groundwater monitoring well was specified in the vicinity of former potable water well PW-1 to assess the water quality in the fractured bedrock aquifer. One soil boring was planned to verify the depth of contamination adjacent to the former UST next to the pumphouse.

Soil samples were collected from each of the three borings for field screening and potential laboratory analysis. Five soil samples were to be selected from each boring for DRO, RRO, and GRO analysis. One of the analytical samples from each monitoring well boring was to be selected for PAHs, BTEX, and TOC testing. The five samples from the former UST soil boring were to also be analyzed for BTEX, and two samples were to be selected for PAH and TOC analyses.

Groundwater samples from both of the monitoring wells were analyzed for DRO, RRO, GRO, and natural attenuation parameters. The groundwater DRO and RRO results were assessed for biogenic versus petroleum derived compounds.

5.12.3 Work Plan Variances

Conditions found in the field led to alterations in the planned sampling activities. Subsurface rocks impacted the sampling intervals for borings at Site 22. Soil sample intervals in each boring were selected based on drill action in order to get adequate sample recovery, and varied from the specified 5-foot interval.

Partially buried concrete and rebar was encountered at the proposed location for Well 22MW2, and the boring was moved a few feet eastward. This boring was then stopped at 26.5 feet bgs due to difficult subsurface conditions. No water entered the boring in the time required to drill the next boring, and the boring was backfilled. Only three of the five soil samples specified in the WP were collected due to poor recovery. This location was renamed Boring 22B1, as shown on Figure 5-12.

Drilling moved to the original proposed location of Boring 22B1, roughly 25 feet away. After shifting the location a few feet due to concrete rubble, drilling and sample recovery was significantly better at this location. Water was encountered at 22 and 28 feet bgs, and the boring was extended to 38 feet bgs. A monitoring well was installed at this location and the location was named 22MW2 (see Figure 5-12).

The proposed location for Monitoring Well 22MW3, near PW-1 is now in the perimeter loop road, which was found to be relocated to loop around the south side of Site 22. Well 22MW3 was placed to the north-northeast of the proposed location, closer to PW-1. One soil sample was collected from 22MW3 for grainsize analysis to compensate for the deficit of grainsize samples from material representing the aquifer beneath the MOC. This grainsize sample is recorded on Table 5-9b (See Section 5.9.3).

5.12.4 Field Investigation

Field activities occurred at Site 22 between August 27 to September 11, 2004. A summary of samples collected, including sample locations and classifications, is presented in Table 5-12a. Boring and Monitoring Well Completion logs are provided in Appendix B.

5.12.4.1 Boring 22B1

Three samples were recovered from Boring 22B1. Samples 22SB106 and 22SB107 were collected from 6 and 13 feet bgs, respectively. The split spoon for Sample 22SB108 was driven from 17 to 18 feet where it met refusal, but an adequate amount of soil was recovered for an analytical sample. The drill cuttings appeared to consist of only freshly fractured rock chips from 18 to 25 feet bgs, and drill action suggested rock. A split spoon was driven at 25 feet to determine if the material was frozen soil. The split spoon did advance for the length of the spoon, suggesting frozen soil, but only 6 inches of damp rock chips were recovered. The boring was not advanced beyond 26.5 feet.

5.12.4.2 Monitoring Well 22MW2

Five analytical soil samples were recovered at the new location for well 22MW2. Sample 22SB109 was collected from petroleum-stained soil that was encountered at roughly 6 to 8 feet bgs. Samples 22SB110 and 22SB111 were collected in unsaturated media typical of the

MOC area. A low-yield water bearing zone was encountered at about 22 to 23 feet bgs, and split spoons were driven from 22 to 23.5 and 23.5 to 25 feet bgs. The two split spoons were combined to obtain sufficient soil volume for a QC/QA replicate set (Samples 22SB112, 22SB212, and 22SB312). A high-yield water bearing zone was encountered at about 28 feet bgs, and Sample 22SB113 was collected at 31 to 32.5 feet bgs. Frozen ground was suspected around 30 feet bgs and confirmed at 35 feet bgs.

5.12.4.3 Monitoring Well 22MW3

Samples were collected from five locations in the Monitoring Well 22MW3 boring. Samples 22SB101, 102, and 103 were collected in the unsaturated zone at depths around 6, 13, and 18 feet bgs, respectively. Frozen ground was suspected after driving the split spoon for Sample 22SB104 past 28 feet bgs. Two attempts were made to reduce the heat input from drilling and reduce the split spoon recovery time in order to obtain a sample of coarse granular material that remained frozen. The first attempt failed. After the drill passed a large rock, a split spoon driven from 38 to 39.5 feet recovered frozen, silty, sandy gravel, with parts of a fractured cobble (Sample 22SB105 22SB205, and 22SB305). The drill bit was advanced to 40.5 feet bgs to remove disturbance from the previous sample, and a split spoon was driven and recovered quickly to confirm frozen granular soil to 42 feet bgs.

5.12.4.4 IDW

IDW generated at Site 22, including headspace samples, soil cuttings, headspace bags, sampling gloves, groundwater sampling tubing, monitoring well purge water, and equipment decontamination water was handled as discussed in Section 3.5.

5.12.4.5 Field Observations

The SOW states that “Well #1 (PW-1) encountered overburden to a depth of 39 feet and bedrock granite or granodiorite below this depth.” Rocky overburden was observed for the full 42 foot depth of the well 22MW3 borehole. The gray silt typical of basal till from a glacier was encountered at 40 feet bgs in Boring 13B1 (See Section 5.9 and Appendix B), which has a surface elevation about 25 feet lower than Monitoring Well 22MW3. Gray silt was not encountered at depth in well 22MW3, suggesting that the boring had not fully penetrated the moraine, and that bedrock is significantly deeper than 42 feet bgs. We suspect that frozen layers of rocky soil have been interpreted as bedrock in the past.

5.12.5 Analytical Results

Table 5-12b summarizes the Site 22 soil sample analytical results, Table 5-12c summarizes the monitoring well developing and sampling data, and Table 5-12d summarizes the Site 22 water sample analytical results. None of the thirteen soil samples or two groundwater samples collected from Site 22 contained analyte concentrations that exceed cleanup levels. Although benzene was not detected, the PQL for benzene in QA replicate Sample 22SB312 was above the cleanup criterion. The PQLs for the associated project and QC samples are less than the cleanup criterion.

TABLE 5-12a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 22: WATER STORAGE BUILDING

Sample Number**	LOCID	Date	Sample Location (See Figure 5-12 for borehole and well location	Depth (feet)	Screening (ppm) ^	Sample Classification†
Soil Samples						
* 22SB106	22B1-6	8/28/04	Boring 22B1	6-7.5	0.3	Light brown, gravelly SAND and cobbles; dry to moist
* 22SB107	22B1-13	8/28/04	Boring 22B1	12.3-14	0.3	Brown to gray, sandy GRAVEL; dry to moist
* 22SB108	22B1-17	8/28/04	Boring 22B1	17-18	0.5	Gray, sandy GRAVEL; dry - cuttings?
B1S4	22B1-25	8/28/04	Boring 22B1 - bottom of borehole	25-26.7	0.2	Granitic rock cuttings
* 22SB109	22MW2-6	8/28/04	Monitoring Well 22MW2	6-7.5	3.0	Brown to gray, gravelly SAND; moist; with cobbles, slight fuel odo
* 22SB110	22MW2-	8/28/04	Monitoring Well 22MW2	13-14.5	0.8	Brown to gray, silty, sandy GRAVEL and cobbles; moist
* 22SB111	22MW2-	8/28/04	Monitoring Well 22MW2	17-18.5	0.7	Brown, gravelly SAND; moist
* 22SB112	22MW2-22	8/28/04	Monitoring Well 22MW2 - Two sample intervals combined	22-25	1.0	Brown, slightly silty, sandy GRAVEL and cobbles; moist
* 22SB212	22MW2-	8/28/04	QC replicate of Sample 22SB112	22-25	1.0	Brown, slightly silty, sandy GRAVEL and cobbles; moist
* 22SB312	22MW2-	8/28/04	QA replicate of Sample 22SB112	22-25	1.0	Brown, slightly silty, sandy GRAVEL and cobbles; moist
* 22SB113	22MW2-	8/28/04	Monitoring Well 22MW2 - bottom of borehole	31-32.5	0.2	Brown, slightly silty, sandy GRAVEL and cobbles; wet
* 22SB101	22MW3-6	8/27/04	Monitoring Well 22MW3	5.5-7	0.5	Brown, silty, sandy GRAVEL and cobbles; moist - grainsize
* 22SB102	22MW3-	8/27/04	Monitoring Well 22MW3	12.5-14	<0.2	Grayish brown, sandy, gravelly SILT and cobbles; moist
* 22SB103	22MW3-	8/27/04	Monitoring Well 22MW3	17-18.5	1.0	Redish brown sandy, silty GRAVEL and cobbles; moist
MW3S4	22MW3-	8/27/04	Monitoring Well 22MW3	22-23.5	0.2	Redish brown sandy, silty GRAVEL and cobbles; moist
* 22SB104	22MW3-	8/27/04	Monitoring Well 22MW3	27-28.5	<0.2	Brown, silty, sandy GRAVEL and cobbles; moist
MW3S6	22MW3-	8/27/04	Monitoring Well 22MW3	33-34.5	0.4	Brown, silty, sandy GRAVEL and cobbles; moist - potentially froz
* 22SB105	22MW3-	8/27/04	Monitoring Well 22MW3	38-39.5	<0.2	Brown, silty, sandy GRAVEL and cobbles; frozen
* 22SB205	22MW3-	8/27/04	QC replicate of Sample 22SB105	38-39.5	<0.2	Brown, silty, sandy GRAVEL and cobbles; frozen
* 22SB305	22MW3-	8/27/04	QA replicate of Sample 22SB105	38-39.5	<0.2	Brown, silty, sandy GRAVEL and cobbles; frozen
Groundwater Samples						
* 22GW115	22MW2	9/11/04	Monitoring Well 22MW2	WL	-	Groundwater - clear
* 22GW114	22MW3	9/11/04	Monitoring Well 22MW3	WL	-	Groundwater - slight turbidity

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Tables 5-12b and 5-12d)
**	The full sample number is preceded by "04NE", for example 22SB106 is sample 04NE22SB106
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
WL	Approximate static water level in feet below ground surface
LOCID	Location Identification: "22B1-6" signifies Site 22, Boring 1 at 6-foot depth (depth is rounded to the nearest foot)

TABLE 5-12b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 22: WATER STORAGE BUILDING

Site 22 - Water Storage Building **Soil Matrix**			Sample Type:	**BOREHOLE 22MW2**							**BOREHOLE 22MW3**			
			Location ID:	22MW2-6	22MW2-13	22MW2-17	22MW2-22			22MW2-31	22MW3-6	22MW3-13	22MW3-17	22MW3-27
			Sample ID:	04NE22SB109	04NE22SB110	04NE22SB111	04NE22SB112	04NE22SB212	04NE22SB312	04NE22SB113	04NE22SB101	04NE22SB102 *	04NE22SB103	04NE22SB104
			Depth (ft):	6-7.5	13-14.5	17-18.5	22-25	22-25	22-25	31-32.5	5.5-7	12.5-14	17-18.5	27-28.5
			Sample Date:	8/28/2004	8/28/2004	8/28/2004	8/28/2004	8/28/2004	8/28/2004	8/28/2004	8/27/2004	8/27/2004	8/27/2004	8/27/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**				*Primary*	*Duplicate*	*Triplicate*					
PID Headspace Reading	HNU HW101 PID	ppm	-	3.0	0.8	0.7	1.0	1.0	1.0	0.2	0.5	<0.2	1.0	<0.2
Percent Moisture	A2540G / E160.3M	%	-	3.6	3.4	5.1	7.9	6.9	5.3	12.5	7.3	11.2	8.5	9.6
Gasoline Range Organics (GRO)	AK101	mg/kg	300	2.7	0.957 J	0.651 J	0.841 J	0.727 J	0.517 J	0.685 J	[3.14] B	[2.84] B	[2.53] B	[2.45] B
Diesel Range Organics (DRO)	AK102	mg/kg	250	68.1	20.2 J	11.8 J	19.7 J	17.4 J	7.32	30.0 J	6.20 J	5.43 J	8.02 J	19.8 J
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	19.4 J	44.7	26.3	37.3	35.7	23.1	65.7	13.4 J	14.2 J	10.7 J	29.5
Aromatic Organic Compounds (BTEX)														
Benzene	SW8260B	µg/kg	20	[13.1]	-	-	[12.1]	[11.1]	**[100]**	-	-	[14.8]	-	-
Ethylbenzene	SW8260B	µg/kg	5,500	[25.2]	-	-	[23.2]	[21.3]	[100]	-	-	[28.4]	-	-
Toluene	SW8260B	µg/kg	5,400	[50.5]	-	-	[46.5]	[42.5]	[100]	-	-	[56.8]	-	-
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[25.2]	-	-	[23.2]	[21.3]	[100]	-	-	[28.4]	-	-
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[50.5]	-	-	[46.5]	[42.5]	[200]	-	-	[56.8]	-	-
Polynuclear Aromatic Hydrocarbons (PAH)														
Acenaphthene	PAH SIM	µg/kg	210,000	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Acenaphthylene	PAH SIM	µg/kg	210,000	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Anthracene	PAH SIM	µg/kg	4,300,000	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	[5.3]	-	-	[5.44]	[5.44]	2.1 J	-	-	[5.76]	-	-
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Chrysene	PAH SIM	µg/kg	620,000	3.83 J	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Fluoranthene	PAH SIM	µg/kg	2,100,000	4.21 J	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Fluorene	PAH SIM	µg/kg	270,000	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	[5.3]	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Naphthalene	PAH SIM	µg/kg	21,000	5.45 J	-	-	24.5 J	[5.44]	[10]	-	-	10.7 J	-	-
Phenanthrene	PAH SIM	µg/kg	4,300,000	7.93	-	-	[5.44]	[5.44]	[10]	-	-	[5.76]	-	-
Pyrene	PAH SIM	µg/kg	1,500,000	7.77	-	-	1.71 J	2.08 J	[10]	-	-	[5.76]	-	-
Total Organic Carbon (TOC)	SGS SOP	mg/kg	-	847	-	-	-	-	-	-	-	1,230	-	-

KEY	**DESCRIPTION**
-	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-12b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 22: WATER STORAGE BUILDING

Site 22 - Water Storage Building
Soil Matrix

			Sample Type:	BOREHOLE 22MW3			BOREHOLE BORING 22B1		
			Location ID:	22MW3-38			22B1-6	22B1-13	22B1-17
			Sample ID:	04NE22SB105	04NE22SB205	04NE22SB305	04NE22SB106	04NE22SB107	04NE22SB108
			Depth (ft):	38-39.5	38-39.5	38-39.5	6-7.5	12.5-14	17-18
			Sample Date:	8/27/2004	8/27/2004	8/27/2004	8/28/2004	8/28/2004	8/28/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**	*Primary*	*Duplicate*	*Triplicate*			
PID Headspace Reading	HNU HW101 PID	ppm	-	<0.2	<0.2	<0.2	0.3	0.3	0.5
Percent Moisture	A2540G / E160.3M	%	-	14.3	13.0	12.7	3.1	3.5	3.9
Gasoline Range Organics (GRO)	AK101	mg/kg	300	[2.30] B	[1.90]	0.365 J	1.33 J	1.56 J	1.27 J
Diesel Range Organics (DRO)	AK102	mg/kg	250	27 J	47.1 J	7.29	35 J	11.4 J	22
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	36.7 J	75.9	14.4 J	56.6 J	24.2	42.7
Aromatic Organic Compounds (BTEX)									
Benzene	SW8260B	µg/kg	20	-	-	-	[10.1]	[14.7]	[10.6]
Ethylbenzene	SW8260B	µg/kg	5,500	-	-	-	[19.5]	[28.3]	[20.3]
Toluene	SW8260B	µg/kg	5,400	-	-	-	[38.9]	[56.6]	[40.7]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	-	-	-	[19.5]	[28.3]	[20.3]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	-	-	-	[38.9]	[56.6]	[40.7]
Polynuclear Aromatic Hydrocarbons (PAH)									
Acenaphthene	PAH SIM	µg/kg	210,000	-	-	-	-	[5.27]	-
Acenaphthylene	PAH SIM	µg/kg	210,000	-	-	-	-	[5.27]	-
Anthracene	PAH SIM	µg/kg	4,300,000	-	-	-	-	[5.27]	-
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	-	-	-	-	[5.27]	-
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	-	-	-	-	[5.27]	-
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	-	-	-	-	[5.27]	-
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	-	-	-	-	[5.27]	-
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	-	-	-	-	[5.27]	-
Chrysene	PAH SIM	µg/kg	620,000	-	-	-	-	[5.27]	-
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	-	-	-	-	[5.27]	-
Fluoranthene	PAH SIM	µg/kg	2,100,000	-	-	-	-	[5.27]	-
Fluorene	PAH SIM	µg/kg	270,000	-	-	-	-	[5.27]	-
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	-	-	-	-	[5.27]	-
Naphthalene	PAH SIM	µg/kg	21,000	-	-	-	-	14.3 J	-
Phenanthrene	PAH SIM	µg/kg	4,300,000	-	-	-	-	[5.27]	-
Pyrene	PAH SIM	µg/kg	1,500,000	-	-	-	-	[5.27]	-
Total Organic Carbon (TOC)	SGS SOP	mg/kg	-	-	-	-	-	[523]	-

KEY	DESCRIPTION
-	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram (ppm)
µg/kg	micrograms per kilogram (ppb)
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-12c GROUNDWATER SAMPLING LOG
SITE 22: WATER STORAGE BUILDING

MONITORING WELL INSTALLATION DATA

WELL ID	**22MW2**	**22MW3**
DATE WELL INSTALLED	8/29/04	8/27/04
GROUND SURFACE ELEVATION (ft)	94.03	99.55
WELL MP ELEVATION (ft)	93.77	99.31
TOP OF SCREENED SECTION, BELOW MP (ft)	24.77	28.30
TOTAL DEPTH OF WELL BELOW MP (ft)	34.57	38.00
DIAMETER OF WELL CASING (inches)	2	2

DEVELOPMENT DATA

DATE OF DEVELOPMENT	9/11/04	9/11/04
TIME DEVELOPMENT INITIATED	17:45	13:40
TIME DEVELOPMENT COMPLETED	18:25	16:30
DEPTH TO WATER BELOW MP (ft)	27.87	32.40
WATER COLUMN IN WELL (ft)	6.70	5.60
GALLONS PER FOOT	0.16	0.16
GALLONS IN WELL	1.07	0.90
DEVELOPMENT METHOD	Purging Pump	Redi-Flo-2
VOLUME WATER REMOVED (gallons)	25	80

PURGING & SAMPLING DATA

LOCID	22MW2	22MW3
SAMPLE ID	04NE22GW115	04NE22GW114
DATE	9/11/04	9/11/04
TIME PURGING INITIATED	18:25	16:31
TIME SAMPLING INITIATED	18:45	17:05
DEPTH TO WATER BELOW MP (ft)	27.87	32.40
WATER COLUMN IN WELL (ft)	6.70	5.60
GALLONS IN WELL	1.07	0.90
PURGING METHOD	Redi-Flo 2	Redi-Flo 2
VOLUME WATER REMOVED (gallons)	3.0	4.50

WATER QUALITY DATA - YSI 556

DATE MEASURED	9/11/04	9/11/04
TIME MEASURED	18:40	17:11
TEMPERATURE (^{o}C)	5.2	7.5
SPECIFIC CONDUCTANCE (mS/cm)	0.08	0.09
DISSOLVED OXYGEN (mg/L)	12.6*	10.8*
pH (Standard Units)	5.8	5.5
OXYGEN REDUCTION POTENTIAL (mV)	211	187
TURBIDITY (NTUs) - Oakton	1.1	17.1
ALKALINITY (mg/L) - Hach phenolpthalein titration	5	5 - 10
FERROUS IRON (mg/L) - Hach colorimeter	0.03	0.00

WATER LEVEL MEASUREMENT DATA

DATE WATER LEVEL MEASURED	9/13/04	9/13/04
TIME WATER LEVEL MEASURED	14:20	14:10
DEPTH TO WATER BELOW MP (ft)	28.26	32.68
WATER LEVEL ELEVATION (ft)	65.51	66.63

* unusually high DO readings may be due to instrument malfunctic

KEY	**DESCRIPTION**
-	Not developed or not measured
^{o}C	Degrees Celsius
ft	Feet
mg/L	Milligrams per liter
MP	Measuring Point is Top of Well Casing
mV	Millivolts
NTUs	Nephelometric Turbidity Units
mS/cm	Millisiemens per centimeter

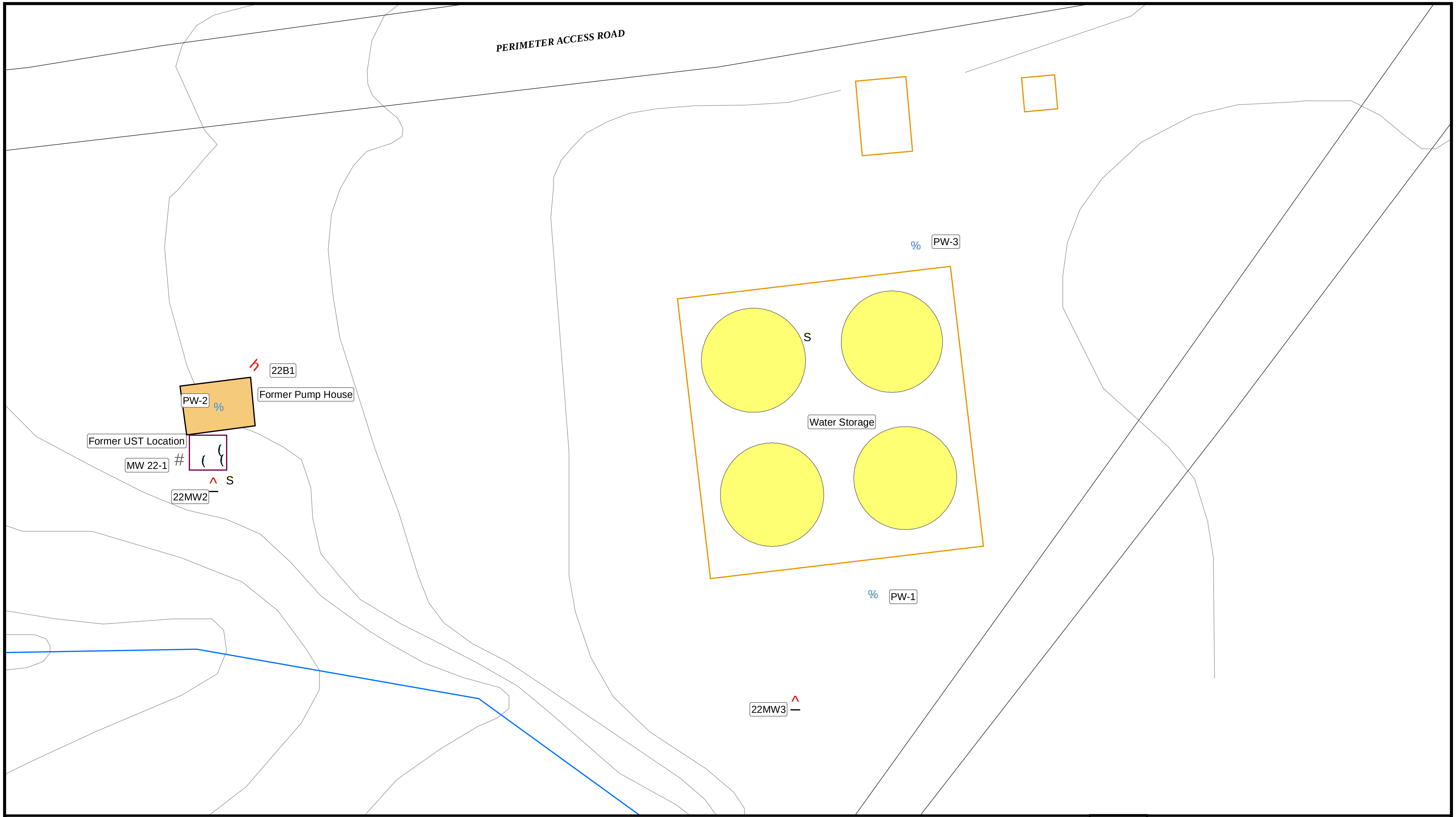
TABLE 5-12d SUMMARY OF WATER ANALYTICAL RESULTS - SITE 22: WATER STORAGE BUILDING

Site 22 - Water Storage Building

Water Matrix

			Sample Type:	GROUNDWATER	
			Location ID:	22MW2	22MW3
			Sample ID:	04NE22GW115	04NE22GW114
			Depth (ft):	28.5	32.5
			Sample Date:	9/11/2004	9/11/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	[0.090]	0.0133 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	[0.333] B	[0.341] B
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	^
Residual Range Organics (RRO)	AK103	mg/L	1.1	[0.556] B	[0.568] B
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	^
Natural Attenuation Parameters					
Nitrogen, Nitrate-Nitrite	E300.0	mg/L	–	0.263	0.243
Sulfate	E300.0	mg/L	–	11.2	11.9
Iron	SW6010B	mg/L	–	[0.2]	4.69

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
^	Tentatively identified compounds not reviewed due to low concentration
mg/L	milligrams per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
WL	Approximate depth to water below ground surface



Legend

- ^ Monitoring well installed by Shannon & Wilson, Inc. August/September 2004
- ϧ Boring advanced by Shannon & Wilson, Inc. August/September 2004
- # Former monitoring well, installed by others
- % Former potable water well, installed by others
- (Historical soil sample from the UST excavation, collected by others
- S Historical sample location, collected by others
- — Former building
- — Topographic Contours (Interval: 5 ft)
- 🟧 Former pump house
- 🟨 Former water storage tanks

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data. Figure based on previous work. Physical features may not correspond to 2004 field observations.

0 10 20 40 60 80 Feet

1 inch equals 20 feet

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 22 - WATER STORAGE BUILDING

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Fig. 5-12

5.13 Site 26: Former Construction Camp

Groundwater samples were collected from two new monitoring wells (26MW1 and 26MW3) installed at Site 26. A third monitoring well (26MW2) was partially drilled but could not be completed as planned (see Figure 5-13 and Table 5-13a). One soil sample for material testing was collected from 26MW2 at 20 feet bgs.

5.13.1 Site Description

Site 26 encompasses two geographically distinct areas: the original Morrison-Knudson construction camp, and a location along the road northeast of the Main Operations Complex, but south of the Suqitughneq River, as shown in Figure 5-13. The former construction camp location is uphill and southeast of the MOC on the same topographic feature. The area appears to have been used to store material from previous removal actions because there are supersacks with soil, an abandoned vehicle, large diesel-powered generators, and dismantled steel tank pieces in the area. The northern location along the road is a relatively dry rise west of the road to the main complex, and south of the Mid-Suqi. River bridge. The ground surface had evidence of frost segregation similar to the vicinity of Site 6.

5.13.2 Data Collection Objectives

The upper well (Monitoring Well 26MW1) was installed as a replacement for former potable water well PW-4 to allow for a monitoring well upgradient of the MOC. The northern wells near the Mid-Suqi. Bridge were to be installed to determine if shallow groundwater in the overburden has hydraulic connectivity to the fractured bedrock aquifer presumed to be present beneath the MOC.

5.13.3 Work Plan Variances

Conditions found in the field led to alterations in the planned sampling activities. Specifically, the location of Monitoring Well 26MW1 was adjusted due to surface obstructions, and the deeper well near the Mid-Suqi. River Bridge was not completed because the resources and technology were not available to seal a conductor casing to the heterogeneous frozen material encountered.

The proposed Monitoring Well 26MW1 location was on the side of an embankment, and the nearest flat location for the drill rig had three partially full supersacks on it. A location with adequate drill rig access was selected to the southwest, closer to former PW-4. Based on the difference in surface elevations between PW-4 and 26MW1, the depth of the new well was adjusted in an attempt to complete the well in the same water bearing zone as the former well.

The boring for the deep well near the Mid-Suqi Bridge (26MW2) was attempted, but drilling stopped when frozen silt was encountered at a depth of about 20 feet bgs. The boring was backfilled with cuttings. Though not in the work plan, a sample of the frozen silt from 20 feet bgs was collected and submitted for grainsize, moisture content, and liquid and plastic limits analysis. The results of these tests are presented in Appendix B and Table 5-13b.

5.13.4 Field Investigation

Field activities occurred at Site 26 between August 25 and September 12, 2004. A summary of samples collected, including a description of sample location and classification, is presented in Table 5-13a. Boring and Monitoring Well Completion logs are provided in Appendix B.

5.13.4.1 Monitoring Well 26MW1

Monitoring Well 26MW1 was installed to a depth of 42 feet bgs. It was developed as described in Section 3, and one water sample was collected for DRO, RRO, GRO, BTEX, PAHs, and natural attenuation parameter analysis. Soil samples were not collected during the installation of this monitoring well.

5.13.4.2 Monitoring Well 26MW3

Shallow groundwater monitoring well 26MW3 was drilled to explore the nature of the subsurface materials and potential confining layer(s) before the deep 26MW2 well was attempted. After development, one water sample was collected from the well and analyzed for DRO, RRO, GRO, BTEX and PAHs on a rush 3-day turnaround time basis. Natural attenuation parameters were analyzed on the normal laboratory schedule.

5.13.4.3 Monitoring Well 26MW2

The deep well location (26MW2) was selected 78 feet from the shallow well to avoid problems with compressed air short-circuiting to the shallow well. Drilling was stopped at 20 feet bgs, and a sample was collected from 20 to 21.5 feet. A well was not installed. The sample of the frozen silt from 20 feet bgs was collected for optional material testing of grainsize, moisture content, and liquid and plastic limits. The boring was backfilled with cuttings.

5.13.4.4 IDW

IDW generated at Site 26 was handled as discussed in Section 3.7.

5.13.4.5 Field Observations

During the boring for Monitoring Well 26MW1, drill action and cuttings suggested groundwater, sand, and then frozen ground at the 35 to 36 feet bgs intervals. From 37.5 to 42 feet, drill action suggested rock, but bedrock is not suspected because similar drill action and cuttings were encountered between 22 and 28 feet bgs.

The subsurface material at shallow well 26MW3 was sandy gravel in cobbles with an iron-brown color and very few fines. Gray silt, suggesting glacial till, was encountered at 22 feet bgs and the drill action suggested harder material. The air hammer would stop operation because the compressed air couldn't exhaust through the sticky silt. With a sufficient pause in drilling, the silt would become wet enough to be blown out of the hole. In retrospect, the unusual drill action occurred because the silt was frozen, and was thawing in the casing.

The soil had greater silt and gravel content and fewer cobbles at the deep well (26MW2) location, suggesting the up-welling portion of a frost pattern cell. At 10 feet bgs, the silt in the coarse soil became gray. Pieces of clear water ice were observed coming up the casing with the cuttings at 18 to 19 feet bgs, and a split spoon was driven to 21.5 feet. The split spoon contained solidly frozen, gray clayey silt with lenses of gravel/fractured rock. The silt began to flow from the split spoon as it thawed.

5.13.5 Analytical Results

Table 5-13c presents the Site 26 monitoring well development and sampling data, and Table 5-12d summarizes the water sample analytical results. GRO, DRO, and RRO were detected at estimated concentrations below the PQLs in the groundwater samples from the two Site 26 wells. All PQLs were less than the ADEC groundwater cleanup criteria, typically by more than an order of magnitude.

The grain size distribution, liquid limit (LL), plastic limit (PL), and moisture content for soil sample 26SB103 are presented in Appendix B Figure B-23. The liquid limit was 26%, while the analyzed moisture content was 24.5%. However, the moisture sample sat for over 1 month before analysis was approved. Since the sample likely lost moisture while awaiting analysis, these results suggest that in-situ material may deform or flow if thawed. The ratio of clay versus silt in sample 26SB103 did not provide insight into the deposition of the glacial till.

TABLE 5-13a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 26: FORMER CONSTRUCTION CAMP

Sample Number**	LOCID	Date	Sample Location (See Figure 5-13)	Depth (feet)	Sample Classification†
Soil Samples					
26SB103	26MW2-20	9/2/04	Proposed deep Well, SW of Mid-Suqi. Bridge	19-20.5	Gray, clayey SILT; frozen - with fractured rock inclusions
Groundwater Samples					
* 26GW101	26MW3	8/25/04	"Shallow" well 26MW3, SW of Mid-Suqi. Bridge	WL 5.5	Groundwater - clear
* 26GW102	26MW1	9/12/04	Well 26MW1, near former PW04	WL 37	Groundwater - clear
* 26GW202	26MW1	9/12/04	QC replicate of Sample 26GW102	WL 37	Groundwater - clear
* 26GW302	26MW1	9/12/04	QA replicate of Sample 26GW102	WL 37	Groundwater - clear

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-13b)
**	The full sample number is preceded by "04NE", for example 26SB103 is sample 04NE26SB103
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
WL	Approximate static water level in feet below ground surface after installation
LOCID	Location Identification: "26MW2-20" signifies Site 26, Monitoring Well 2 at 20-foot depth (depth is rounded to the nearest foot)

TABLE 5-13b SUMMARY OF SOIL TESTING RESULTS
SITE 26: FORMER CONSTRUCTION CAMP

Site 26 - Former Construction Camp Soil Material Testing		Sample Type: Location ID: Sample ID: Depth (ft): Sample Date:	BOREHOLE 26MW2-20 04NE26SB103 20 9/2/2004
Parameter Tested	**Test Method**	**Units**	
Moisture Content	ASTM D2216	%	24.5
Sieve Analysis	ASTM D422 or C136	**	See Figure B-23
Hydrometer Analysis	ASTM D422	**	See Figure B-23
Plastic Limit	ASTM D4318	% Moisture	26.0
Liquid Limit	ASTM D4318	% Moisture	20.0
Soil Classification	USCS		CL-ML

KEY	DESCRIPTION
%	percent dry weight
**	Sieve and Hydrometer Analysis Reports are provided in Appendix B
CL-ML	Low Plasticity Silty Clay

TABLE 5-13c GROUNDWATER SAMPLING LOG
SITE 26: FORMER CONSTRUCTION CAMP

MONITORING WELL INSTALLATION DATA

WELL ID	**26MW1**	**26MW3**
DATE WELL INSTALLED	8/30/04	8/22/04
GROUND SURFACE ELEVATION (ft)	107.62 (est.)	56.89
WELL MP ELEVATION (ft)	107.37	56.49
TOP OF SCREENED SECTION, BELOW MP (ft)	32.1	9.4
TOTAL DEPTH OF WELL BELOW MP (ft)	41.9	24.22
DIAMETER OF WELL CASING (inches)	2	2

DEVELOPMENT DATA

DATE OF DEVELOPMENT	9/12/04	8/25/04
TIME DEVELOPMENT INITIATED	16:43	14:23
TIME DEVELOPMENT COMPLETED	17:25	15:00
DEPTH TO WATER BELOW MP (ft)	36.74	5.06
WATER COLUMN IN WELL (ft)	5.16	19.16
GALLONS PER FOOT	0.16	0.16
GALLONS IN WELL	0.83	3.07
DEVELOPMENT METHOD	Redi-Flo-2	Redi-Flo-2
VOLUME WATER REMOVED (gallons)	85	40

PURGING & SAMPLING DATA

LOCID	26MW1	26MW3
SAMPLE ID	04NE26GW102	04NE26GW101
DATE	9/12/04	8/25/04
TIME PURGING INITIATED	17:53	15:00
TIME SAMPLING INITIATED	18:05	15:38
DEPTH TO WATER BELOW MP (ft)	36.74	5.07
WATER COLUMN IN WELL (ft)	5.16	19.15
GALLONS IN WELL	0.83	3.06
PURGING METHOD	Redi-Flo 2	Redi-Flo 2
VOLUME WATER REMOVED (gallons)	4.00	8.0

WATER QUALITY DATA - YSI 556

DATE MEASURED	9/12/04	8/25/04
TIME MEASURED	18:30	16:14
TEMPERATURE (^{o}C)	5.3	3.5
SPECIFIC CONDUCTANCE (mS/cm)	0.06	0.18
DISSOLVED OXYGEN (mg/L)	12.2*	1.7
pH (Standard Units)	5.4	6.6
OXYGEN REDUCTION POTENTIAL (mV)	276	77.8
TURBIDITY (NTUs) - Oakton	3.9	11.3
ALKALINITY (mg/L) - Hach phenolpthalein titration	5 - 10	55 (Methyl orange)
FERROUS IRON (mg/L) - Hach colorimeter	0.01	0.48

WATER LEVEL MEASUREMENT DATA

DATE WATER LEVEL MEASURED	9/13/04	9/13/04
TIME WATER LEVEL MEASURED	14:05	12:45
DEPTH TO WATER BELOW MP (ft)	36.84	5.32
WATER LEVEL ELEVATION (ft)	70.53	51.17

* unusually high DO readings may be due to instrument malfunctic

KEY	**DESCRIPTION**
-	Not developed or not measured
^{o}C	Degrees Celsius
ft	Feet
mg/L	Milligrams per liter
MP	Measuring Point is Top of Well Casing
mV	Millivolts
NTUs	NephOlometric Turbidity Units
mS/cm	Millisiemens per centimeter

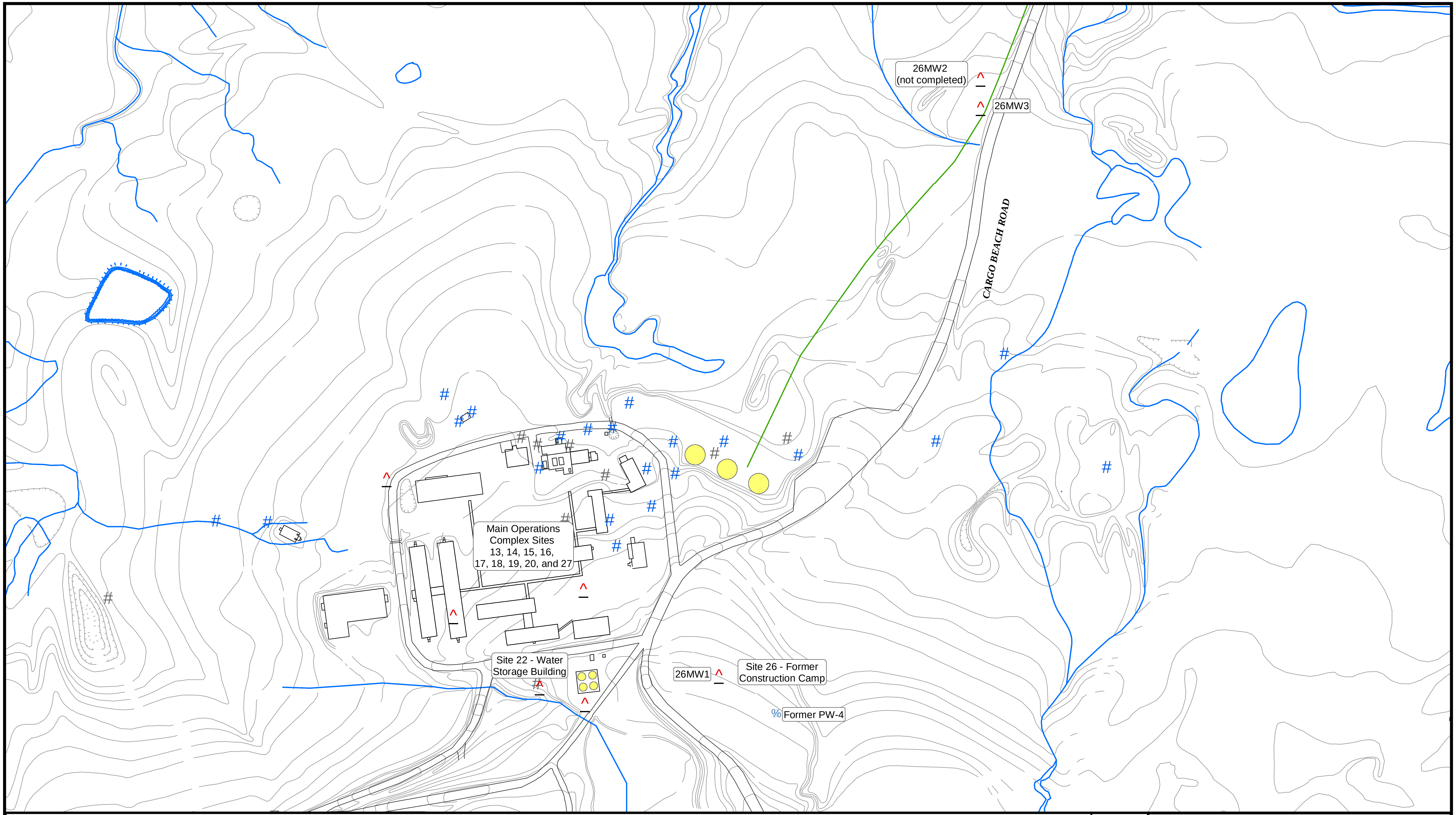
TABLE 5-13d SUMMARY OF WATER ANALYTICAL RESULTS - SITE 26: FORMER CONSTRUCTION CAMP

Site 26 - Former Construction Camp

Water Matrix

			Sample Type:	GROUNDWATER			
			Location ID:	26MW1			26MW3
			Sample ID:	04NE26GW102	04NE26GW202	04NE26GW302	04NE26GW101
			Depth (ft):	37	37	37	5.5
			Sample Date:	9/12/2004	9/12/2004	9/12/2004	8/25/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**	*Primary*	*Duplicate*	*Triplicate*	
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	0.0166 J	–	–	0.0135 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	0.078 J	–	–	0.0812 J
Residual Range Organics (RRO)	AK103	mg/L	1.1	0.249 J	–	–	0.0911 J
Aromatic Organic Compounds (BTEX)							
Benzene	SW8260B	µg/L	5	[0.4]	–	–	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	–	–	[1]
Toluene	SW8260B	µg/L	1,000	[1]	–	–	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	–	–	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	–	–	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)							
Acenaphthene	PAH SIM	µg/L	2,200	[0.0562]	[0.0543]	[0.111]	[0.0543]
Acenaphthylene	PAH SIM	µg/L	2,200	[0.0562]	[0.0543]	[0.111]	[0.0543]
Anthracene	PAH SIM	µg/L	11,000	[0.0562]	[0.0543]	[0.111]	[0.0543]
Benzo(a)anthracene	PAH SIM	µg/L	1	[0.0562]	[0.0543]	[0.0111]	[0.0543]
Benzo(a)pyrene	PAH SIM	µg/L	0.2	[0.0562]	[0.0543]	[0.0111]	[0.0543]
Benzo(b)fluoranthene	PAH SIM	µg/L	1	[0.0562]	[0.0543]	[0.0111]	[0.0543]
Benzo(g,h,i)perylene	PAH SIM	µg/L	1,100	[0.0562]	[0.0543]	[0.111]	[0.0543]
Benzo(k)fluoranthene	PAH SIM	µg/L	10	[0.0562]	[0.0543]	[0.0111]	[0.0543]
Chrysene	PAH SIM	µg/L	100	[0.0562]	[0.0543]	[0.0111]	[0.0543]
Dibenzo(a,h)anthracene	PAH SIM	µg/L	0.1	[0.0562]	[0.0543]	[0.0111]	[0.0543]
Fluoranthene	PAH SIM	µg/L	1,460	[0.112]	[0.109]	[0.111]	[0.109]
Fluorene	PAH SIM	µg/L	1,460	[0.0562]	[0.0543]	[0.111]	[0.0543]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/L	1	[0.0562]	[0.0543]	[0.0111]	[0.0543]
Naphthalene	PAH SIM	µg/L	700	[0.0562]	[0.0543]	[0.111]	0.153 B
Phenanthrene	PAH SIM	µg/L	11,000	[0.112]	[0.109]	0.0263 J	[0.109]
Pyrene	PAH SIM	µg/L	1,100	[0.0562]	[0.0543]	[0.111]	[0.0543]
Natural Attenuation Parameters							
Nitrate	E300.0	mg/L	–	–	–	–	[0.1]
Nitrogen, Nitrate-Nitrite	E300.0	mg/L	–	0.203	–	–	
Sulfate	E300.0	mg/L	–	7.64	–	–	9.58
Iron	SW6010B	mg/L	–	[0.2]	–	–	1.63

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
J	Estimated concentration; refer to Appendix C for data qualification information
0.153 B	Analyte concentration biased due to detection in method, trip, or equipment blank
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
WL	Approximate depth to water below ground surface



Legend

^	Monitoring well installed by Shannon & Wilson, Inc. August/September 2004
#	Existing monitoring well, installed by others
#	Former monitoring well installed by others
%	Former potable water well, installed by others
—	Former fuel pipeline
—	Water feature
—	Topographic Contours (Interval: 5 ft)
🟨	Former tank

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data. Figure based on previous work. Physical features may not correspond to 2004 field observations.

1 inch equals 250 feet

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 26 - FORMER CONSTRUCTION CAMP

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32-1-16821

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Fig. 5-13

5.14 Site 29: Suqitughneq River and Estuary

Surface water samples were collected from three locations (29SW101, 29SW102, and 29SW103) along the Suqi. River, and sediment samples were collected from six (29SD104 through 29SD109) locations in the Suqi. Estuary (see Figure 5-14).

5.14.1 Site Description

The Suqi. River flows from the Kinipaghulghat Mountains in an arc trending north through the tundra to a lagoon/estuary located east of the airstrip, where it drains into the Bering Sea, as shown in Figure 2-3. It receives flow from an East Tributary and a West Tributary. Both of these tributaries may receive flow from the NE Cape complex. The Drainage Basin (Site 28) flows into the East Tributary, and the southern branch of the East Tributary flows past the White Alice site (Site 31). The lagoon/estuary at mouth of the Suqi. River is separated from the Bering Sea by a sand berm that forms at the beach and occasionally breeches.

5.14.2 Data Collection Objectives

Surface water and sediment samples were collected to gather additional data regarding the possible migration of pesticides, fuels, and PCBs from the Northeast Cape Complex to the estuary.

5.14.3 Work Plan Variances

The SOW states “This estuary, however, is periodically blocked off from the Bering Sea due to a gravel berm that develops at the outlet. Collect 6 surface sediment samples from depositional areas within the Suqitughneq River estuary.”

During Shannon & Wilson’s field effort the estuary was observed to be a fresh water lake, and shoreline processes were maintaining a coarse sand berm, keeping the water elevation above high tide. Depositional areas of sediment were not observed near the surface of the water around the estuary. Sediment samples were collected through water depths greater than 3 feet by wearing chest waders and using a stick to probe for depositional areas (See Photograph 14 in Appendix A). An Eckman dredge was dropped on the upcurrent side of the sampler to bring sediment to the surface. The contents of the dredge were released into a new disposable aluminum pan for sampling.

5.14.4 Field Investigation

Field activities occurred at Site 29 on August 12-15 and September 3-4, 2004. A summary of samples collected, including a description of sample location and classification, is presented in Table 5-14a. Sample locations are depicted on Figure 5-14.

The surface water of the Suqi. River was sampled in locations which were upgradient, mid-gradient, and downgradient of the Main Operations Complex Drainage Basin (Site 28). The surface water sample from the upgradient portion of the river (29SW103) was collected approximately 0.4 mile east of the Mid-Suqi. Bridge. The sample from the mid-gradient portion of the river (29SW102) was collected approximately 200 feet downstream of the confluence of the Suqi. River and the drainage swale identified as Site 28-Drainage Basin (See Photograph 13). The surface water sample from the downgradient portion of the Suqi. River was collected approximately 25 feet downstream of the Lower-Suqi. Bridge, upstream of the estuary/lagoon. The samples were analyzed for DRO, RRO, GRO, PAH, PCBs and BTEX. TAqH and TAH were calculated from the PAH and BTEX results. An analysis of the DRO and RRO results was made to determine the presence of natural (biogenic) organics versus petroleum derived components.

Six sediment samples were collected from the Suqitughneq River estuary. Sediment samples were collected with an Eckman dredge from the base of the estuary, which was submerged by 3-4.5 feet of water. The samples were analyzed for pesticides, DRO, RRO, GRO, BTEX, PAHs, PCBs, mercury, and total organic carbon. An analysis for the presence of natural organics versus petroleum derived components was conducted for all of the DRO and RRO results.

5.14.4.1 IDW

Sampling gloves and aluminum pans used during sediment sampling of the estuary were placed in the project IDW bag. Water used for decontamination of hand tools was collected in 5 gallon buckets, then transported to 55-gallon drums at the camp, where it was filtered through GAC and discharged to the surface of the gravel pad.

5.14.4.2 Field Observations

No tidal influence was noted in the Suqi. Estuary. From our discussions with Eugene Toolie, the dam separating the water body from the Bering Sea fails every few years, typically in the fall. The vegetation and shape of the shoreline support that statement. Along much of the shoreline, the water level was at the level of the surrounding surface tundra, and a submerged vertical drop of two to three feet was present near the shore. Depositional sediment was found to be 3 feet or greater below the water surface. Aquatic vegetation was often present, and would foul the closure of the dredge. Where the water was not as deep, the lake bed consisted of boulders and coarse sand and gravel, likely due to ice scouring. Scouring would occur when the surface of the estuary is frozen and the water level fluctuates, causing the ice to crack and move. A subtle current toward the beach was noted in the area where the sediment samples were collected.

5.14.5 Analytical Results

Table 5-14b summarizes the Site 29 sediment sample analytical results, and Table 5-14c summarizes the Site 29 water sample analytical results.

Five of the six sediment sample locations contained DRO at concentrations greater than the soil cleanup criterion, and attributable to biogenic compounds (See Table D-1 in Appendix D). The estimated concentrations ranged from 302 mg/kg to 988 mg/kg. DRO was detected in Sample 29SD106 at an estimated concentration less than the cleanup level (173 mg/kg), and was identified by the laboratory as a weathered middle distillate fuel (diesel). BTEX was not detected in the sediment samples, however the benzene PQLs exceeded the cleanup criterion for several samples, likely due to the wet, organic nature of the sediment. Three PAH compounds were detected, but no PAH results or PQLs exceed the cleanup criteria. Sample 29SD105 contained 0.452 mg/kg of the PCB Aroclor 1260. No other sediment samples contained detectable concentrations of PCBs. Although not detected, the PQLs for the pesticides dieldrin and lindane exceeded the soil cleanup criteria in all of the project samples.

The hydrocarbon concentrations detected in the surface water collected from the Suqi. River were all less than the ADEC groundwater cleanup criteria and the surface water criteria for TAH and TAqH. No BTEX, or PCB compounds were measured within the laboratory PQLs. Sample 29SW101 and its QA replicate both contained detectable concentrations (less than cleanup criteria) of multiple PAH compounds. This may be due to the sampling location, approximately 25 feet downstream from the Lower-Suqi. Bridge. The bridge is constructed from creosote-treated wood similar to telephone poles.

TABLE 5-14a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 29: SUQITUGHNEQ RIVER AND ESTUARY

Sample Number**	LOCID	Date	Sample Location (See Figure 5-14)	Depth (feet)	Sample Classification†
Sediment Samples					
* 29SD104	29SD104	9/3/04	SW end of Suqi. Estuary, close to Lower Suqi. Bridge	3.2	Brown to black, organic SILT; trace sand, rusty algae
* 29SD105	29SD105	9/3/04	SW end of Suqi. Estuary, neck in channel	3.5-4	Black organic SILT, shiny flecks, fibrous decomposing vegetation
* 29SD106	29SD106	9/3/04	SW end of Suqi. Estuary, S side of wider channel	4	Black to dark brown, decomposing organics with silt; trace sand
* 29SD107	29SD107	9/4/04	SW end of Suqi. Estuary, N side of wider channel	4	Brown to black, slightly fine sandy SILT; 20% decomposing organic
* 29SD207	29SD107	9/4/04	QC replicate of Sample 29SD107	4	Brown to black, slightly fine sandy SILT; 20% decomposing organic
* 29SD307	29SD107	9/4/04	QA replicate of Sample 29SD107	4	Brown to black, slightly fine sandy SILT; 20% decomposing organic
* 29SD108	29SD108	9/4/04	Suqi. Estuary where river inlet widens to main pond	4.5	Brown to black, slightly fine sandy SILT; with decomposing organic
* 29SD109	29SD109	9/4/04	Suqi. Estuary where river inlet widens to main pond	4.2	Brown to black, fine sandy SILT; with decomposing organics
Surface Water Samples					
* 29SW101	29SW101	8/12/04	Lower reach of Suqi. River, just below lower bridge	-	Surface water - clear, flowing
* 29SW201	29SW101	8/12/04	QC replicate of Sample 29SW101	-	Surface water - clear, flowing
* 29SW301	29SW101	8/12/04	QA replicate of Sample 29SW101	-	Surface water - clear, flowing
* 29SW102	29SW102	8/14/04	Central Suqi. River, below drainage basin outfall	-	Surface water - clear, flowing
* 29SW103	29SW103	8/15/04	Upper Suqi. River, E fork, down from shallow lake	-	Surface water - clear, flowing

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Tables 5-14b and 5-14c)
**	The full sample number is preceded by "04NE", for example 29SD104 is sample 04NE29SD104
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
LOCID	Location Identification: "29SD104" Site 29, Sediment Sample 104

TABLE 5-14b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 29: SUQITUGHNEQ RIVER AND ESTUARY

Site 29 - Suqitughneq River and Estuary

Soil Matrix

			Sample Type:	SEDIMENT SAMPLES							
			Location ID:	29SD104	29SD105	29SD106	29SD107			29SD108	29SD109
			Sample ID:	04NE29SD104	04NE29SD105	04NE29SD106 *	04NE29SD107	04NE29SD207	04NE29SD307	04NE29SD108	04NE29SD109
			Depth (ft):	3.2	3.5-4	4	4	4	4	4.5	4.2
			Sample Date:	9/3/2004	9/3/2004	9/3/2004	9/4/2004	9/4/2004	9/4/2004	9/4/2004	9/4/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**				*Primary*	*Duplicate*	*Triplicate*		
Percent Moisture	A2540G / E160.3M	%	–	74.6	86.1	41.9	60.7	63.4	56.5	56.2	57.5
Gasoline Range Organics (GRO)	AK101	mg/kg	300	[9.73]	[17.0]	[5.61]	[6.19]	[4.58]	0.271 J	[3.16]	[2.85]
Diesel Range Organics (DRO)	AK102	mg/kg	250	**653 J**	**988 J**	173 J	**447 J**	232 J	157	**456 J**	**302 J**
Laboratory Assessment of Hydrocarbon Origin†	–	–	–	biogenic	biogenic	**diesel**	biogenic	biogenic	-	biogenic	biogenic
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	1,370 J	4,060 J	393 J	1,870 J	913 J	710	1,600 J	1,170 J
Laboratory Assessment of Hydrocarbon Origin†	–	–	–	biogenic	biogenic	biogenic	biogenic	biogenic	-	biogenic	biogenic
Aromatic Organic Compounds (BTEX)											
Benzene	SW8260B	µg/kg	20	**[50.6]**	**[88.4]**	**[29.1]**	**[32.2]**	**[23.8]**	**[61.1]**	[16.4]	[14.8]
Ethylbenzene	SW8260B	µg/kg	5,500	[97.3]	[170]	[56.1]	[61.9]	[45.8]	[61.1]	[31.6]	[28.5]
Toluene	SW8260B	µg/kg	5,400	[195]	[340]	[112]	[124]	[91.7]	[61.1]	[63.2]	[57]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[97.3]	[170]	[56.1]	[61.9]	[45.8]	[61.1]	[31.6]	[28.5]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[195]	[340]	[112]	[124]	[91.7]	[122]	[63.2]	[57]
Polynuclear Aromatic Hydrocarbons (PAH)											
Acenaphthene	PAH SIM	µg/kg	210,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Acenaphthylene	PAH SIM	µg/kg	210,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Anthracene	PAH SIM	µg/kg	4,300,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	[386]	[695]	[16.4]	[258]	[263]	[46]	19.1 J	[229]
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Chrysene	PAH SIM	µg/kg	620,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Fluoranthene	PAH SIM	µg/kg	2,100,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Fluorene	PAH SIM	µg/kg	270,000	[386]	[695]	14.6 J	[258]	[263]	[46]	26.8 J	[229]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Naphthalene	PAH SIM	µg/kg	21,000	[386]	[695]	16.3 J	[258]	[263]	[46]	23.2 J	[229]
Phenanthrene	PAH SIM	µg/kg	4,300,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Pyrene	PAH SIM	µg/kg	1,500,000	[386]	[695]	[16.4]	[258]	[263]	[46]	[22.8]	[229]
Polychlorinated Biphenyls (PCBs)			Sum of congeners:								
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.186]	[0.366]	[0.0877]	[0.126]	[0.261]	[0.0575]	[0.215]	[0.239]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.186]	[0.366]	[0.0877]	[0.126]	[0.261]	[0.115]	[0.215]	[0.239]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.186]	[0.366]	[0.0877]	[0.126]	[0.261]	[0.0575]	[0.215]	[0.239]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.186]	[0.366]	[0.0877]	[0.126]	[0.261]	[0.0575]	[0.215]	[0.239]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.186]	[0.366]	[0.0877]	[0.126]	[0.261]	[0.0575]	[0.215]	[0.239]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.186]	[0.366]	[0.0877]	[0.126]	[0.261]	[0.0575]	[0.215]	[0.239]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	[0.186]	0.452	[0.0877]	[0.126]	[0.261]	[0.0575]	[0.215]	[0.239]

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-14b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 29: SUQITUGHNEQ RIVER AND ESTUARY

Site 29 - Suqitughneq River and Estuary

Soil Matrix

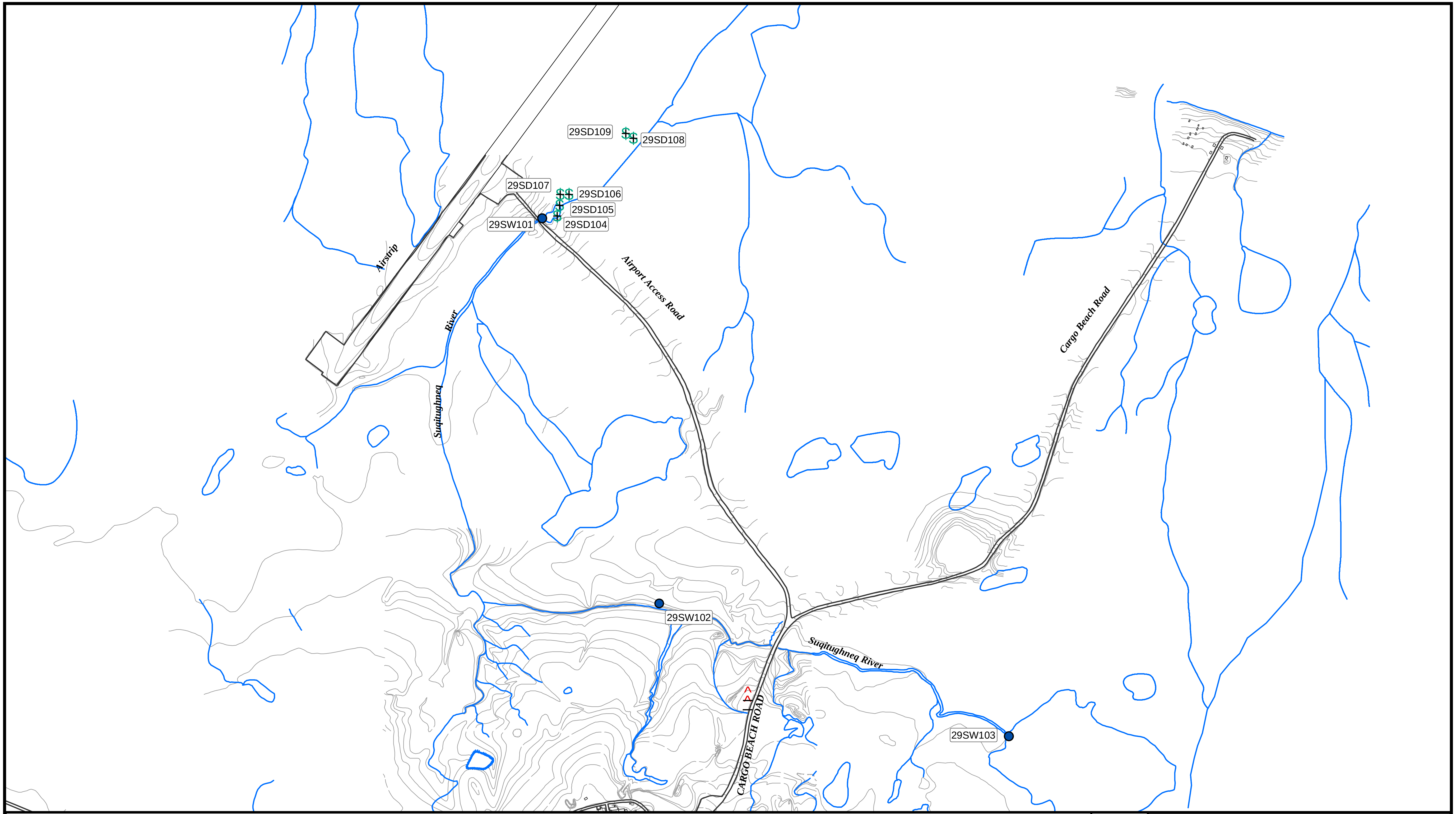
			Sample Type:	SEDIMENT SAMPLES							
			Location ID:	29SD104	29SD105	29SD106	29SD107			29SD108	29SD109
			Sample ID:	04NE29SD104	04NE29SD105	04NE29SD106 *	04NE29SD107	04NE29SD207	04NE29SD307	04NE29SD108	04NE29SD109
			Depth (ft):	3.2	3.5-4	4	4	4	4	4.5	4.2
			Sample Date:	9/3/2004	9/3/2004	9/3/2004	9/4/2004	9/4/2004	9/4/2004	9/4/2004	9/4/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**				*Primary*	*Duplicate*	*Triplicate*		
Pesticides											
4,4'-DDD	SW8081A	mg/kg	35 (ing)	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	0.00057 J	[0.086]	[0.095]
4,4'-DDE	SW8081A	mg/kg	24 (ing)	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0046]	[0.086]	[0.095]
4,4'-DDT	SW8081A	mg/kg	24 (ing)	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0046]	[0.086]	[0.095]
Aldrin	SW8081A	mg/kg	0.5 (ing)	[0.056]	[0.11]	[0.026]	[0.038]	[0.078]	[0.0023]	[0.065]	[0.072]
Dieldrin	SW8081A	mg/kg	0.015	**[0.074]**	**[0.15]**	**[0.035]**	**[0.05]**	**[0.1]**	[0.0046]	**[0.086]**	**[0.095]**
Endosulfan I	SW8081A	mg/kg	7	[0.056]	[0.11]	[0.026]	[0.038]	[0.078]	[0.0023]	[0.065]	[0.072]
Endosulfan II	SW8081A	mg/kg	7	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0046]	[0.086]	[0.095]
Endosulfan sulfate	SW8081A	mg/kg	7	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	0.000455 J	[0.086]	[0.095]
Endrin	SW8081A	mg/kg	0.3	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0046]	[0.086]	[0.095]
Endrin aldehyde	SW8081A	mg/kg	–	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0046]	[0.086]	[0.095]
Endrin ketone	SW8081A	mg/kg	–	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0046]	[0.086]	[0.095]
Heptachlor	SW8081A	mg/kg	0.8 (inh)	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0023]	[0.086]	[0.095]
Heptachlor epoxide	SW8081A	mg/kg	0.2	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0023]	[0.086]	[0.095]
Methoxychlor	SW8081A	mg/kg	52	[0.074]	[0.15]	[0.035]	[0.05]	[0.1]	[0.0046]	[0.086]	[0.095]
Toxaphene	SW8081A	mg/kg	8 (ing)	[1.9]	[3.7]	[0.88]	[1.3]	[2.6]	[0.115]	[2.2]	[2.4]
alpha-BHC	SW8081A	mg/kg	–	[0.056]	[0.11]	[0.026]	[0.038]	[0.078]	[0.0023]	[0.065]	[0.072]
alpha-Chlordane	SW8081A	mg/kg	3	[0.056]	[0.11]	[0.026]	[0.038]	[0.078]	[0.0023]	[0.065]	[0.072]
beta-BHC	SW8081A	mg/kg	–	[0.056]	[0.11]	[0.026]	[0.038]	[0.078]	[0.0046]	[0.065]	[0.072]
delta-BHC	SW8081A	mg/kg	–	[0.056]	[0.11]	[0.026]	[0.038]	[0.078]	[0.0023]	[0.065]	[0.072]
gamma-BHC (Lindane)	SW8081A	mg/kg	0.003	**[0.056]**	**[0.11]**	**[0.026]**	**[0.038]**	**[0.078]**	[0.0023]	**[0.065]**	**[0.072]**
gamma-Chlordane	SW8081A	mg/kg	3	[0.056]	[0.11]	[0.026]	[0.038]	[0.078]	[0.0023]	[0.065]	[0.072]
Total Organic Carbon (TOC)	SGS SOP	mg/kg	–	42,700	117,000	22,700	46,000	52,100	–	31,600	39,100
Mercury	SW7471A	mg/kg	1.4	[0.156]	0.0911 J	0.0481 J	[0.102]	0.0398 J	[205]	0.0305 J	0.0323 J

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
%	percent
mg/kg	milligrams per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-14c SUMMARY OF WATER ANALYTICAL RESULTS - SITE 29: SUQITUGHNEQ RIVER AND ESTUARY

Site 29 - Suqitughneq River and Estuary **Water Matrix**			Sample Type:	**SURFACE WATER**				
			Location ID:	29SW101			29SW102	29SW103
			Sample ID:	04NE29SW101	04NE29SW201	04NE29SW301	04NE29SW102 *	04NE29SW103
			Depth (ft):	-	-	-	-	-
			Sample Date:	8/12/2004	8/12/2004	8/12/2004	8/14/2004	8/15/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**	*Primary*	*Duplicate*	*Triplicate*		
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	0.0112 J	0.0117 J	[0.050]	0.0146 J	0.0101 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	0.111 J	0.122 J	0.0879 J	0.0846 J	0.127 J
Residual Range Organics (RRO)	AK103	mg/L	1.1	0.325 J	0.346 J	[0.5]	0.252 J	0.369 J
Aromatic Organic Compounds (BTEX)								
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]	[0.5]	[0.4]	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	[1]	[1]
Toluene	SW8260B	µg/L	1000	[1]	[1]	[1]	[1]	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	[1]	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	[2]	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)								
Acenaphthene	PAH SIM	µg/L	2,200	0.0848	[0.0556]	0.0119 J	[0.0549]	[0.0549]
Acenaphthylene	PAH SIM	µg/L	2,200	[0.0575]	[0.0556]	0.0118 J	[0.0549]	[0.0549]
Anthracene	PAH SIM	µg/L	11,000	[0.0575]	[0.0556]	[0.1]	[0.0549]	[0.0549]
Benzo(a)anthracene	PAH SIM	µg/L	1	[0.0575]	[0.0556]	0.0433	[0.0549]	[0.0549]
Benzo(a)pyrene	PAH SIM	µg/L	0.2	[0.0575]	[0.0556]	0.0383 J	[0.0549]	[0.0549]
Benzo(b)fluoranthene	PAH SIM	µg/L	1	[0.0575]	[0.0556]	0.036	[0.0549]	[0.0549]
Benzo(g,h,i)perylene	PAH SIM	µg/L	1,100	[0.0575]	[0.0556]	[0.1]	[0.0549]	[0.0549]
Benzo(k)fluoranthene	PAH SIM	µg/L	10	[0.0575]	[0.0556]	0.0672	[0.0549]	[0.0549]
Chrysene	PAH SIM	µg/L	100	[0.0575]	[0.0556]	0.0552	[0.0549]	[0.0549]
Dibenzo(a,h)anthracene	PAH SIM	µg/L	0.1	[0.0575]	[0.0556]	0.0324	[0.0549]	[0.0549]
Fluoranthene	PAH SIM	µg/L	1,460	[0.115]	[0.111]	0.0227 J	[0.11]	[0.11]
Fluorene	PAH SIM	µg/L	1,460	0.0656	[0.0556]	0.0114J	[0.0549]	[0.0549]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/L	1	[0.0575]	[0.0556]	0.0396	[0.0549]	[0.0549]
Naphthalene	PAH SIM	µg/L	700	0.261	[0.0556] B	0.0118 J	[0.0549] B	[0.0549] B
Phenanthrene	PAH SIM	µg/L	11,000	0.0614 J	[0.111]	0.0132 J	[0.11]	[0.11]
Pyrene	PAH SIM	µg/L	1,100	[0.0575]	[0.0556]	0.0223 J	[0.0549]	[0.0549]
Polychlorinated Biphenyls (PCBs)								
PCB-1016 (Aroclor 1016)	SW8082	µg/L	0.5	[0.109]	[0.111]	[0.5]	[0.115]	[0.105]
PCB-1221 (Aroclor 1221)	SW8082	µg/L	0.5	[0.109]	[0.111]	[0.5]	[0.115]	[0.105]
PCB-1232 (Aroclor 1232)	SW8082	µg/L	0.5	[0.109]	[0.111]	[0.5]	[0.115]	[0.105]
PCB-1242 (Aroclor 1242)	SW8082	µg/L	0.5	[0.109]	[0.111]	[0.5]	[0.115]	[0.105]
PCB-1248 (Aroclor 1248)	SW8082	µg/L	0.5	[0.109]	[0.111]	[0.5]	[0.115]	[0.105]
PCB-1254 (Aroclor 1254)	SW8082	µg/L	0.5	[0.109]	[0.111]	[0.5]	[0.115]	[0.105]
PCB-1260 (Aroclor 1260)	SW8082	µg/L	0.5	[0.109]	[0.111]	[0.5]	[0.115]	[0.105]
PCB-1262 (Aroclor 1262)	SW8082	µg/L	0.5	-	-	[0.5]	-	-
PCB-1268 (Aroclor 1268)	SW8082	µg/L	0.5	-	-	[0.5]	-	-
Calculated Total aromatic hydrocarbons (TAH) †	(see text)	µg/L	10	2.7	2.7	2.8	2.7	2.7
Calculated Total aqueous hydrocarbons (TAqH) ‡	(see text)	µg/L	15	3.5	3.2	3.0	3.2	3.2

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C and, for TAH/TAqH, surface water levels in 18 AAC 70.
J	Estimated concentration; refer to Appendix C for data qualification information
[0.0532] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)
†	TAH equals the sum of BTEX analyte concentrations estimated below the PQL or detected above the PQL, plus 1/2 the PQL of analytes not reported above the Method Detection Limit (MDL).
‡	TAqH equals the sum of BTEX and PAH analyte concentrations estimated below the PQL or detected above the PQL, plus 1/2 the PQL of analytes not reported above the Method Detection Limit (MDL).



Legend

- ● Surface water sample collected by Shannon & Wilson, Inc. August/September 2004
- $ Sediment sample collected by Shannon & Wilson, Inc. August/September 2004
- ^ Monitoring well installed by Shannon & Wilson, Inc. August/September 2004

Water feature

Topographic Contours (Interval: 5 ft)

1 inch equals 800 feet

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 29 - SUQITUGHNEQ RIVER AND ESTUARY

June 2005

32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-14

5.15 Site 31: White Alice Site

Soil samples were collected from 39 locations at the former White Alice Communications site. Fifteen of these samples were analyzed to assess potential fuel impacts, and 24 were analyzed for PCBs.

5.15.1 Site Description

The White Alice site is located southeast and above the MOC in a glacial valley at the base of Mt. Kangukhsam. The site was the location of four large antennas, a central main electronics building, and other supporting structures. It appears to be located on a rise of unconsolidated surficial material deposited by a glacier, and is bounded on the west by the incised south branch of the Suqi. River, and the east-north east by a shallow drainage basin. Figure 5-15 shows the general layout of Site 31 with sampling locations. Concrete foundations of the Main Electronics Center and the four former antennas remain on the site.

5.15.2 Data Collection Objectives

Surface and subsurface soil samples were collected to address uncertainties regarding the extent of potential fuel and/or PCB contamination identified during the previous remedial investigations and removal actions.

5.15.3 Work Plan Variances

Sampled locations varied from the proposed sample locations due to inconsistencies between the site figure and observed surface features.

The WP called for six surface soil samples and two co-located subsurface soil samples from an area downgradient of a former septic tank outfall and previous sample location 01NE31SS123. An extra co-located subsurface soil sample was collected beneath the shallow sample 31SS131. The soil surface in this area appeared to be recently regraded. An organic soil horizon was encountered while collecting Sample 31SS131. The organic layer might represent the surface of the site before the recent grading., therefore Sample 31SB134 was collected from soil below this layer.

5.15.4 Field Investigation

Field activities occurred at Site 31 on August 31, 2004. A summary of samples collected, including a description of sample location and classification, is presented in Table 5-15a, and Figure 5-15 depicts the sample locations. Photograph 15 in Appendix A shows soil sampling activities on the western portion of the site, with the northeastern portion of the site visible in the background.

5.15.4.1 Soil Sampling

In the vicinity of the former fuel tank impoundment at the western edge of the site, two shallow soil borings were advanced to 5.5 feet bgs. Two subsurface soil samples were collected from each boring and analyzed for DRO and RRO. One of the samples was also analyzed for TOC. Samples 31SB101 and 31SB102 were collected from Boring 31B1, and Samples 31SB103 and 31SB104 were collected from Boring 31B2. The boring locations are shown on Figure 5-15. Surface soil Sample 31SS110 was collected near Boring 31B1, approximately 20 feet downgradient of previous sample location 01NE31SS119/120. This sample was collected where water was suspected to drain from the former AST impoundment, and was analyzed for DRO, RRO, and total organic carbon.

Five subsurface soil samples (approximately 2 to 4 feet bgs) were collected from locations along the former buried fuel pipelines at Site 31. Three soil samples (Samples 31SB105 through 31SB107) were collected from locations along the west side of the main electronics center. Sample 31SB108 was collected from the west side of WAC Antenna 3 and Sample 31SB109 was collected from the west side of WAC Antenna 4. The sample depths were accessed with a drill rig and the samples were collected from drill auger flights. Samples 31SB105 through 31SB109 were analyzed for DRO, RRO, GRO, BTEX, PAHs, and total organic carbon.

Soil samples were collected in the vicinity of the former AST at Antenna 1 in the southern portion of the White Alice site. Three surface soil samples and two co-located subsurface samples were collected in a radius approximately 10 to 15 feet from previous sample location 01NE31SS105/106. The co-located samples (with numbers from 126 to 129) were collected from drill auger flights, and Sample 31SS130 was accessed with a shovel. The five samples were analyzed for DRO and RRO, and three of the samples were also analyzed for TOC.

Near surface and co-located subsurface samples were collected for PCB analysis in three distinct areas. The co-located samples were collected from drill auger flights, and the single surface samples were accessed with a shovel.

On the south side of the former Main Electronics Center, Building 1001, soil samples were collected from six locations surrounding the eastern portion of the former PCB sampling grid. At three of the sample locations, a co-located subsurface soil sample was collected along with a surface soil sample. These samples were numbered (31SS or 31SB) sequentially from 117 through 125.

Four surface soil samples and two co-located subsurface soil samples were collected along the western portion of the site, downgradient of previous sample location 01NE31SS124 and west of the road. These samples, with numbers from 31SS or 31SB 111 to 116, were analyzed for PCBs.

Six surface soil samples and three co-located subsurface soil samples were collected from locations downgradient of the former septic tank outfall in the northern portion of the site. These samples, with numbers from 31SS or 31SB 131 to 139 were analyzed for PCBs.

5.15.4.2 IDW

Headspace samples were returned to the soil surface at the corresponding soil sampling location. Soil cuttings were used to backfill the boring of origin. Headspace bags, sampling gloves, and disposable rubber overboots were placed in the project IDW bag. Water used for decontamination of hand tools, auger and rod, and boots was transferred to a 55 gallon drum at the MOC, then filtered through GAC and discharged to the surface.

5.15.4.3 Field Observations

The surface of the While Alice site appears to have been recently re-graded, removing the markings of previous sampling locations. The scales and orientations of the various features on the site figure were inconsistent with features in the field, particularly the location of the former septic tank outfall line. Witching rods were used to estimate the boundaries of former excavations and piping, and spray paint marks remaining on the main building slab were used to estimate the boundaries of the PCB sampling grid.

5.15.5 Analytical Results

Table 5-15b summarizes the Site 31 analytical results for soil samples. One location for the fuel system-related samples contained hydrocarbon concentrations in excess of the ADEC cleanup criteria. Sample 31SB106 was collected along the former pipeline corridor from east of the road and west of Building 1001, and contained 1,280 mg/kg DRO. The associated QC and QA samples also contained over 1,000 mg/kg DRO. While benzene was not detected, QA replicate Sample 31SB306 has a benzene PQL in excess of the cleanup criterion. PAHs were detected at several locations in concentrations two orders of magnitude below cleanup criteria.

The samples from the six locations surrounding the eastern portion of the PCB sampling grid at former Building 1001, plus a quality control duplicate and replicate set, contained detectable levels of the PCB congener Aroclor 1260. Samples 31SS119, 31SB121, 31SS122, 31SS123, and 31SS125 contained concentrations of Aroclor 1260 from 2.08 to 14.8 mg/kg, exceeding the 1 mg/kg cleanup criterion. Aroclor 1260 was detected in some of the samples from the Septic outfall and western sampling areas, but at levels less than the cleanup criterion.

TABLE 5-15a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 31: WHITE ALICE SITE

Sample Number**	LOCID	Date	Sample Location (See Figure 5-15 for borehole and well location	Depth (feet)	Screening (ppm) ^	Sample Classification†
Soil Samples						
* 31SB101	31B1-2	8/31/04	Boring 31B1	2-3.5	0.7	Medium dense, brown, slightly gravelly SAND; moist
* 31SB102	31B1-4	8/31/04	Boring 31B1	4-5.5	0.6	Medium dense, brown, slightly gravelly SAND; moist
* 31SB103	31B2-2	8/31/04	Boring 31B2	2-3.5	0.4	Medium dense, brown, coarse gravelly, sandy SILT; moist
* 31SB104	31B2-4	8/31/04	Boring 31B2	4-5.5	0.7	Dense, brown, gravelly, silty SAND; moist - rock at bottom
* 31SB105	31SB105-	8/31/04	Fuel pipeline corridor, SW side of road	2.7-3.1	0.5	Dark brown, silty, gravelly SAND; moist
* 31SB106	31SB106-	8/31/04	Fuel pipeline corridor, NE side of road	2.5-2.8	43	Dark brown, silty, gravelly SAND; moist
* 31SB206	31SB106-	8/31/04	QC replicate of Sample 31SB106	2.5-2.8	43	Dark brown, silty, gravelly SAND; moist
* 31SB306	31SB106-	8/31/04	QA replicate of Sample 31SB106	2.5-2.8	43	Dark brown, silty, gravelly SAND; moist
* 31SB107	31SB107-	8/31/04	Fuel pipeline corridor, PCB grid area	3-3.5	0.4	Brown, slightly silty, sandy GRAVEL; moist
* 31SB108	31SB108-	8/31/04	Fuel pipeline corridor, Antenna 3 AST	3.5-4	0.3	Brown, gravelly medium SAND; moist
* 31SB109	31SB109-	8/31/04	Fuel pipeline corridor, Antenna 4 AST	3.5-4	0.8	Dense, brown, silty, sandy GRAVEL; moist
* 31SS110	31SS110-1	8/31/04	Probable water drainage from ASTs,	1.65	0.7	Brown, silty, sandy GRAVEL; moist
* 31SS111	31SS111-1	8/31/04	N of ASTs, W of road, NE sample	1.2	-	Brown, silty, sandy GRAVEL; moist
* 31SS112	31SS112-2	8/31/04	N of ASTs, W of road, SE sample	1.8-2.0	-	Dark brown, silty, sandy GRAVEL; trace organics; moist
* 31SB113	31SS112-4	8/31/04	Beneath Sample 31SS112	3.7-4	-	Light brown, slightly sandy, silty, GRAVEL; moist
* 31SS114	31SS114-1	8/31/04	N of ASTs, W of road, SW sample	0.9	-	Brown, silty, sandy GRAVEL; moist
* 31SS115	31SS115-2	8/31/04	N of ASTs, W of road, NW sample	1.9-2.1	-	Brown, silty, sandy GRAVEL and cobbles; moist
* 31SB116	31SS115-4	8/31/04	Beneath Sample 31SS115	3.8-4.1	-	Brown, sandy, gravelly SILT; moist
* 31SS117	31SS117-2	8/31/04	SW sample, Main Center, former PCB grid	1.9	-	Dark brown, sandy, gravelly SILT; moist
* 31SB118	31SS117-4	8/31/04	Beneath Sample 31SS117	4	-	Brown, sandy, gravelly SILT; moist
* 31SB218	31SS117-4	8/31/04	QC replicate of Sample 31SB118	4	-	Brown, sandy, gravelly SILT; moist
* 31SB318	31SS117-4	8/31/04	QA replicate of Sample 31SB118	4	-	Brown, sandy, gravelly SILT; moist
* 31SS119	31SS119-1	8/31/04	Main Center, in SE corner of former PCB grid	0.8-1.2	-	Dense, brown, silty, sandy GRAVEL; moist
* 31SS120	31SS120-2	8/31/04	N sample, Main Center, former PCB grid	1.9-2.1	-	Light brown, slightly silty, sandy GRAVEL; moist
* 31SB121	31SS120-4	8/31/04	Beneath Sample 31SS120	4-4.2	-	Brown, gravelly, silty SAND; moist
* 31SS122	31SS122-1	8/31/04	S sample, Main Center, former PCB grid	1.2	-	Stiff, dark brown, SILT; moist
* 31SS123	31SS123-2	8/31/04	E sample, Main Center, former PCB grid	2	-	Brown, silty, gravelly SAND; moist - pipe next to hole
* 31SB124	31SS123-4	8/31/04	Beneath Sample 31SS123	3.8-4.1	-	Brown to dark brown, silty gravelly SAND; moist
* 31SS125	31SS125-1	8/31/04	NE sample, Main Center, former PCB grid	1.2	-	Brown, silty, gravelly SAND; moist
* 31SS126	31SS126-2	8/31/04	Antenna 1 AST (01NE31SS105) area, W sample	1.5-2	<0.2	Brown, poorly graded, silty SAND; moist
* 31SB127	31SS126-4	8/31/04	Beneath Sample 31SS126	3.5-3.8	0.4	Brown SILT; trace gravel; moist
* 31SS128	31SS128-2	8/31/04	Antenna 1 AST area, N sample	1.8-2	<0.2	Brown, sandy SILT; moist
* 31SB129	31SS128-4	8/31/04	Beneath Sample 31SS128	3.7-3.8	0.2	Brown, gravelly SILT; moist

TABLE 5-15a SAMPLE LOCATIONS AND DESCRIPTIONS - SITE 31: WHITE ALICE SITE

Sample Number**	LOCID	Date	Sample Location (See Figure 5-15 for borehole and well location	Depth (feet)	Screening (ppm) ^	Sample Classification†
Soil Samples						
* 31SS130	31SS130-1	8/31/04	Antenna 1 AST area, SE sample	1.3	<0.2	Brown, poorly graded SAND and stiff SILT; layered; moist
* 31SS131	31SS131-2	8/31/04	SE sample, septic tank outfall area	2.1	-	Brown, sandy, silty GRAVEL; moist
* 31SS132	31SS132-2	8/31/04	SW sample, septic tank outfall area	1.4-1.6	-	Brown, silty, sandy GRAVEL; moist
* 31SB133	31SS132-4	8/31/04	Beneath Sample 31SS132	3.5-4	-	Brown, sandy, silty GRAVEL; moist
* 31SB134	31SS131-3	8/31/04	Beneath Sample 31SS131	2.9	-	Brown, silty, sandy GRAVEL; moist
* 31SS135	31SS135-1	8/31/04	S-central sample, septic tank outfall area	1.1-1.2	-	Brown, silty, sandy GRAVEL; moist
* 31SS136	31SS136-1	8/31/04	NE sample, septic tank outfall area	1.3-1.5	-	Dark brown, slightly silty, sandy GRAVEL; trace organics; moist
* 31SB137	31SS136-4	8/31/04	Beneath Sample 31SS136	4.2-4.5	-	Brown, slightly silty, sandy GRAVEL; moist
* 31SS138	31SS138-1	8/31/04	Central sample, septic tank outfall area	1-1.5	-	Brown, silty, sandy GRAVEL; moist
* 31SS139	31SS139-2	8/31/04	NW sample, septic tank outfall area	1.4-1.6	-	Brown, silty, sandy GRAVEL; moist

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Table 5-15b)
**	The full sample number is preceded by "04NE", for example 31SB101 is sample 04NE31SB101
^	Field screening instrument was an HnU HW101 photoionization detector (PID) with 11.7 eV lamp
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
ppm	parts per million, calibrated to 100 ppm isobutylene
LOCID	Location Identification: "31SS130-1" signifies Site 31, Surface Sample 130 at 1-foot depth (depth is rounded to the nearest foot)

TABLE 5-15b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 31: WHITE ALICE SITE

Site 31 - White Alice Site

Soil Matrix

			Sample Type:	BOREHOLE 31B1		BOREHOLE 31B2		SURFACE	FUEL PIPELINE AND ASTS						
			Location ID:	31B1-2	31B1-4	31B2-2	31B2-4	31SS110-1	31SB105-3	31SB106-3			31SB107-3	31SB108-4	31SB109-4
			Sample ID:	04NE31SB101	04NE31SB102	04NE31SB103	04NE31SB104	04NE31SS110	04NE31SB105	04NE31SB106	04NE31SB206	04NE31SB306	04NE31SB107	04NE31SB108 *	04NE31SB109
			Depth (ft):	2-3.5	4-5.5	2-3.5	4-5.5	1.65	2.7-3.1	2.5-2.8	2.5-2.8	2.5-2.8	3-3.5	3.5-4	3.5-4
			Sample Date:	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**							*Primary*	*Duplicate*	*Triplicate*			
PID Headspace Reading	HNU HW101 PID	ppm	–	0.7	0.6	0.4	0.7	0.7	0.5	43	43	43	0.4	0.3	0.8
Percent Moisture	A2540G / E160.3M	%	–	3.0	3.2	7.9	7.8	8.9	10.3	8.8	10	6.6	7.2	3.4	91.1
Gasoline Range Organics (GRO)	AK101	mg/kg	300	–	–	–	–	–	[3.78] B	110 J	119 J	76.7 J	[3.40] B	[2.62] B	[3.17] B
Diesel Range Organics (DRO)	AK102	mg/kg	250	85.3	3.91 J	19 J	24.8	14.7 J	30	**1,280**	**1,080**	**1,240**	8.3 J	50.6 J	7.97J
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	32 J	14.1 J	86.5	106	229	421 J	474 J	350 J	204	84.0	27.7 J	74.5
Aromatic Organic Compounds (BTEX)															
Benzene	SW8260B	µg/kg	20	–	–	–	–	–	[19.6]	[16.9]	[17.1]	**[70.5]**	[17.7]	[13.6]	[16.5]
Ethylbenzene	SW8260B	µg/kg	5,500	–	–	–	–	–	[37.8]	[32.4]	[33]	[70.5]	[34.0]	[26.2]	[31.7]
Toluene	SW8260B	µg/kg	5,400	–	–	–	–	–	[75.6]	[64.8]	[66]	[70.5]	[68.1]	[52.4]	[63.3]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	[37.8]	[32.4]	[33]	[70.5]	[34.0]	[26.2]	[31.7]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	[75.6]	[64.8]	[66]	[141]	[68.1]	[52.4]	[63.3]
Polynuclear Aromatic Hydrocarbons (PAH)															
Acenaphthene	PAH SIM	µg/kg	210,000	–	–	–	–	–	[5.63]	[54.9]	[56.6]	[50]	[5.48]	[5.11]	[5.66]
Acenaphthylene	PAH SIM	µg/kg	210,000	–	–	–	–	–	[5.63]	[54.9]	[56.6]	[50]	[5.48]	[5.11]	[5.66]
Anthracene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	[5.63]	[5.49]	[56.6]	[50]	[5.48]	[5.11]	[5.66]
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	–	–	–	–	–	2.53 J	73.5	70.9	67.8	[5.48]	3.11 J	[5.66]
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	2.662 J	23.0	56 J	28.6 J	2.55 J	[5.11]	[5.66]
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	–	–	–	–	–	2.3 J	74.1	98.8	78.5	2.9 J	[5.11]	[5.66]
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	1.73 J	32.8	31.4	28.6 J	2.07 J	[5.11]	[5.66]
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	2.56 J	92.9	[56.6]	78.5	2.48 J	[5.11]	[5.66]
Chrysene	PAH SIM	µg/kg	620,000	–	–	–	–	–	3.13 J	86.4	89.6	107	3.81 J	[5.11]	[5.66]
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	[5.63]	18.5	16.7	14.3 J	[5.48]	[5.11]	[5.66]
Fluoranthene	PAH SIM	µg/kg	2,100,000	–	–	–	–	–	5.62 J	167	156	164	6.68	[5.11]	[5.66]
Fluorene	PAH SIM	µg/kg	270,000	–	–	–	–	–	1.88 J	[54.9]	[56.6]	[50]	[5.48]	[5.11]	[5.66]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	–	–	–	–	–	[5.63]	40.0	38.6	28.6 J	[5.48]	[5.11]	[5.66]
Naphthalene	PAH SIM	µg/kg	21,000	–	–	–	–	–	[5.63]	[54.9]	[56.6]	[50]	[5.48]	[5.11]	[5.66]
Phenanthrene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	4.66 J	6.73	[56.6]	21.4 J	4.62 J	[5.11]	[5.66]
Pyrene	PAH SIM	µg/kg	1,500,000	–	–	–	–	–	4.3 J	214	227	253	5.71	[5.11]	[5.66]
Polychlorinated Biphenyls (PCBs)			Sum of congeners:												
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1262 (Aroclor 1262)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
PCB-1268 (Aroclor 1268)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	SGS SOP	mg/kg	–	–	–	–	5,640	11,900	12,800	8,310	8,890	–	2,490	1,790	4,240

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[3.400] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-15b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 31: WHITE ALICE SITE

Site 31 - White Alice Site

Soil Matrix

			Sample Type:	ANTENNA 1 AST AREA					WESTERN AREA					
			Location ID:	31SS126-2	31SS126-4	31SS128-2	31SS128-4	31SS130-1	31SS111-1	31SS112-2	31SS112-4	31SS114-1	31SS115-2	31SS115-4
			Sample ID:	04NE31SS126	04NE31SB127	04NE31SS128	04NE31SB129	04NE31SS130	04NE31SS111	04NE31SS112	04NE31SB113	04NE31SS114	04NE31SS115	04NE31SB116
			Depth (ft):	1.5-2	3.5-3.8	1.8-2	3.7-3.8	1.3	1.2	1.8-2	3.7-4	0.9	1.9-2.1	3.8-4.1
			Sample Date:	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**											
PID Headspace Reading	HNU HW101 PID	ppm	–	<0.2	0.4	<0.2	0.2	<0.2	–	–	–	–	–	–
Percent Moisture	A2540G / E160.3M	%	–	2.6	11.9	13.5	13.7	3.7	15.6	11	3.6	2.6	21.2	24.5
Gasoline Range Organics (GRO)	AK101	mg/kg	300	–	–	–	–	–	–	–	–	–	–	–
Diesel Range Organics (DRO)	AK102	mg/kg	250	5.24 J	9.06 J	6.35 J	5.52 J	6.83 J	–	–	–	–	–	–
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	26.8 J	122	75.7	56.4 J	88.4	–	–	–	–	–	–
Aromatic Organic Compounds (BTEX)														
Benzene	SW8260B	µg/kg	20	–	–	–	–	–	–	–	–	–	–	–
Ethylbenzene	SW8260B	µg/kg	5,500	–	–	–	–	–	–	–	–	–	–	–
Toluene	SW8260B	µg/kg	5,400	–	–	–	–	–	–	–	–	–	–	–
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	–	–	–	–	–	–
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	–	–	–	–	–	–
Polynuclear Aromatic Hydrocarbons (PAH)									–	–	–	–	–	–
Acenaphthene	PAH SIM	µg/kg	210,000	–	–	–	–	–	–	–	–	–	–	–
Acenaphthylene	PAH SIM	µg/kg	210,000	–	–	–	–	–	–	–	–	–	–	–
Anthracene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	–	–	–	–	–	–
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	–	–	–	–	–	–	–	–	–	–	–
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	–	–	–	–	–	–
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	–	–	–	–	–	–	–	–	–	–	–
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	–	–	–	–	–	–
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	–	–	–	–	–	–
Chrysene	PAH SIM	µg/kg	620,000	–	–	–	–	–	–	–	–	–	–	–
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	–	–	–	–	–	–
Fluoranthene	PAH SIM	µg/kg	2,100,000	–	–	–	–	–	–	–	–	–	–	–
Fluorene	PAH SIM	µg/kg	270,000	–	–	–	–	–	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	–	–	–	–	–	–	–	–	–	–	–
Naphthalene	PAH SIM	µg/kg	21,000	–	–	–	–	–	–	–	–	–	–	–
Phenanthrene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	–	–	–	–	–	–
Pyrene	PAH SIM	µg/kg	1,500,000	–	–	–	–	–	–	–	–	–	–	–
Polychlorinated Biphenyls (PCBs)			Sum of congeners:											
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	–	–	–	–	–	[0.0593]	[0.0585]	[0.0498]	[0.0503]	[0.0639]	[0.0667]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	–	–	–	–	–	[0.0593]	[0.0585]	[0.0498]	[0.0503]	[0.0639]	[0.0667]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	–	–	–	–	–	[0.0593]	[0.0585]	[0.0498]	[0.0503]	[0.0639]	[0.0667]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	–	–	–	–	–	[0.0593]	[0.0585]	[0.0498]	[0.0503]	[0.0639]	[0.0667]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	–	–	–	–	–	[0.0593]	[0.0585]	[0.0498]	[0.0503]	[0.0639]	[0.0667]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	–	–	–	–	–	[0.0593]	[0.0585]	[0.0498]	[0.0503]	[0.0639]	[0.0667]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	–	–	–	–	–	0.0606	0.0307 J	[0.0498]	[0.0503]	[0.0639]	[0.0667]
PCB-1262 (Aroclor 1262)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–
PCB-1268 (Aroclor 1268)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	SGS SOP	mg/kg	–	1,460	–	6,980	6,050	–	–	–	–	–	–	–

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[3.400] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-15b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 31: WHITE ALICE SITE

Site 31 - White Alice Site

Soil Matrix

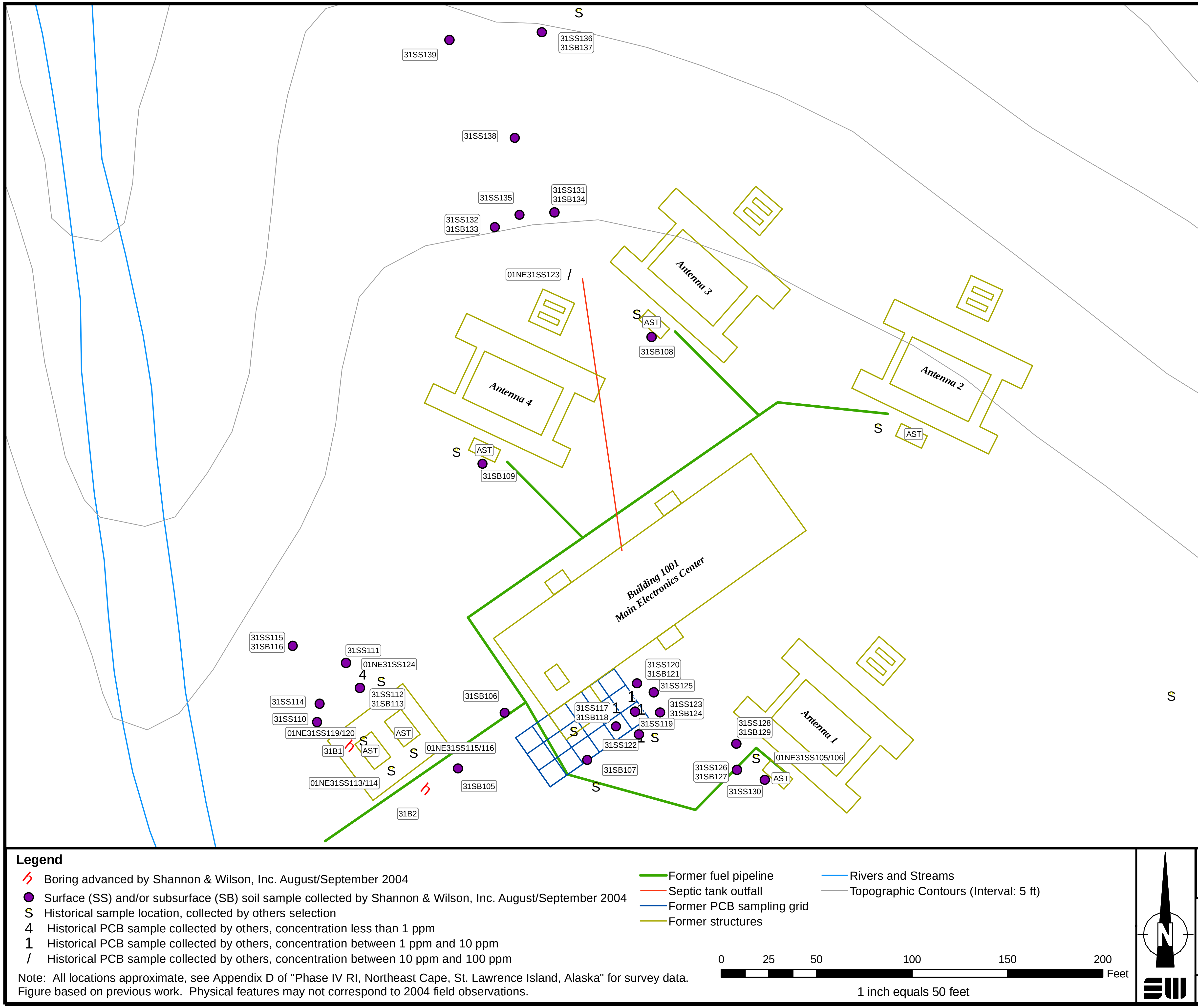
			Sample Type:	FORMER BUILDING 1001 GRID										
			Location ID:	31SS117-2	31SS117-4			31SS119-1	31SS120-2	31SS120-4	31SS122-1	31SS123-2	31SS123-4	31SS125-1
			Sample ID:	04NE31SS117	04NE31SB118	04NE31SB218	04NE31SB318	04NE31SS119	04NE31SS120	04NE31SB121	04NE31SS122	04NE31SS123	04NE31SB124	04NE31SS125
			Depth (ft):	1.9	4	4	4	0.8-2	1.9-2.1	4-4.2	1.2	2	3.8-4.1	1.2
			Sample Date:	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**		*Primary*	*Duplicate*	*Triplicate*							
PID Headspace Reading	HNU HW101 PID	ppm	–	–	–	–	–	–	–	–	–	–	–	–
Percent Moisture	A2540G / E160.3M	%	–	7.4	7.2	7.3	7.0	4.5	9.7	8.3	12.4	9.3	9.4	12.3
Gasoline Range Organics (GRO)	AK101	mg/kg	300	–	–	–	–	–	–	–	–	–	–	–
Diesel Range Organics (DRO)	AK102	mg/kg	250	–	–	–	–	–	–	–	–	–	–	–
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	–	–	–	–	–	–	–	–	–	–	–
Aromatic Organic Compounds (BTEX)														
Benzene	SW8260B	µg/kg	20	–	–	–	–	–	–	–	–	–	–	–
Ethylbenzene	SW8260B	µg/kg	5,500	–	–	–	–	–	–	–	–	–	–	–
Toluene	SW8260B	µg/kg	5,400	–	–	–	–	–	–	–	–	–	–	–
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	–	–	–	–	–	–
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	–	–	–	–	–	–
Polynuclear Aromatic Hydrocarbons (PAH)				–	–	–	–	–	–	–	–	–	–	–
Acenaphthene	PAH SIM	µg/kg	210,000	–	–	–	–	–	–	–	–	–	–	–
Acenaphthylene	PAH SIM	µg/kg	210,000	–	–	–	–	–	–	–	–	–	–	–
Anthracene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	–	–	–	–	–	–
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	–	–	–	–	–	–	–	–	–	–	–
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	–	–	–	–	–	–
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	–	–	–	–	–	–	–	–	–	–	–
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	–	–	–	–	–	–
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	–	–	–	–	–	–
Chrysene	PAH SIM	µg/kg	620,000	–	–	–	–	–	–	–	–	–	–	–
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	–	–	–	–	–	–
Fluoranthene	PAH SIM	µg/kg	2,100,000	–	–	–	–	–	–	–	–	–	–	–
Fluorene	PAH SIM	µg/kg	270,000	–	–	–	–	–	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	–	–	–	–	–	–	–	–	–	–	–
Naphthalene	PAH SIM	µg/kg	21,000	–	–	–	–	–	–	–	–	–	–	–
Phenanthrene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	–	–	–	–	–	–
Pyrene	PAH SIM	µg/kg	1,500,000	–	–	–	–	–	–	–	–	–	–	–
Polychlorinated Biphenyls (PCBs)			Sum of congeners:											
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.0521]	[0.0537]	[0.0545]	[0.025]	[0.0521]	[0.0565]	[0.0534]	[0.0568]	[0.0557]	[0.0563]	[0.0565]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.0521]	[0.0537]	[0.0545]	[0.050]	[0.0521]	[0.0565]	[0.0534]	[0.0568]	[0.0557]	[0.0563]	[0.0565]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.0521]	[0.0537]	[0.0545]	[0.025]	[0.0521]	[0.0565]	[0.0534]	[0.0568]	[0.0557]	[0.0563]	[0.0565]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.0521]	[0.0537]	[0.0545]	[0.025]	[0.0521]	[0.0565]	[0.0534]	[0.0568]	[0.0557]	[0.0563]	[0.0565]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.0521]	[0.0537]	[0.0545]	[0.025]	[0.0521]	[0.0565]	[0.0534]	[0.0568]	[0.0557]	[0.0563]	[0.0565]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.0521]	[0.0537]	[0.0545]	[0.025]	[0.0521]	[0.0565]	[0.0534]	[0.0568]	[0.0557]	[0.0563]	[0.0565]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	0.213	0.487	0.634	0.666	**14.6**	0.387	**2.77**	**7.66**	**14.8**	0.455	**2.08**
PCB-1262 (Aroclor 1262)	SW8082	mg/kg	"	–	–	–	[0.025]	–	–	–	–	–	–	–
PCB-1268 (Aroclor 1268)	SW8082	mg/kg	"	–	–	–	[0.025]	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	SGS SOP	mg/kg	–	–	–	–	–	–	–	–	–	–	–	–

KEY	DESCRIPTION
–	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone, migration to groundwater exposure route.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[3.400] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-15b SUMMARY OF SOIL ANALYTICAL RESULTS - SITE 31: WHITE ALICE SITE

Site 31 - White Alice Site **Soil Matrix**			Sample Type:	**SEPTIC OUTFALL AREA**								
			Location ID:	31SS131-2	31SS131-3	31SS132-2	31SS132-4	31SS135-1	31SS136-1	31SS136-4	31SS138-1	31SS139-2
			Sample ID:	04NE31SS131	04NE31SB134	04NE31SS132	04NE31SB133	04NE31SS135	04NE31SS136 *	04NE31SB137	04NE31SS138	04NE31SS139
			Depth (ft):	2.1	2.9	1.4-1.6	3.5-4	1.1-1.2	1.3-1.5	4.2-4.5	1-1.5	1.4-1.6
			Sample Date:	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004	8/31/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**									
PID Headspace Reading	HNU HW101 PID	ppm	–	–	–	–	–	–	–	–	–	–
Percent Moisture	A2540G / E160.3M	%	–	16.1	14.8	6.8	6.5	8.1	10.3	9.7	16.3	13.8
Gasoline Range Organics (GRO)	AK101	mg/kg	300	–	–	–	–	–	–	–	–	–
Diesel Range Organics (DRO)	AK102	mg/kg	250	–	–	–	–	–	–	–	–	–
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	–	–	–	–	–	–	–	–	–
Aromatic Organic Compounds (BTEX)												
Benzene	SW8260B	µg/kg	20	–	–	–	–	–	–	–	–	–
Ethylbenzene	SW8260B	µg/kg	5,500	–	–	–	–	–	–	–	–	–
Toluene	SW8260B	µg/kg	5,400	–	–	–	–	–	–	–	–	–
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	–	–	–	–
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	–	–	–	–	–	–	–	–	–
Polynuclear Aromatic Hydrocarbons (PAH)				–	–	–	–	–	–	–	–	–
Acenaphthene	PAH SIM	µg/kg	210,000	–	–	–	–	–	–	–	–	–
Acenaphthylene	PAH SIM	µg/kg	210,000	–	–	–	–	–	–	–	–	–
Anthracene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	–	–	–	–
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	–	–	–	–	–	–	–	–	–
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	–	–	–	–
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	–	–	–	–	–	–	–	–	–
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	–	–	–	–
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	–	–	–	–	–	–	–	–	–
Chrysene	PAH SIM	µg/kg	620,000	–	–	–	–	–	–	–	–	–
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	–	–	–	–	–	–	–	–	–
Fluoranthene	PAH SIM	µg/kg	2,100,000	–	–	–	–	–	–	–	–	–
Fluorene	PAH SIM	µg/kg	270,000	–	–	–	–	–	–	–	–	–
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	–	–	–	–	–	–	–	–	–
Naphthalene	PAH SIM	µg/kg	21,000	–	–	–	–	–	–	–	–	–
Phenanthrene	PAH SIM	µg/kg	4,300,000	–	–	–	–	–	–	–	–	–
Pyrene	PAH SIM	µg/kg	1,500,000	–	–	–	–	–	–	–	–	–
Polychlorinated Biphenyls (PCBs)			Sum of congeners:									
PCB-1016 (Aroclor 1016)	SW8082	mg/kg	1 (ing/inh)	[0.0599]	[0.0597]	[0.0565]	[0.052]	[0.0545]	[0.0587]	[0.0579]	[0.0585]	[0.0596]
PCB-1221 (Aroclor 1221)	SW8082	mg/kg	"	[0.0599]	[0.0597]	[0.0565]	[0.052]	[0.0545]	[0.0587]	[0.0579]	[0.0585]	[0.0596]
PCB-1232 (Aroclor 1232)	SW8082	mg/kg	"	[0.0599]	[0.0597]	[0.0565]	[0.052]	[0.0545]	[0.0587]	[0.0579]	[0.0585]	[0.0596]
PCB-1242 (Aroclor 1242)	SW8082	mg/kg	"	[0.0599]	[0.0597]	[0.0565]	[0.052]	[0.0545]	[0.0587]	[0.0579]	[0.0585]	[0.0596]
PCB-1248 (Aroclor 1248)	SW8082	mg/kg	"	[0.0599]	[0.0597]	[0.0565]	[0.052]	[0.0545]	[0.0587]	[0.0579]	[0.0585]	[0.0596]
PCB-1254 (Aroclor 1254)	SW8082	mg/kg	"	[0.0599]	[0.0597]	[0.0565]	[0.052]	[0.0545]	[0.0587]	[0.0579]	[0.0585]	[0.0596]
PCB-1260 (Aroclor 1260)	SW8082	mg/kg	"	0.0591 J	0.0977	0.278	0.0314 J	0.34	0.0448 J	[0.0579]	[0.0585]	[0.0596]
PCB-1262 (Aroclor 1262)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–
PCB-1268 (Aroclor 1268)	SW8082	mg/kg	"	–	–	–	–	–	–	–	–	–
Total Organic Carbon (TOC)	SGS SOP	mg/kg	–	–	–	–	–	–	–	–	–	–

KEY	**DESCRIPTION**
–	Analysis not requested or cleanup level not established
ppm	parts per million
%	percent
mg/kg	milligrams per kilogram (ppm)
µg/kg	micrograms per kilogram (ppb)
PID	Photoionization detector
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone, migration to groundwater exposure route.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
[3.400] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)



Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE 31 - WHITE ALICE SITE

June 2005
32-1-16821

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5-15

5.16 Background Sample Collection

Soil samples were collected from 18 background locations. Surface water and sediment samples were collected from 10 locations.

5.16.1 Site Description

Background samples from the tundra surface soil, gravel surface soil, sediment, and surface water were intended to be collected from areas that exhibited similar physical characteristics (aspect, elevation, drainage basin, vegetation and topography) to the potentially impacted areas at Northeast Cape. The background sample locations were therefore selected from areas outside the property boundary, as shown on Figure 5-16b, but within a 4-mile radius from the MOC. Accordingly, samples were collected from a wide variety of different locations in an area of approximately 14.5 square miles around the northeast Cape Complex (See Table 5-16a).

5.16.2 Data Collection Objectives

The objective of the background samples was to compile a statistically valid representation of naturally-occurring organic compounds in the project vicinity. These data may be useful in evaluating whether observed on-site conditions are attributable to anthropogenic and/or biogenic sources.

5.16.3 Work Plan Variances

The objective of collecting background samples with “similar characteristics to site-impacted areas at Northeast Cape, but … located within a reasonable distance from the site” was difficult to achieve. As evident on Figure 2-2, there is no other area of massive deposition from a steep valley glacier within a reasonable distance of the site. Gravelly surface soil similar to the site was particularly difficult to find, and three “background” samples were collected from the gravel quarries used as borrow sources during site development. These quarries are within the boundary indicated on Figure 5-16, but are on a slope above the site, so were considered to be less impacted by site activities than down-gradient locations.

5.16.3.1 Background Soil Samples

Although 20 background soil samples were scoped, only eighteen samples were collected. Of the 18 samples, 9 could be considered “gravelly” and 4 were primarily organic peat. Bulk density tests were difficult to complete because many of the gravel areas contained fractured cobbles that would puncture the balloon of a volumeter or preclude driving a cylinder. Other soil sample locations would fill with water. Seven successful bulk density measurements were completed.

Because measuring the grainsize of material that is primarily peat has no recognized method or application for our objectives, five peaty samples were submitted for analysis of organic content by ignition furnace. The three peaty samples with less than 40 percent organics were also run for grainsize analysis with hydrometer testing, although this can bias the results high at the fine end of the grainsize distibution. Three background soil samples appeared to contain mineral soil with over 10% fines, and were submitted for grainsize analysis with hydrometer testing of the fines. Thirteen background soil samples were submitted for sieve analysis. A grainsize portion was not collected from one background soil sample location because there was not enough soil left between the rocks after collecting the analytical sample to be representative of the analytical sample.

5.16.3.2 Background Sediment Samples

Granular sediments and sediments that were exposed due to low water levels were also difficult to find. A majority of sediment samples were highly organic, and were collected through a water column. The soft organic sediments were similar to those found in the Suqitughneq River and Estuary. No bulk density tests of sediment were successfully completed. Due to a misunderstanding after discussing how a meaningful bulk density sample could be achieved, only two grainsize samples were collected from background sediment locations. One of these samples was primarily peat and a grainsize analysis was not performed. The other sample was submitted for full grainsize analysis.

5.16.4 Field Investigation

Background sampling field activities occurred between September 7 and September 13, 2004. A summary of samples collected, including a description of sample location and classification, is presented in Table 5-16a and sample locations are depicted on Figure 5-17.

Nine surface soil samples (BGSS101, BGSS102, BGSS103, BGSS104, BGSS105, BGSS107, BGSS110, BGSS113, and BGSS115) were collected from areas with tundra vegetation beyond the installation boundary. The samples were analyzed for DRO, RRO, GRO, total organic carbon, and, when practicable, physical soil properties (grain size distribution, moisture content, and soil bulk density). In addition, a comparison of natural organics and petroleum derived components was conducted for the DRO and RRO results.

Nine gravel surface soil samples were collected, three of which (Samples BGSS111, BGSS112, and BGSS114) were collected from the quarry areas to southwest and southeast of Site 31. The background gravel samples were intended to be similar to the granular soils which comprise the gravel pads and roads of the former installation. Photograph 16 in Appendix A shows a sample being collected from a gravel area. The samples were analyzed for DRO, RRO, GRO, total organic carbon, and, when practicable, physical soil properties (grain size distribution, moisture content, and soil bulk density). These samples also underwent a comparison of natural organics and petroleum derived components for the DRO and RRO results.

Ten sediment samples were collected from areas beyond the installation boundary. The samples were analyzed for DRO, RRO, GRO, PAHs, BTEX, total organic carbon, and, when practicable, physical soil properties (grain size distribution, moisture content, and soil bulk density). These samples also underwent a comparison of natural organics and petroleum derived components for the DRO and RRO results.

Ten surface water samples were collected from rivers, streams, creeks, lakes, and ponds beyond the installation boundary. The surface water sample locations generally coincided with the sediment sample locations. The water samples were analyzed for DRO, RRO, GRO, PAH, and BTEX. The PAH and BTEX results were used to calculate TaqH and TAH.

5.16.4.1 IDW

Sampling gloves were placed in the project IDW bag. Water used for decontamination of hand tools was collected in a 55 gallon drum at camp, then filtered through GAC and discharged to the surface of the gravel pad.

5.16.4.2 Field Observations

The site-impacted areas at Northeast Cape, particularly in the Main Operations Complex, are an amalgam of building debris, native tundra, beach sand and gravel, quarried rock, and other environments. The site is at the base of the only North-facing depositional area of a steep valley glacier on the northeast cape of St. Lawrence Island. Surface runoff pathways from site-impacted areas are often difficult to determine, particularly the drainage pathways to the north and west of the Upper Camp on the mountain crest.

5.16.5 Analytical Results

Table 5-16b summarizes the analytical results for background soil and sediment samples, and Table 5-16c summarizes the analytical results for water background samples. Table 5-16d and Appendix B contains the results of the soil material testing (i.e., grainsize classification graphs).

Of the nine surface soil samples collected from tundra areas, five (Samples BGSS102, BGSS103, 105, 113, and 115) were primarily organic peat, containing over 29 percent organics by dry mass as measured by combustion at 450ºC. DRO concentrations in these samples ranged from 205 to an estimated 404 mg/kg, with three of them exceeding the 250mg/kg ADEC cleanup criterion. RRO concentrations ranged from an estimated 1,260 to an estimated 2,080 mg/kg.

Higher mineral content soils were found beneath the vegetation for Samples BGSS101, BGSS104, BGSS107, and BGSS110. Concentrations of DRO and RRO varied from below the PQLs to an estimated 198 mg/kg DRO and an estimated 1,240 mg/kg RRO. All of the detected DRO and RRO in background samples exhibited characteristics of biogenic hydrocarbons (See Table D-1 in Appendix D).

Samples BGSS106, BGSS108, BGSS109, BGSS111, BGSS112, BGSS114, BGSS116, BGSS117, and BGSS118 were collected from exposed coarse granular soils. The highest DRO and RRO concentrations of all the background samples were measured in Sample BGSS118, with values of 825 mg/kg DRO, and 5,080 mg/kg RRO. Sample BGSS118 was collected from an area of beach sand and gravel, however the granular soil was found to overlay peat when an attempt was made to measure bulk density. DRO concentrations were estimated values at concentrations less than the PQL for the remaining gravel-area samples. RRO concentrations ranged from an estimated 18 mg/kg to an estimated 357 mg/kg. The DRO and/or RRO concentrations, when adequate, were attributed to biogenic hydrocarbons.

Of the ten sediment samples collected from areas beyond the installation boundary, Samples BGSD101 (and QA replicate BGSD301), BGSD103, and BGSD108 contained concentrations of DRO in excess of the ADEC soil cleanup criterion. RRO concentrations ranged from an estimated 524 mg/kg to 4,260 mg/kg for these samples. These hydrocarbons were assessed to be biogenic in origin. BTEX constituents were not detected above the laboratory PQLs, however the benzene PQLs at seven locations exceeded the soil cleanup criterion. The PQLs are likely elevated due to high moisture contents and organic materials.

Ten surface water samples were collected from streams, creeks, or ponds beyond the installation boundary. None of the results exceed the applied cleanup criteria. The majority of the GRO, DRO, and RRO results were estimated values below the PQL or not detected above the PQL. RRO was measured in Samples BGSW103 and BGSW105 at concentrations above the PQL. RRO was detected at a similar concentration in the associated method blank for sample BGSW103, however. Two samples (BGSW101 and BGSW104), which were collected from an area to the West of the Complex, along with an associated QC duplicate (BGSW201) contained levels of Naphthalene slightly greater than the PQL. Naphthalene was also detected in Sample BGSW102 at a concentration less than the PQL.

TABLE 5-16a - SAMPLE LOCATIONS AND DESCRIPTIONS - BACKGROUND

Sample Number**	LOCID	Date	Sample Location (See Figure 5-16)	Depth (feet)	Sample Classification†
Soil Samples					
* BGSS101	BGSS101	9/8/04	Drainage on toe of mountain, WSW of MOC	0.5-0.7	Brown, slightly gravelly, silty SAND and organics, moist
* BGSS202	BGSS101	9/8/04	QC replicate of Sample BGSS101	0.5-0.7	Brown, slightly gravelly, silty SAND and organics, moist
* BGSS301	BGSS101	9/8/04	QA replicate of Sample BGSS101	0.5-0.7	Brown, slightly gravelly, silty SAND and organics, moist
* BGSS102	BGSS102	9/8/04	Flat tundra and lake area to W of western antennas	0.7-0.9	Dark brown, silty PEAT;
* BGSS103	BGSS103	9/8/04	Flat tundra and lake area to W of western antennas	0.5-0.7	Dark brown, silty PEAT;
* BGSS104	BGSS104	9/8/04	Flat tundra and lake area to W of western antennas	0.4-0.8	Gray SILT; wet
* BGSS105	BGSS105	9/9/04	Tundra above beach, NW of site	0.4-0.5	Brown PEAT; wet
* BGSS106	BGSS106	9/9/04	Mid-reach, Tapisaghek River Valley, E of MOC	0.4-0.6	Brown, gravelly SAND to sandy GRAVEL; moist, scattered organics
* BGSS107	BGSS107	9/10/04	Upper Tapisaghek Valley, adjacent to dry creek bed	0-0.2	Brown, silty SAND; moist, with organics [Loam]
* BGSS108	BGSS108	9/10/04	Upper Tapisaghek Valley, in dry creek bed	0-0.2	Brown, sandy GRAVEL; moist
* BGSS109	BGSS109	9/10/04	Upper Tapisaghek Valley, similar to Site 6	0.2-0.4	Brown, slightly silty, sandy GRAVEL; moist, with organics
* BGSS110	BGSS110	9/10/04	Gravelly tundra above Tapisaghek River Delta	0.1-0.3	Brown, slightly silty, gravelly SAND; moist
* BGSS111	BGSS111	9/11/04	Western gravel quarry, south of MOC	0.1-0.3	Brown, sandy GRAVEL and cobbles; moist, trace silt and organics
* BGSS112	BGSS112	9/11/04	Eastern gravel quarry, across from base of tram	0-0.2	Brown, sandy GRAVEL; moist
* BGSS113	BGSS113	9/12/04	E of MOC above Upper Suqi. Lake - tundra w/ berries	0.3-0.5	Dark brown sandy SILT with PEAT; moist
* BGSS114	BGSS114	9/13/04	Eastern gravel quarry S of White Alice, N of BGSS112	0.1-0.3	Brown, silty, sandy GRAVEL; moist
* BGSS214	BGSS114	9/13/04	QC replicate of Sample BGSS114	0.1-0.3	Brown, silty, sandy GRAVEL; moist
* BGSS314	BGSS114	9/13/04	QA replicate of Sample BGSS114	0.1-0.3	Brown, silty, sandy GRAVEL; moist
* BGSS115	BGSS115	9/13/04	E of MOC above Upper Suqi. Lake, soil over talus	0.5-0.7	Dark brown, PEAT; moist
* BGSS116	BGSS116	9/13/04	E of MOC above Upper Suqi. Lake, gravel in talus	0-0.3	Brown, sandy GRAVEL; moist
* BGSS117	BGSS117	9/13/04	E of MOC above Upper Suqi. Lake - gravel track	0.1-0.3	Brown, sandy GRAVEL, trace silt; moist
* BGSS118	BGSS118	9/13/04	Above beach between Cargo Beach and Tapisaghek	0.3-0.5	Brown, rounded gravelly SAND; moist
Sediment Samples					
* BGSD101	BGW101	9/8/04	Drainage on toe of mountain, WSW of MOC	0.3-0.5	Dark brown, slightly silty, gravelly SAND; wet
* BGSD201	BGW101	9/8/04	QC replicate of Sample BGSD101	0.3-0.5	Dark brown, slightly silty, gravelly SAND; wet
* BGSD301	BGW101	9/8/04	QA replicate of Sample BGSD101	0.3-0.5	Dark brown, slightly silty, gravelly SAND; wet
* BGSD102	BGW102	9/8/04	Flat tundra and lake area to W of western antennas	0-0.2	Dark brown, silty SAND and organics; wet [Loamy]
* BGSD103	BGW103	9/8/04	Flat tundra and lake area to W of western antennas	0.1-0.3	Dark brown PEAT; wet, with roots
* BGSD104	BGW104	9/8/04	Flat tundra and lake area to W of western antennas	0.2-0.5	Dark brown, silty PEAT; wet
* BGSD105	BGW105	9/9/04	Tundra above beach, NW of site	0-0.2	Brown to gray SILT; wet, with organics
* BGSD106	BGW106	9/9/04	Mid-reach, Tapisaghek River Valley, E of MOC	0-0.2	Brown, silty SAND; wet
* BGSD107	BGW107	9/10/04	Lower-reach, Tapisaghek River Valley, E of MOC	0.2-0.4	Brown, slightly silty SAND; wet

TABLE 5-16a - SAMPLE LOCATIONS AND DESCRIPTIONS - BACKGROUND

Sample Number**	LOCID	Date	Sample Location (See Figure 5-16)	Depth (feet)	Sample Classification†
Sediment Samples					
* BGSD108	BGW108	9/10/04	Outlet, smaller stream than Suqi, NW of Tapi. River	0-0.2	Brown to black, organic SILT; trace sand, rusty algae
* BGSD109	BGW109	9/10/04	Mid-reach, smaller stream, NW of Tapi. River	0-0.2	Dark brown, sandy SILT; wet, trace organics
* BGSD110	BGW110	9/12/04	E of MOC above Upper Suqi. Lake, small pond	0.1-0.3	Bark brown PEAT; wet, with roots
* BGSD210	BGW110	9/12/04	QC replicate of Sample BGSD110	0.1-0.3	Bark brown PEAT; wet, with roots
* BGSD310	BGW110	9/12/04	QA replicate of Sample BGSD110	0.1-0.3	Bark brown PEAT; wet, with roots
Surface Water Samples					(For size comparison, the Suqi. River was considered a large creek, and the Suqi. Estuary a large lake.)
* BGSW101	BGW101	9/8/04	Drainage on toe of mountain, WSW of MOC	-	Clear surface water from small creek
* BGSW201	BGW101	9/8/04	QC replicate of Sample BGSW101	-	Clear surface water from small creek
* BGSW301	BGW101	9/8/04	QA replicate of Sample BGSW101	-	Clear surface water from small creek
* BGSW102	BGW102	9/8/04	Flat tundra and lake area to W of western antennas	-	Clear surface water from medium-sized lake
* BGSW103	BGW103	9/8/04	Flat tundra and lake area to W of western antennas	-	Clear surface water from medium-sized lake
* BGSW104	BGW104	9/8/04	Flat tundra and lake area to W of western antennas	-	Clear surface water from medium-sized creek
* BGSW105	BGW105	9/9/04	Tundra above beach, NW of site	-	Clear surface water from small creek
* BGSW106	BGW106	9/9/04	Mid-reach, Tapisaghek River Valley, E of MOC	-	Clear surface water from small river
* BGSW107	BGW107	9/10/04	Lower-reach, Tapisaghek River Valley, E of MOC	-	Clear surface water from small river
* BGSW108	BGW108	9/10/04	Outlet, smaller stream than Suqi, NW of Tapi. River	-	Clear surface water from medium-sized creek
* BGSW109	BGW109	9/10/04	Mid-reach, smaller stream, NW of Tapi. River	-	Clear surface water from medium-sized creek
* BGSW110	BGW110	9/12/04	E of MOC above Upper Suqi. Lake, small pond	-	Clear surface water from small pond

note: Sediment and Surface Water samples were approximately co-located, and were thus given common LOCIDs from BGW101-BGW110

KEY	DESCRIPTION
*	Sample analyzed by the project or QA laboratory (See Tables 5-16b and 5-16c)
**	The full sample number is preceded by "04NE", for example BGSS101 is sample 04NEBGSS101
†	Sample classification applies to the portion of the specified sample interval from which the sample was collected
-	Measurement not recorded or not applicable
LOCID	Location Identification: "BGSS101" signifies Background Surface Soil Sample 101

TABLE 5-16b SUMMARY OF SOIL ANALYTICAL RESULTS - BACKGROUND

Background Samples **Soil Matrix**			Sample Type:	**SURFACE SOIL**												
			Location ID:	BGSS101			BGSS102	BGSS103	BGSS104	BGSS105	BGSS106	BGSS107	BGSS108	BGSS109	BGSS110	BGSS111
			Sample ID:	04NEBGSS101	04NEBGSS201	04NEBGSS301	04NEBGSS102	04NEBGSS103	04NEBGSS104	04NEBGSS105	04NEBGSS106	04NEBGSS107	04NEBGSS108	04NEBGSS109	04NEBGSS110	04NEBGSS111
			Depth (ft):	0.5-0.7	0.5-0.7	0.5-0.7	0.7-0.9	0.5-0.7	0.4-0.8	0.4-0.5	0.4-0.6	0-0.2	0-0.2	0.2-0.4	0.1-0.3	0.1-0.3
			Sample Date:	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/9/2004	9/9/2004	9/10/2004	9/10/2004	9/10/2004	9/10/2004	9/11/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**	*Primary*	*Duplicate*	*Triplicate*										
Percent Moisture	A2540G / E160.3M	%	-	15.5	15.0	13.9	55.5	57.2	49.3	79.9	28.9	23.6	3.9	21.1	12.4	8.4
Gasoline Range Organics (GRO)	AK101	mg/kg	300	2.21 J	2.01 J	5.44	1.60 J	2.80 J	1.54 J	3.91 J	1.56 J	1.46 J	1.23 J	1.31 J	0.773 J	0.899 J
Diesel Range Organics (DRO)	AK102	mg/kg	250	20.5 J	18.9 J	6.29	219 J	**404 J**	198 J	**269 J**	22.3 J	40.5 J	4.01 J	50.8 J	12 J	6.25 J
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	-	-	biogenic	biogenic	biogenic	biogenic	^	^	^	biogenic	^	^
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	175 J	163 J	65.3	1,260 J	2,050 J	1,240 J	2,080 J	139 J	255	18 J	357 J	76.3	40.4
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	-	-	biogenic	biogenic	biogenic	biogenic	^	^	^	biogenic	^	^
Aromatic Organic Compounds (BTEX)																
Benzene	SW8260B	µg/kg	20	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylbenzene	SW8260B	µg/kg	5,500	-	-	-	-	-	-	-	-	-	-	-	-	-
Toluene	SW8260B	µg/kg	5,400	-	-	-	-	-	-	-	-	-	-	-	-	-
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	-	-	-	-	-	-	-	-	-	-	-	-	-
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	-	-	-	-	-	-	-	-	-	-	-	-	-
Polynuclear Aromatic Hydrocarbons (PAH)																
Acenaphthene	PAH SIM	µg/kg	210,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	PAH SIM	µg/kg	210,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	PAH SIM	µg/kg	4,300,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	-	-	-	-	-	-	-	-	-	-	-	-	-
Chrysene	PAH SIM	µg/kg	620,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluoranthene	PAH SIM	µg/kg	2,100,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	PAH SIM	µg/kg	270,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	PAH SIM	µg/kg	21,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	PAH SIM	µg/kg	4,300,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Pyrene	PAH SIM	µg/kg	1,500,000	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Organic Carbon (TOC)	SGS SOP	mg/kg	-	15,200	13,700	-	88,100	164,000	67,800	434,000	7,450	11,800	1,320	46,100	7,660	4,510
Total Metals																
Chromium	SW6020	mg/kg	26 (total Cr)	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	SW6020	mg/kg	400 (ing/inh)	-	-	-	-	-	-	-	-	-	-	-	-	-
Mercury	SW7471A	mg/kg	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-
Zinc	SW6020	mg/kg	9,100	-	-	-	-	-	-	-	-	-	-	-	-	-

KEY	DESCRIPTION
-	Analysis not requested or cleanup level not established
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
^	Tentatively identified compounds not reviewed due to low concentration
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)

TABLE 5-16b SUMMARY OF SOIL ANALYTICAL RESULTS - BACKGROUND

Background Samples **Soil Matrix**			Sample Type:	**SURFACE SOIL**									**SEDIMENT**			
			Location ID:	BGSS112	BGSS113	BGSS114			BGSS115	BGSS116	BGSS117	BGSS118	BGW101			BGW102
			Sample ID:	04NEBGSS112	04NEBGSS113	04NEBGSS114 *	04NEBGSS214	04NEBGSS314	04NEBGSS115	04NEBGSS116	04NEBGSS117	04NEBGSS118	04NEBGSD101	04NEBGSD201	04NEBGSD301	04NEBGSD102
			Depth (ft):	0-0.2	0.3-0.5	0.1-0.3	0.1-0.3	0.1-0.3	0.5-0.7	0-0.3	0.1-0.3	0.3-0.5	0.3-0.5	0.3-0.5	0.3-0.5	0-0.2
			Sample Date:	9/11/2004	9/12/2004	9/13/2004	9/12/2004	9/12/2004	9/13/2004	9/13/2004	9/13/2004	9/13/2004	9/8/2004	9/8/2004	9/8/2004	9/8/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**			*Primary*	*Duplicate*	*Triplicate*					*Primary*	*Duplicate*	*Triplicate*	
Percent Moisture	A2540G / E160.3M	%	-	7.7	53.9	7.8	8.0	4.5	64.1	9.2	9.8	79.6	89.4	83.6	90.02	86.5
Gasoline Range Organics (GRO)	AK101	mg/kg	300	0.756 J	4.87 J	1.25 J	-	-	9.29 J	1.04 J	0.881 J	44.0 J	4.04 J	[13.2]	3.68 J	6.49 J
Diesel Range Organics (DRO)	AK102	mg/kg	250	6.29 J	**379**	5.95 J	6.60 J	2.99 J	205	15.9 J	8.09 J	**825 J**	**661 J**	119 J	**314**	135 J
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	biogenic	^	^	-	biogenic	^	^	biogenic	biogenic	biogenic	–	biogenic
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	42.8	1,910	28.6	44.8	18.4 J	1,440 J	79.7	62.2	5,080 J	2,050	524	928	613
Lab Assessment of Hydrocarbon Origin†	-	-	-	^	biogenic	^	^	-	biogenic	^	^	biogenic	biogenic	biogenic	–	biogenic
Aromatic Organic Compounds (BTEX)																
Benzene	SW8260B	µg/kg	20	-	-	-	-	-	-	-	-	-	**[164]**	**[68.6]**	**[1000]**	**[143]**
Ethylbenzene	SW8260B	µg/kg	5,500	-	-	-	-	-	-	-	-	-	[315]	[132]	[1000]	[275]
Toluene	SW8260B	µg/kg	5,400	-	-	-	-	-	-	-	-	-	[630]	[264]	[1000]	[550]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	-	-	-	-	-	-	-	-	-	[315]	[132]	[3001]	[275]
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	-	-	-	-	-	-	-	-	-	[630]	[264]		[550]
Polynuclear Aromatic Hydrocarbons (PAH)																
Acenaphthene	PAH SIM	µg/kg	210,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	120 J	[717]
Acenaphthylene	PAH SIM	µg/kg	210,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Anthracene	PAH SIM	µg/kg	4,300,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	-	-	-	-	-	-	-	-	-	[1000]	[633]	40.1 J	[717]
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Chrysene	PAH SIM	µg/kg	620,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Fluoranthene	PAH SIM	µg/kg	2,100,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Fluorene	PAH SIM	µg/kg	270,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Naphthalene	PAH SIM	µg/kg	21,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	147 J	[717]
Phenanthrene	PAH SIM	µg/kg	4,300,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Pyrene	PAH SIM	µg/kg	1,500,000	-	-	-	-	-	-	-	-	-	[1000]	[633]	[200]	[717]
Total Organic Carbon (TOC)	SGS SOP	mg/kg	-	4,780	93,600	3,740	-	-	269,000	11,700	6,070	319,000	193,000	220,000	**-**	255,000
Total Metals																
Chromium	SW6020	mg/kg	26 (total Cr)	-	-	9.11	11.9	7.86 J	-	-	-	-	-	-	-	-
Lead	SW6020	mg/kg	400 (ing/inh)	-	-	15.4 J	15.1 J	16.5 J	-	-	-	-	-	-	-	-
Mercury	SW7471A	mg/kg	1.4	-	-	0.0151 J	[0.0433]	0.0104 J	-	-	-	-	-	-	-	-
Zinc	SW6020	mg/kg	9,100	-	-	28.0	33.4	28.1 J	-	-	-	-	-	-	-	-

note: Sediment and Surface Water samples were co-located, and were thus given common LOCIDs from BGW101-BGW110

KEY	DESCRIPTION
-	Analysis not requested or cleanup level not established
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
^	Tentatively identified compounds not reviewed due to low concentration
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)

TABLE 5-16b SUMMARY OF SOIL ANALYTICAL RESULTS - BACKGROUND

Background Samples Soil Matrix			Sample Type:		SEDIMENT SAMPLES								
			Location ID:	BGW103	BGW104	BGW105	BGW106	BGW107	BGW108	BGW109	BGW110		
			Sample ID:	04NEBGSD103	04NEBGSD104	04NEBGSD105	04NEBGSD106	04NEBGSD107	04NEBGSD108	04NEBGSD109	04NEBGSD110	04NEBGSD210	04NEBGSD310
			Depth (ft):	0.1-0.3	0.2-0.5	0-0.2	0-0.2	0.2-0.4	0-0.2	0-0.2	0.1-0.3	0.1-0.3	0.1-0.3
			Sample Date:	9/8/2004	9/8/2004	9/9/2004	9/9/2004	9/10/2004	9/10/2004	9/10/2004	9/12/2004	9/12/2004	9/12/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**								*Primary*	*Duplicate*	*Triplicate*
Percent Moisture	A2540G / E160.3M	%	-	85	31.8	84.7	4.6	23.9	67.8	37.3	87.1	-	-
Gasoline Range Organics (GRO)	AK101	mg/kg	300	12.3 J	0.897 J	4.56 J	1.37 J	0.677 J	2.00 J	2.11 J	4.25 J	-	-
Diesel Range Organics (DRO)	AK102	mg/kg	250	**798 J**	98.7	178	3.84 J	24.3 J	**399 J**	160	104 J	-	-
Lab Assessment of Hydrocarbon Origin†	-	-	-	biogenic	biogenic	biogenic	^	^	biogenic	biogenic	biogenic	-	-
Residual Range Organics (RRO)	AK103	mg/kg	10,000 (ing)	4,260 J	494	1,220	17.2 J	59.2	1,650 J	1,270 J	784	-	-
Lab Assessment of Hydrocarbon Origin†	-	-	-	biogenic	biogenic	biogenic	^	^	biogenic	biogenic	biogenic	-	-
Aromatic Organic Compounds (BTEX)													
Benzene	SW8260B	µg/kg	20	**[198]**	[19.6]	**[107]**	[15.1]	[8.78]	**[43.1]**	**[23.2]**	**[102]**	[12.7] (wet)	**[100] (wet)**
Ethylbenzene	SW8260B	µg/kg	5,500	[380]	[37.7]	[206]	[28.9]	[16.9]	[82.8]	[44.5]	[196]	[24.4] (wet)	[100] (wet)
Toluene	SW8260B	µg/kg	5,400	[761]	[75.4]	[412]	[57.9]	[33.8]	[166]	[89.1]	[392]	16.6 J (wet)	[100] (wet)
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[380]	[37.7]	[206]	[28.9]	[16.9]	[82.8]	[44.5]	[196]	[24.4] (wet)	[100] (wet)
m & p-Xylenes	SW8260B	µg/kg	78,000 (total Xylenes)	[761]	[75.4]	[412]	[57.9]	[33.8]	[166]	[89.1]	[392]	[48.9] (wet)	[200] (wet)
Polynuclear Aromatic Hydrocarbons (PAH)													
Acenaphthene	PAH SIM	µg/kg	210,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Acenaphthylene	PAH SIM	µg/kg	210,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Anthracene	PAH SIM	µg/kg	4,300,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Benzo(a)anthracene	PAH SIM	µg/kg	6,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Benzo(a)pyrene	PAH SIM	µg/kg	1,000 (ing)	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Benzo(b)fluoranthene	PAH SIM	µg/kg	21,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Benzo(g,h,i)perylene	PAH SIM	µg/kg	1,500,00	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	47.1 J	-	-
Benzo(k)fluoranthene	PAH SIM	µg/kg	1,500,00	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Chrysene	PAH SIM	µg/kg	620,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Dibenzo(a,h)anthracene	PAH SIM	µg/kg	1,000 (ing)	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Fluoranthene	PAH SIM	µg/kg	2,100,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Fluorene	PAH SIM	µg/kg	270,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/kg	11,000 (ing)	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Naphthalene	PAH SIM	µg/kg	21,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Phenanthrene	PAH SIM	µg/kg	4,300,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Pyrene	PAH SIM	µg/kg	1,500,000	[660]	[74.4]	[328]	[5.22]	[6.55]	[306]	[79.3]	[47.8]	-	-
Total Organic Carbon (TOC)	SGS SOP	mg/kg	-	384,000	31,800	373,000	658	3,060	171,000	57,300	311,000	-	-
Total Metals													
Chromium	SW6020	mg/kg	26 (total Cr)	-	-	-	-	-	-	-	-	-	-
Lead	SW6020	mg/kg	400 (ing/inh)	-	-	-	-	-	-	-	-	-	-
Mercury	SW7471A	mg/kg	1.4	-	-	-	-	-	-	-	-	-	-
Zinc	SW6020	mg/kg	9,100	-	-	-	-	-	-	-	-	-	-

note: Sediment and Surface Water samples were co-located, and were thus given common LOCIDs from BGW101-BGW110

KEY	DESCRIPTION
-	Analysis not requested or cleanup level not established
†	Refer to Table D-1 in Appendix D for assessment of hydrocarbon origin
^	Tentatively identified compounds not reviewed due to low concentration
%	percent
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
ing	Cleanup level based on ingestion pathway
inh	Cleanup level based on inhalation pathway
J	Estimated concentration; refer to Appendix C for data qualification information
36	Concentration detected
2900	Reported concentration exceeds the regulatory cleanup leve
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
[0.037]	Analyte not detected above Practical Quantitation Limit (PQL); PQL exceeds the regulatory cleanup leve
(wet)	Result reported on a wet weight basis

TABLE 5-16c SUMMARY OF WATER ANALYTICAL RESULTS - BACKGROUND

Background Samples **Water Matrix**			Sample Type:	SURFACE WATER											
			Location ID:	BGW101			BGW102	BGW103	BGW104	BGW105	BGW106	BGW107	BGW108	BGW109	BGW110
			Sample ID:	04NEBGSW101	04NEBGSW201	04NEBGSW301	04NEBGSW102	04NEBGSW103	04NEBGSW104	04NEBGSW105	04NEBGSW106	04NEBGSW107	04NEBGSW108	04NEBGSW109	04NEBGSW110 *
			Depth (ft):	–	–	–	–	–	–	–	–	–	–	–	–
			Sample Date:	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/9/2004	9/9/2004	9/10/2004	9/10/2004	9/10/2004	9/12/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**	*Primary*	*Duplicate*	*Triplicate*									
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	0.0105 J	[0.090]	0.0145 J	0.0196 J	0.0165 J	0.0342 J	0.0106 J	[0.090]	0.0334 J	0.0204 J	0.0178 J	0.0230 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	[0.337] B	[0.330] B	0.0289 J	[0.303] B	[0.326] B	[0.330] B	0.175 J	0.0813 J	0.0714 J	0.136 J	0.144 J	0.165 J
Residual Range Organics (RRO)	AK103	mg/L	1.1	[0.562] B	[0.549] B	[0.75]	[0.505] B	0.658 B	[0.549] B	0.58	0.354 J	0.21 J	0.311 J	0.335 J	0.451 J
Aromatic Organic Compounds (BTEX)															
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]	[0.5]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Toluene	SW8260B	µg/L	1,000	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
m & p-Xylenes	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)															
Acenaphthene	PAH SIM	µg/L	2,200	[0.0562]	[0.0543]	[0.1]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Acenaphthylene	PAH SIM	µg/L	2,200	[0.0562]	[0.0543]	[0.1]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Anthracene	PAH SIM	µg/L	11,000	[0.0562]	[0.0543]	[0.1]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Benzo(a)anthracene	PAH SIM	µg/L	1	[0.0562]	[0.0543]	[0.01]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Benzo(a)pyrene	PAH SIM	µg/L	0.2	[0.0562]	[0.0543]	[0.01]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Benzo(b)fluoranthene	PAH SIM	µg/L	1	[0.0562]	[0.0543]	[0.01]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Benzo(g,h,i)perylene	PAH SIM	µg/L	1,100	[0.0562]	[0.0543]	[0.1]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Benzo(k)fluoranthene	PAH SIM	µg/L	10	[0.0562]	[0.0543]	[0.01]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Chrysene	PAH SIM	µg/L	100	[0.0562]	[0.0543]	[0.01]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Dibenzo(a,h)anthracene	PAH SIM	µg/L	0.1	[0.0562]	[0.0543]	[0.01]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Fluoranthene	PAH SIM	µg/L	1,460	[0.112]	[0.109]	[0.1]	[0.11]	[0.108]	[0.108]	[0.115]	[0.108]	[0.11]	[0.115]	[0.11]	[0.108]
Fluorene	PAH SIM	µg/L	1,460	[0.0562]	[0.0543]	[0.1]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Indeno(1,2,3-cd)pyrene	PAH SIM	µg/L	1	[0.0562]	[0.0543]	[0.01]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Naphthalene	PAH SIM	µg/L	700	0.104	0.0586	[0.1]	0.0455 J	[0.0538]	0.142	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Phenanthrene	PAH SIM	µg/L	11,000	[0.0562]	[0.109]	[0.1]	[0.11]	[0.108]	[0.108]	[0.115]	[0.108]	[0.11]	[0.115]	[0.11]	[0.108]
Pyrene	PAH SIM	µg/L	1,100	[0.0562]	[0.0543]	[0.1]	[0.0549]	[0.0538]	[0.0538]	[0.0575]	[0.0538]	[0.0549]	[0.0575]	[0.0549]	[0.0538]
Calculated Total aromatic hydrocarbons (TAH) †	(see text)	µg/L	10	2.7	2.7	2.8	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
Calculated Total aqueous hydrocarbons (TAqH) ‡	(see text)	µg/L	15	3.1	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2

note: Sediment and Surface Water samples were co-located, and were thus given common LOCIDs from BGW101-BGW110

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C and, for TAH/TAqH, surface water levels in 18 AAC 70.
J	Estimated concentration; refer to Appendix C for data qualification information
0.658 B	Analyte concentration biased due to detection in method, trip, or equipment blank
[0.0549] B	Result qualified as not detected due to method, trip, or equipment blank detection
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
*	Matrix Spike / Matrix Spike Duplicate (MS/MSD)
†	TAH equals the sum of BTEX analyte concentrations estimated below the PQL or detected above the PQL, plus 1/2 the PQL of analytes not reported above the Method Detection Limit (MDL).
‡	TAqH equals the sum of BTEX and PAH analyte concentrations estimated below the PQL or detected above the PQL, plus 1/2 the PQL of analytes not reported above the Method Detection Limit (MDL).

TABLE 5-16d SUMMARY OF SOIL TESTING RESULTS - BACKGROUND

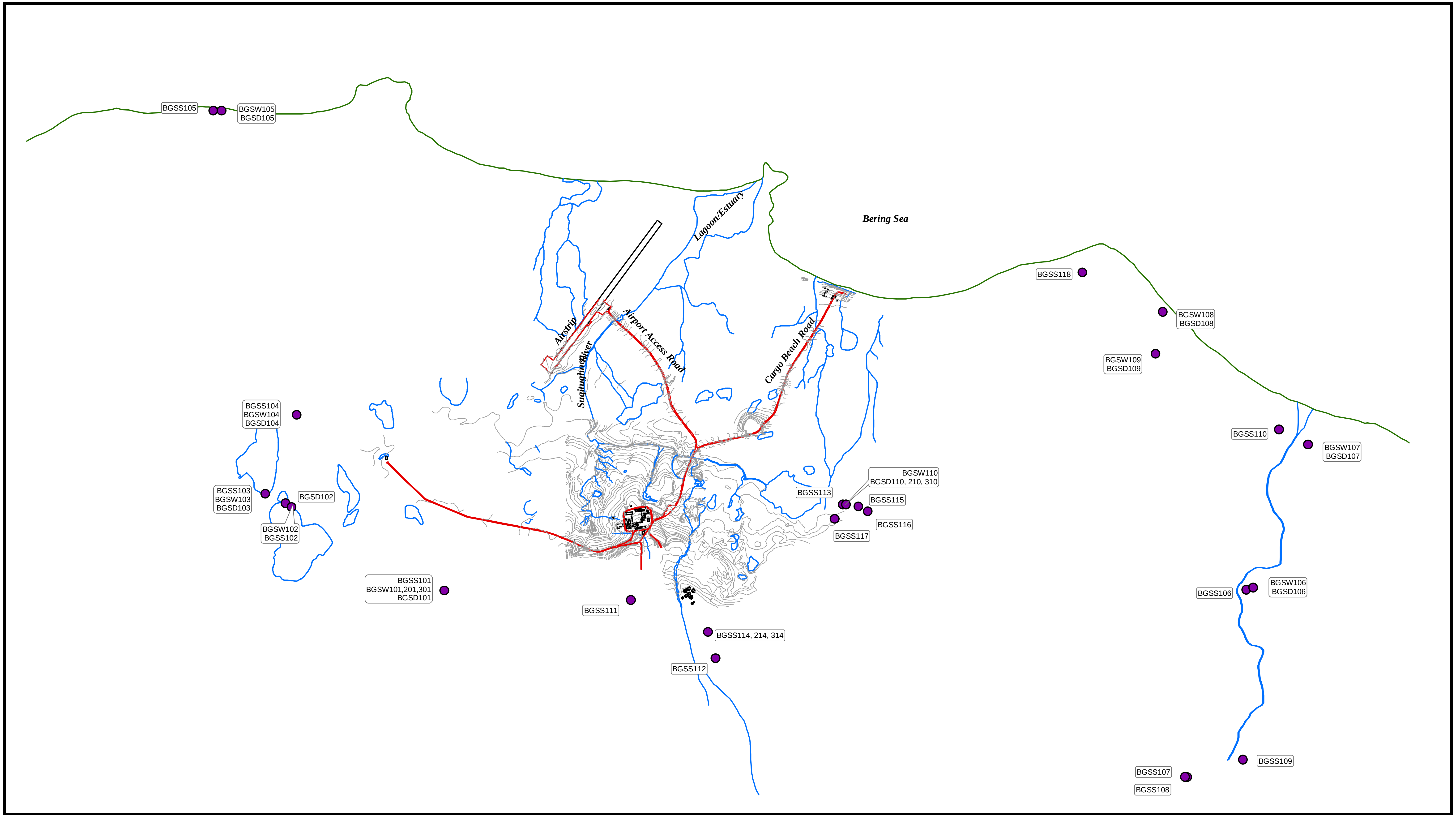
Background Samples Soil Matrix		Sample Type:	SURFACE SOIL								
		Location ID:	BGSS101	BGSS102	BGSS103	BGSS104	BGSS105	BGSS106	BGSS107	BGSS108	BGSS109
		Sample ID:	04NEBGSS101	04NEBGSS102	04NEBGSS103	04NEBGSS104	04NEBGSS105	04NEBGSS106	04NEBGSS107	04NEBGSS108	04NEBGSS109
		Depth (ft):	0.5-0.7	0.7-0.9	0.5-0.7	0.4-0.8	0.4-0.5	0.4-0.6	0-0.2	0-0.2	0.2-0.4
		Sample Date:	9/8/2004	9/8/2004	9/8/2004	9/8/2004	9/9/2004	9/9/2004	9/10/2004	9/10/2004	9/10/2004
Parameter Tested	**Test Method**	**Units**									
Soil Material Testing											
Moisture Content	ASTM D2216	%	16.3	135.6	-	40.9	337.7	9.9	26	2.0	7
Organics (450 C)	ASTM D2974	%	-	29	57	-	66	-	-	-	-
Sieve Analysis	ASTM D422 or C136	**	See Fig. B-25	See Fig. B-25	-	See Fig. B-26	-	See Fig. B-26	See Fig. B-26	See Fig. B-27	See Fig. B-27
Hydrometer Analysis	ASTM D422	**	See Fig. B-25	See Fig. B-25	-	See Fig. B-26	-	-	See Fig. B-26	-	-
Bulk Density	ASTM D2167M	Kg/m3	1,402	-	-	-	282.0	1,490	-	-	-
Bulk Density	ASTM D2167M	lbs/ft3	87.5	-	-	-	17.6	93.0	-	-	-
Soil Classification	USCS		SM	PT or ML	PT	ML	PT	GP	SM	GW	GP

KEY	DESCRIPTION
-	Analysis not requested
%	percent dry weight
GP	Poorly-Graded Gravels, Gravel-Sand Mixtures
GP-GM	Poorly-Graded Gravel with Silt
GM	Silty Gravels, Gravel-Sand-Clay Mixtures
GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
PT	Peat, Humus, Swamp Soils with High Organic Content
SM	Silty Sands, Sand-Silt Mixture
SP	Poorly-Graded Sand, Gravelly Sands, Little or No Fines

TABLE 5-16d SUMMARY OF SOIL TESTING RESULTS - BACKGROUND

Background Samples **Soil Matrix**		Sample Type:	**SURFACE SOIL**								**SEDIMENT**
		Location ID:	BGSS110	BGSS111	BGSS112	BGSS113	BGSS114	BGSS115	BGSS116	BGSS117	BGW102
		Sample ID:	04NEBGSS110	04NEBGSS111	04NEBGSS112	04NEBGSS113	04NEBGSS114 *	04NEBGSS115	04NEBGSS116	04NEBGSS117	04NEBGSD102
		Depth (ft):	0.1-0.3	0.1-0.3	0-0.2	0.3-0.5	0.1-0.3	0.5-0.7	0-0.3	0.1-0.3	0-0.2
		Sample Date:	9/10/2004	9/11/2004	9/11/2004	9/12/2004	9/13/2004	9/13/2004	9/13/2004	9/13/2004	9/8/2004
Parameter Tested	**Test Method**	**Units**					*Primary*				
Soil Material Testing											
Moisture Content	ASTM D2216	%	4.8	4.9	2.3	173.2	5.4	214.0	5.4	6.3	42.2
Organics (450 C)	ASTM D2974	%	-	-	-	36	-	38	-	-	-
Sieve Analysis	ASTM D422 or C136	**	See Fig. B-27	See Fig. B-28	See Fig. B-28	See Fig. B-28	See Fig. B-29	See Fig. B-29	See Fig. B-29	See Fig. B-29	See Fig. B-25
Hydrometer Analysis	ASTM D422	**	-	-	-	See Fig. B-28	-	See Fig. B-29	-	-	See Fig. B-25
Bulk Density	ASTM D2167M	Kg/m3	1,737	-	-	379.1	1,851	362.1	-	-	-
Bulk Density	ASTM D2167M	lbs/ft3	108.4	-	-	23.7	115.5	22.6	-	-	-
Soil Classification	USCS		SP	GP-GM	GP	PT or ML	GM	PT or ML	GP-GM	GP-GM	SM

KEY	DESCRIPTION
-	Analysis not requested
%	percent
GP	Poorly-Graded Gravels, Gravel-Sand Mixtures
GP-GM	Poorly-Graded Gravel with Silt
GM	Silty Gravels, Gravel-Sand-Clay Mixtures
GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
PT	Peat, Humus, Swamp Soils with High Organic Content
SM	Silty Sands, Sand-Silt Mixture
SP	Poorly-Graded Sand, Gravelly Sands, Little or No Fines



Legend

Background sample collected by Shannon & Wilson, Inc. August/September 2004

● "SS" indicates surface soil sample, "SW" indicates surface water sample, "SD" indicates sediment sample

— Water Feature

— Road

— Shoreline

— Topo Contours (Interval: 5 ft)

Note: All locations approximate, see Appendix D of "Phase IV RI, Northeast Cape, St. Lawrence Island, Alaska" for survey data.
Figure based on previous work. Physical features may not correspond to 2004 field observations.

0 1,500 3,000 6,000 9,000 12,000 Feet

1 inch equals approximately 3,000 feet

N

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

BACKGROUND SAMPLE LOCATIONS

June 2005
32-1-16821

SHANNON & WILSON, INC.
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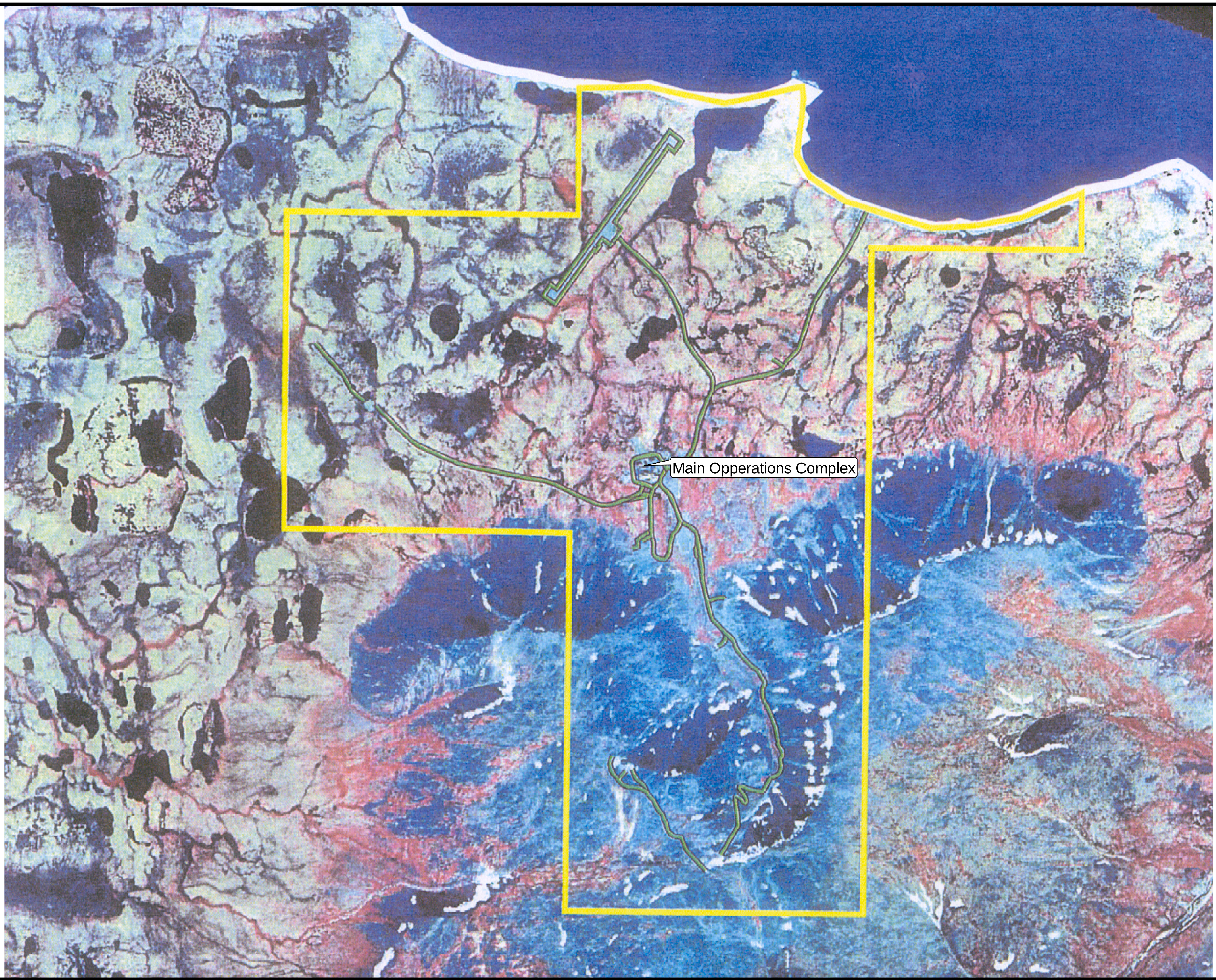
Fig. 5-16a



Legend

🟩 Roads

🟨 Site Boundary

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

SITE BOUNDARY

June 2005
32-1-16821

SHANNON & WILSON, INC.
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Fig. 5-16b

6.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives in the study of this site. The findings we have presented within this report are based on the limited research, sampling, and analyses that we conducted. They should not be construed as definite conclusions regarding the area's soil, sediment, surface water, or groundwater. It is possible that our RI activities did not identify the highest concentrations of target COPCs, although our intention was to sample areas likely to be impacted. As a result, the analyses and sampling performed can only provide you with our professional judgment as to the environmental characteristics of this site, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. The data presented in this report should be considered representative of the time of our site assessment. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

Shannon & Wilson has prepared the attachments in Appendix H, "Important Information About Your Geotechnical/Environmental Report," to assist you and others in understanding the use and limitations of our report.

You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the responsibility for reporting these findings and therefore has not, and will not, disclose the results of this study unless authorized by you or required by law.

We appreciate this opportunity to be of service. Please contact the undersigned with questions or comments concerning the contents of this report.

Sincerely,

SHANNON & WILSON, INC.

Written By:

Randy Hessong

Randy Hessong
Engineer/Field Team Leader

Approved By:

Matthew S H

Matthew S. Hemry, P.E.
Senior Associate/Project Engineer

7.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC), 2003a. Water Quality Standards, 18 AAC 70, June 26, 2003.

Alaska Department of Environmental Conservation (ADEC), 2003b. Technical Memorandum 01-007, "Additional Cleanup Values," November 24, 2003.

Alaska Department of Environmental Conservation (ADEC), 2004. Oil and Other Hazardous Substances Pollution Control, 18 AAC 75, May 2004.

MWH, 2003. Summary Report - Phase III Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska, March 2003.

MWH, 2004. Human Health and Ecological risk Assessment - Northeast Cape Installation, St. Lawrence Island, Alaska – Final, March 2004.

Shannon & Wilson, Inc. Work Plan - Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska, August 2004.

APPENDIX A

Select Site Photographs

Photograph 1: A Hercules C-130 Transport operated by Lynden Air Cargo was used to transport equipment and supplies to the site.

Photograph 2: A temporary camp was constructed on the gravel pad near the airstrip.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 1 AND 2

June 2005
32-1-16821

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Photograph 3: Typical vegetation in the Site 1 "Burn Site," study area, looking north-northeast past field screening location FS1-8 to field camp. No apparent burn area was encountered, so field screening and surface sampling were performed over a large area in the vicinity of the gravel pad.

Photograph 4: Excavated soil at the former pumphouse of Site 3. Some adjustments to boring locations were necessary. Wellpoint 03WP103 and Kitnagak Bay are visible in the background.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 3 AND 4

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Photograph 5: Ice recovered in split-spoon sampler from 5 feet bgs in Site 3 boring 03B3.

Photograph 6: Site 6 Boring 06B2 completed, decontaminating drill auger and rod in alconox solution and rinse water drums on the drill rig, looking southeast.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 5 AND 6

June 2005
32-1-16821

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Photograph 7: Sampling wellpoint 06WP5 with a peristaltic pump. The boulder field is west of the site, and is one sign of frost-influenced surface topography.

Photograph 8: Exposed debris at the base of the Site 7 landfill's southeast side. Soil samples were collected on the bench behind the pictured person, and to the left of the photo.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 7 AND 8

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Photograph 9: Looking north-northeast across Site 8 from the bank of the Suqitughneq River to the Cargo Beach Road/Airport Access Road intersection. The spring in the foreground and two locations in the wetland were sampled.

Photograph 10: Conducting the boring for installation of Monitoring Well 18MW1 using Tubex type air-rotary drilling on the regraded surface of the MOC. A cleaned split spoon sampler is in the foreground, looking southwest.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 9 AND 10

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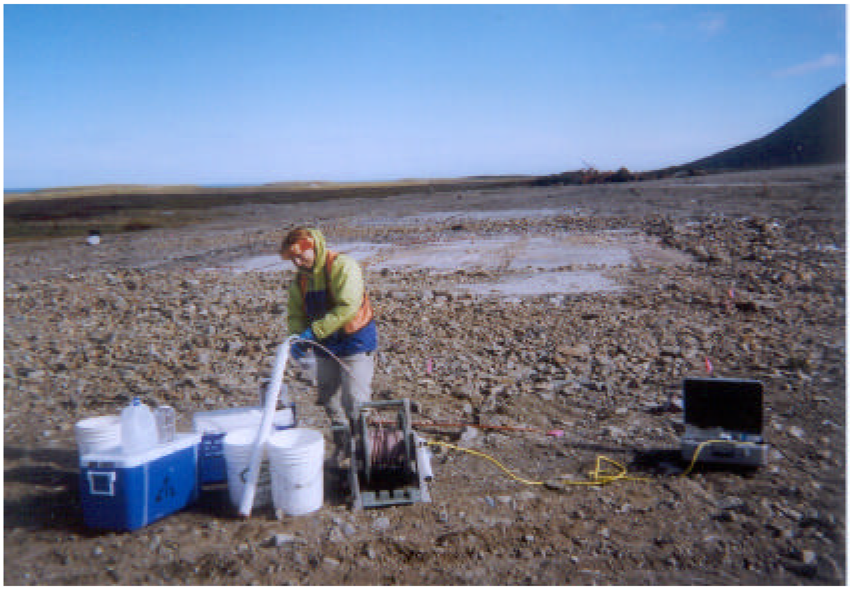
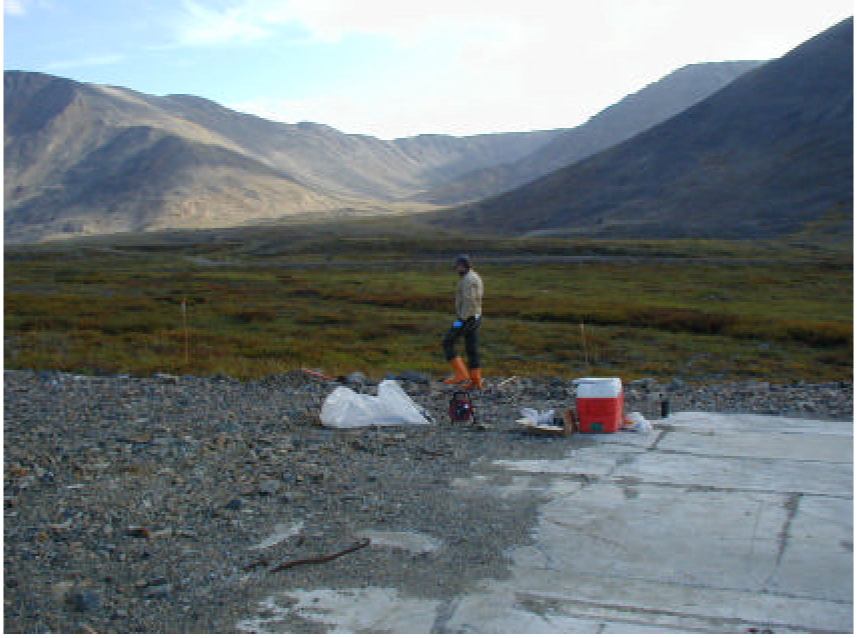


Photograph 11: Decontaminating a pump after sampling Monitoring Well MW 88-8 in the Main Operations Complex. Site 13 surface sample locations are marked with pin flags, looking east.



Photograph 12: Preparing to collect near-surface soil samples for PCB analysis at Site 14, looking south-southeast.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 11 AND 12

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Photograph 13: Sampling the middle reach of the Suqitughneq River, just downstream of the MOC drainage basin, looking east.

Photograph 14: Sediment samples were collected from depositional areas of the Suqitughneq River Estuary with an Eckman Dredge, looking west-northwest. Tidal influence was not observed in the estuary, which was essentially a fresh water impoundment for the duration of the field activities.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 13 AND 14

June 2005 32-1-16821

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Photograph 15: Sampling being performed at the White Alice Site by hand (left) and drill rig (right). Pipe stand is at the former tank impoundment, looking north.

Photograph 16: Background soil sampling in upper Tapisaghak Valley. Course material similar to that at the MOC was difficult to find.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

PHOTOGRAPHS 15 AND 16

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APPENDIX B

Boring Logs,
Monitoring Well Construction Details, and
Grain Size Classification plots

APPENDIX B TABLE OF CONTENTS

Borings and Monitoring Wells

APPENDIX B TABLE OF CONTENTS (continued)

Grain Size Classification

MATERIAL DESCRIPTION

Coordinates: N: 103,997 E: 101,497

Elevation: 16.7 Ft.

Loose, dark brown, coarse gravelly, silty SAND; moist [Fill]

Soft, dark brown, silty PEAT; wet; organic (sewage) odor

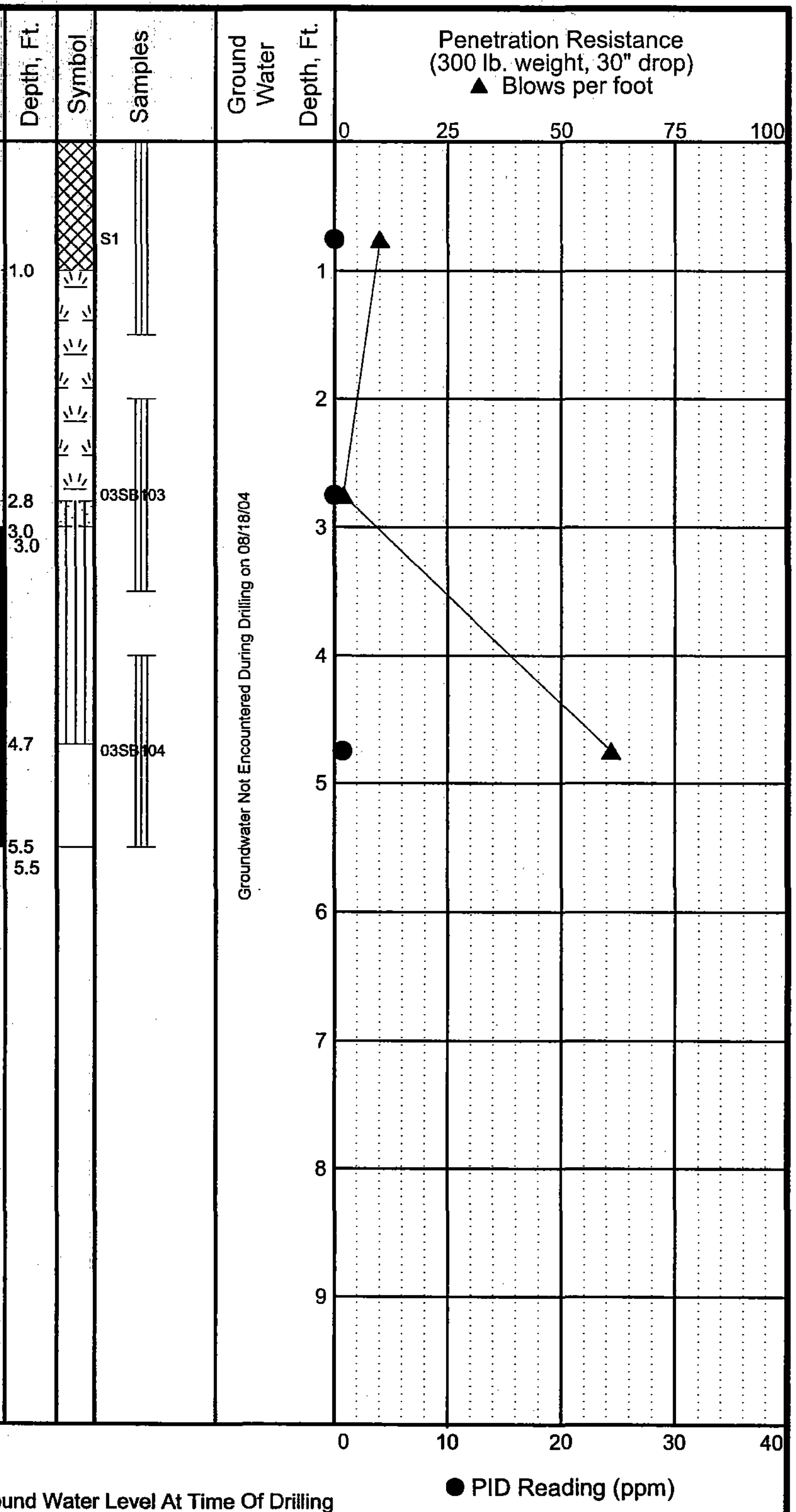
Soft, brown, sandy SILT; trace organics; moist

Brown, ice rich SILT; with organics; frozen

ICE

Bottom of Boring
Boring Completed 08/18/04

Boring advanced with 8-inch auger



LEGEND

* Sample Not Recovered
Ⅲ 3" O.D. Split Spoon Sample
B Auger Cuttings
▮ Frozen

∇ Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 03B1

June 2005 32-1-16821

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Fig. B-1a

MATERIAL DESCRIPTION

Coordinates: N: 103,948 E: 101,500

Elevation: 16.5 Ft.

Loose, brown, gravelly medium SAND; moist to wet; slight weathered hydrocarbon odor [Fill]

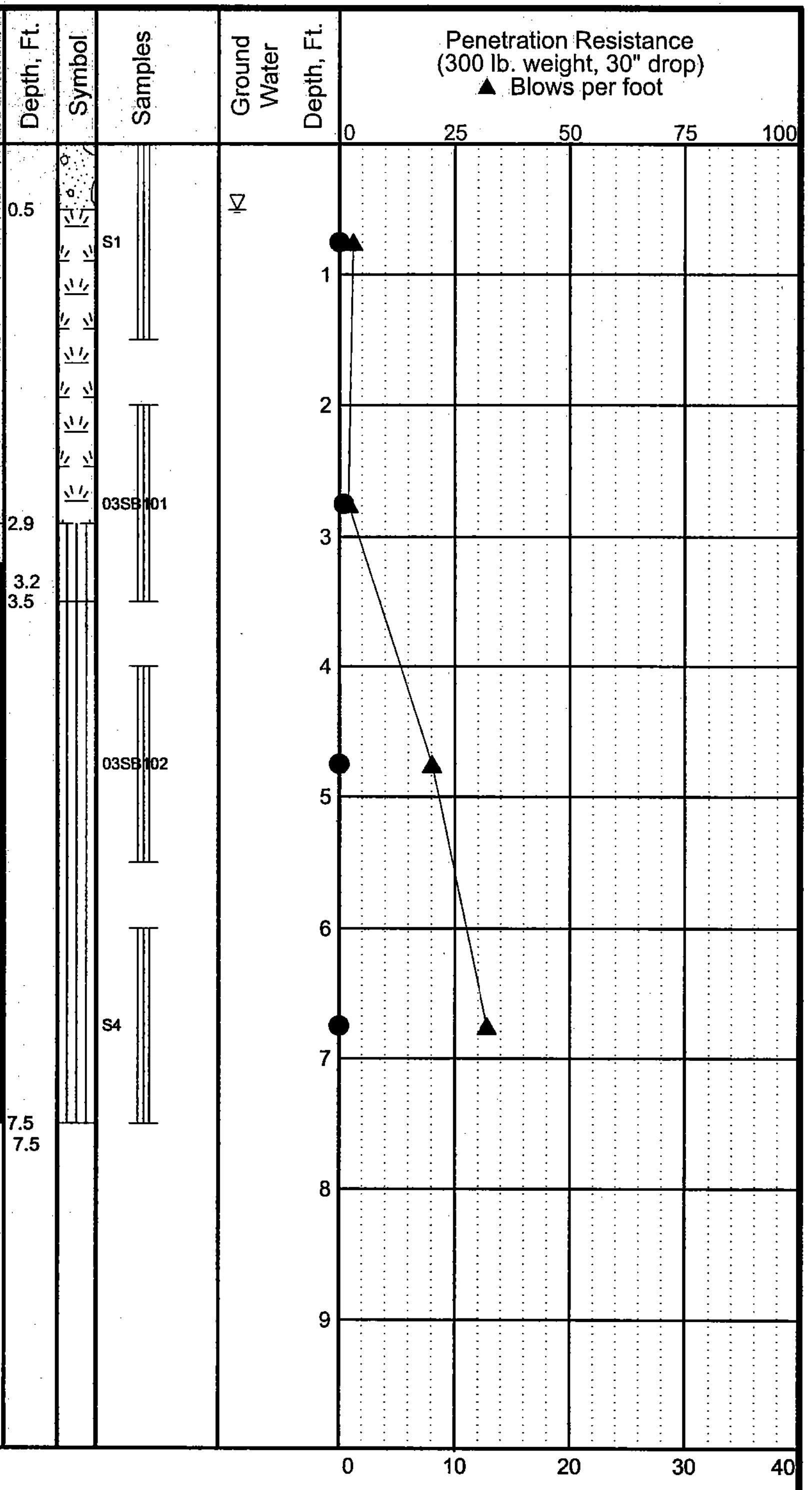
Soft, dark brown silty PEAT; wet

Soft, brown to stiff dark grey SILT; wet to frozen and ice rich

Gray SILT; frozen; with lenses of water ice 1/2 inch thick at 5' bgs, decreasing lense thickness with depth

Bottom of Boring
Boring Completed 08/18/04

Boring advanced with Tubex air/rotary



LEGEND

* Sample Not Recovered

Ⅲ 3" O.D. Split Spoon Sample

B Auger Cuttings

▮ Frozen

⊻ Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 03B2

June 2005 32-1-16821

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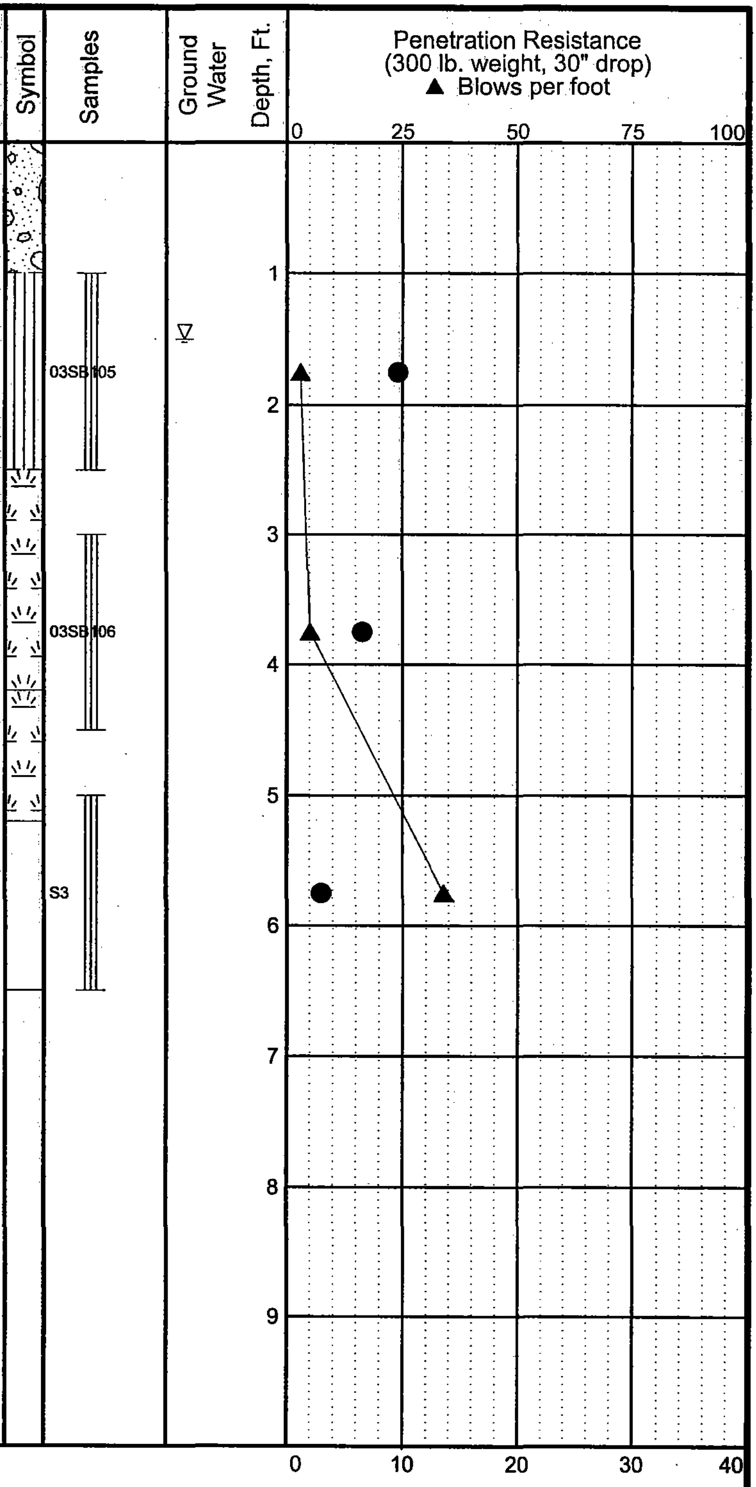
Fig. B-2a

MATERIAL DESCRIPTION Coordinates: N: 104,003 E: 101,484 Elevation: 15.9 Ft.	Depth, Ft.
Loose, brown, gravelly medium SAND; moist to wet; weathered diesel odor [Fill]	
Soft, dark brown alternating layers of SILT and PEAT; wet; mild hydrocarbon and sewage odors	1.0
Soft, dark brown, silty PEAT; wet	2.5
ICE and brown, sandy PEAT; frozen; in approximately 3-inch lenses	4.2 4.2
ICE	5.2
Bottom of Boring Boring Completed 08/18/04 Boring advanced with 8-inch auger	6.5 6.5



● PID Reading (ppm)

LEGEND

* Sample Not Recovered
Ⅲ 3" O.D. Split Spoon Sample
B Auger Cuttings
∇ Ground Water Level At Time Of Drilling
■ Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 03B3

June 2005 32-1-16821

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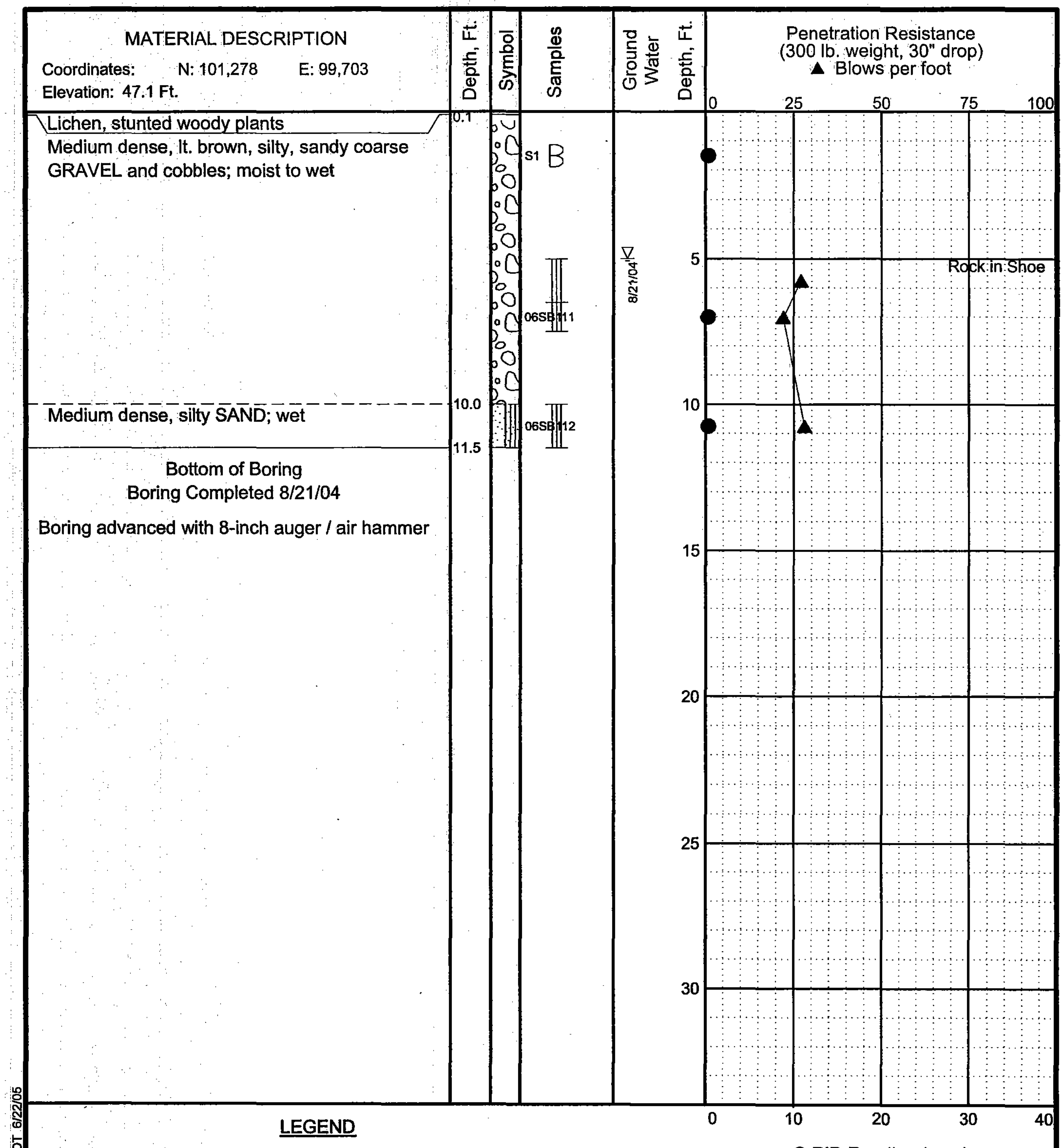
Fig. B-3a



MATERIAL DESCRIPTION

Coordinates:	N: 101,278	E: 99,703
Elevation: 47.1 Ft.		

Lichen, stunted woody plants

Medium dense, lt. brown, silty, sandy coarse GRAVEL and cobbles; moist to wet

Medium dense, silty SAND; wet

Bottom of Boring
Boring Completed 8/21/04

Boring advanced with 8-inch auger / air hammer

LEGEND

*	Sample Not Recovered
Ш	3" O.D. Split Spoon Sample
B	Auger Cuttings
⊻	Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 06B1

June 2005 32-1-16821

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Geotechnical and Environmental Consultants

Fig. B-4a

MATERIAL DESCRIPTION

Coordinates: N: 101,128 E: 99,758

Elevation: 46.6 Ft.

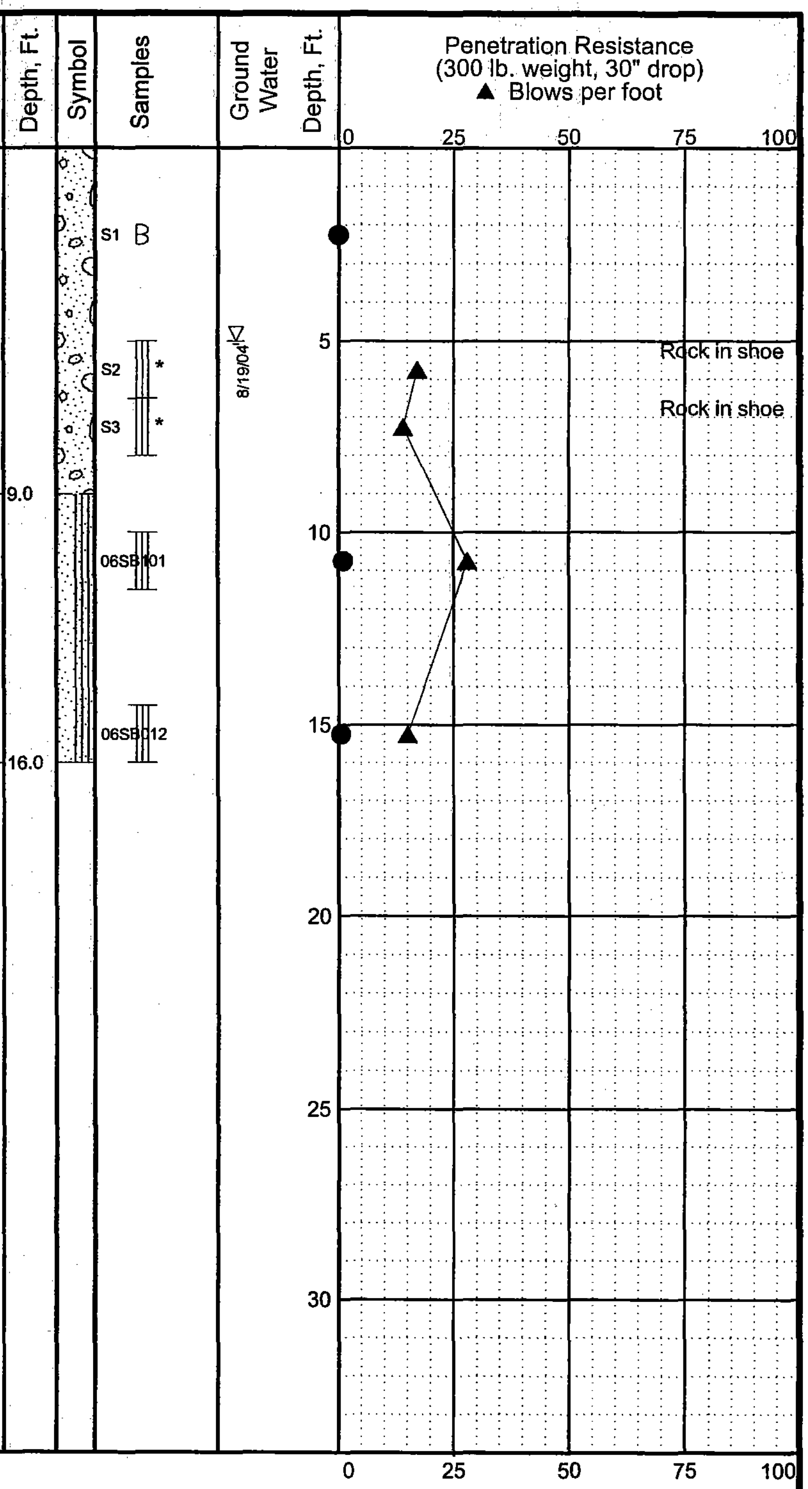
Medium dense, brown coarse SAND and cobbles / boulders; moist to wet

Medium dense, lt. gray, slightly silty fine to medium SAND and cobbles; wet

Bottom of Boring

Boring Completed 8/19/04

Boring advanced with Tubex air/rotary



LEGEND

*	Sample Not Recovered	⊻	Ground Water Level At Time Of Drilling
⌶	3" O.D. Split Spoon Sample		
B	Auger Cuttings		

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 06B2

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-5a

MATERIAL DESCRIPTION

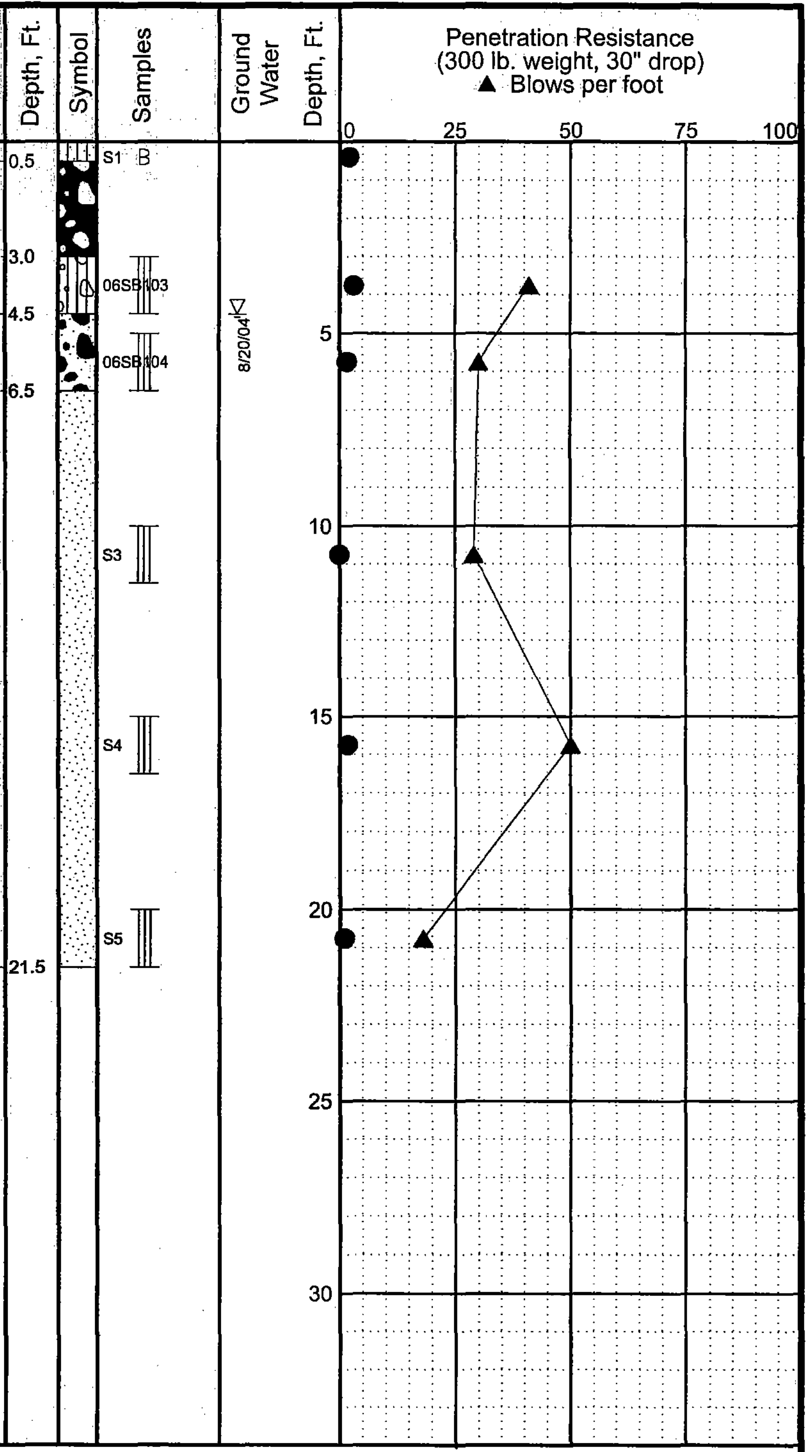
Coordinates: N: 101,105 E: 99,712

Elevation: 46.1 Ft.

Brown, sandy SILT; moist	0.5
Boulders and Cobbles	3.0
Dense, brown, sub-angular gravelly, fine sandy SILT; with cobbles; moist	4.5
Dense, lt. gray, silty, sandy GRAVEL; wet	6.5
Dense, lt. gray, angular SAND and cobbles; wet; varying trace to slight silt and gravel contents 3.5 hours to advance boring	21.5

Bottom of Boring
Boring Completed 8/20/04

Boring advanced with 8-inch auger / air hammer



● PID Reading (ppm)

LEGEND

- * Sample Not Recovered
- Ш 3" O.D. Split Spoon Sample
- B Auger Cuttings
- ⊻ Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 06B3

June 2005 32-1-16821

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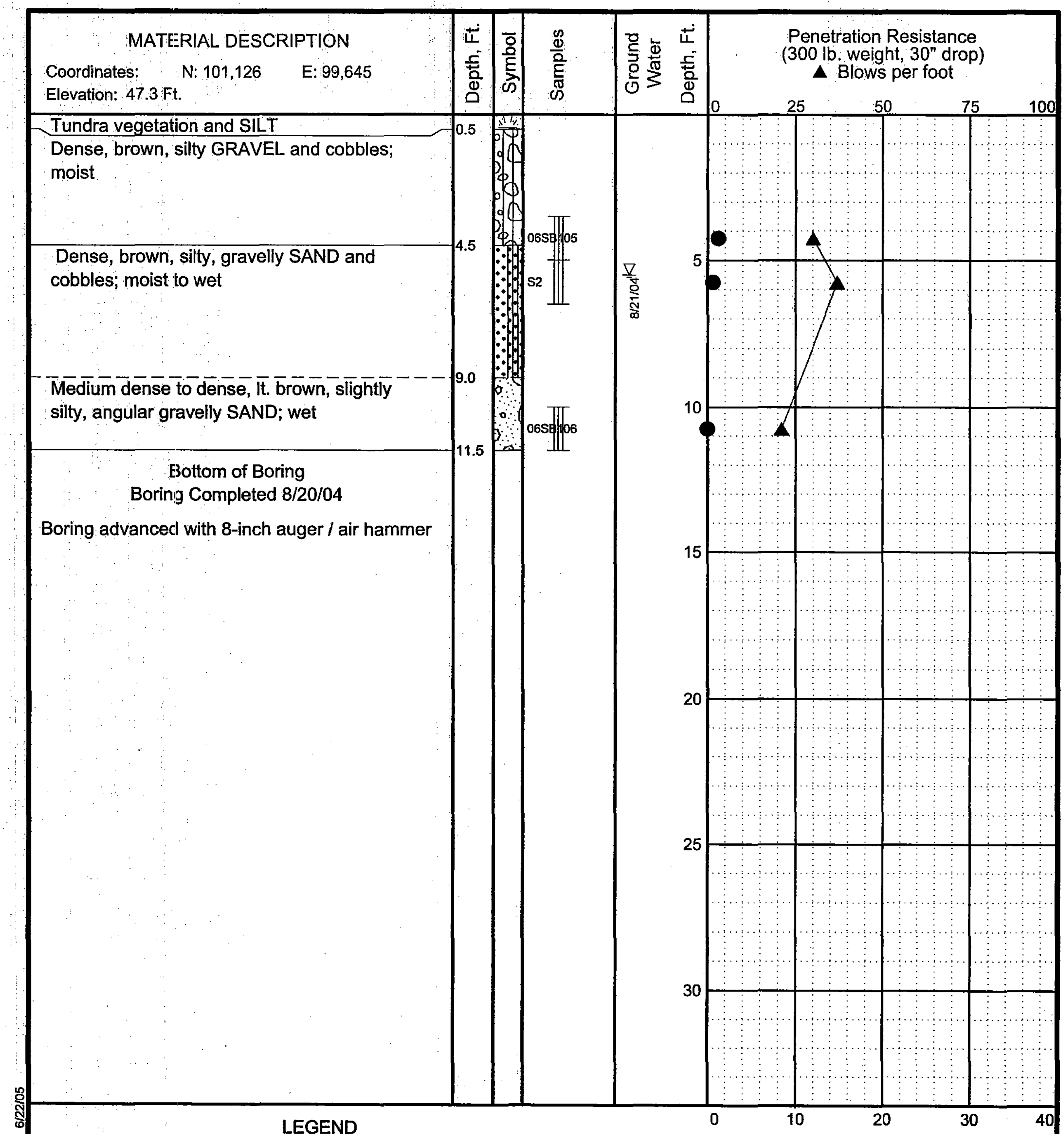
Fig. B-6a



Coordinates: N: 101,126 E: 99,645
Elevation: 47.3 Ft.

Tundra vegetation and SILT

Dense, brown, silty GRAVEL and cobbles; moist

Dense, brown, silty, gravelly SAND and cobbles; moist to wet

Medium dense to dense, lt. brown, slightly silty, angular gravelly SAND; wet

Bottom of Boring
Boring Completed 8/20/04

Boring advanced with 8-inch auger / air hammer

LEGEND

- * Sample Not Recovered
- ⅠⅠⅠ 3" O.D. Split Spoon Sample
- B Auger Cuttings
- ⊻ Ground Water Level At Time Of Drilling
- ● PID Reading (ppm)

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 06B4

June 2005 32-1-16821

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Fig. B-7a

MATERIAL DESCRIPTION

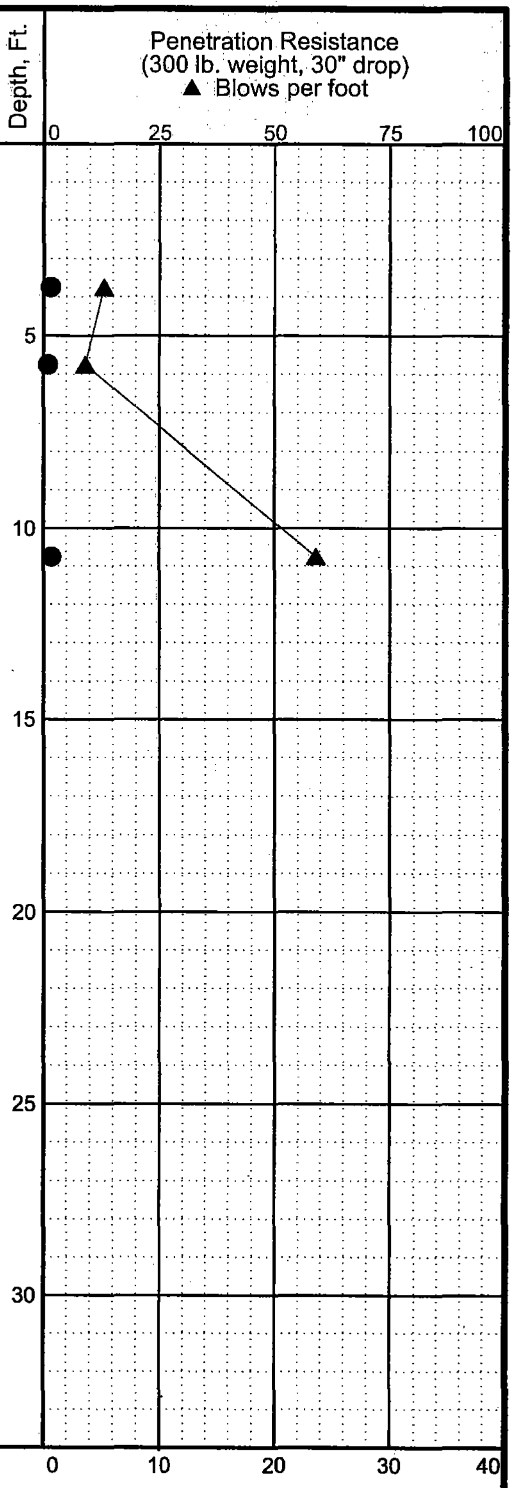
Coordinates: N: 101,205 E: 99,607

Elevation: 46 Ft.

MATERIAL DESCRIPTION	Depth, Ft.	Samples	Ground Water
Thin tundra vegetation on Boulders and Cobbles			
Medium dense, brown, silty GRAVEL and cobbles; moist	3.0	S1	
Stiff, lt brown to reddish brown, sandy SILT; trace gravel; moist	5.0	06SB107	
Dense, lt brown, silty GRAVEL and cobbles; wet	8.0	06SB108	8/21/04 ⊻
	11.5		

Bottom of Boring
Boring Completed 8/21/04

Boring advanced with 8-inch auger / air hammer



● PID Reading (ppm)

LEGEND

- * Sample Not Recovered
- ⌶ 3" O.D. Split Spoon Sample
- B Auger Cuttings
- ⊻ Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 06B5

June 2005 32-1-16821

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Fig. B-8a

MATERIAL DESCRIPTION

Coordinates: N: 101,263 E: 99,638
Elevation: 47.2 Ft.

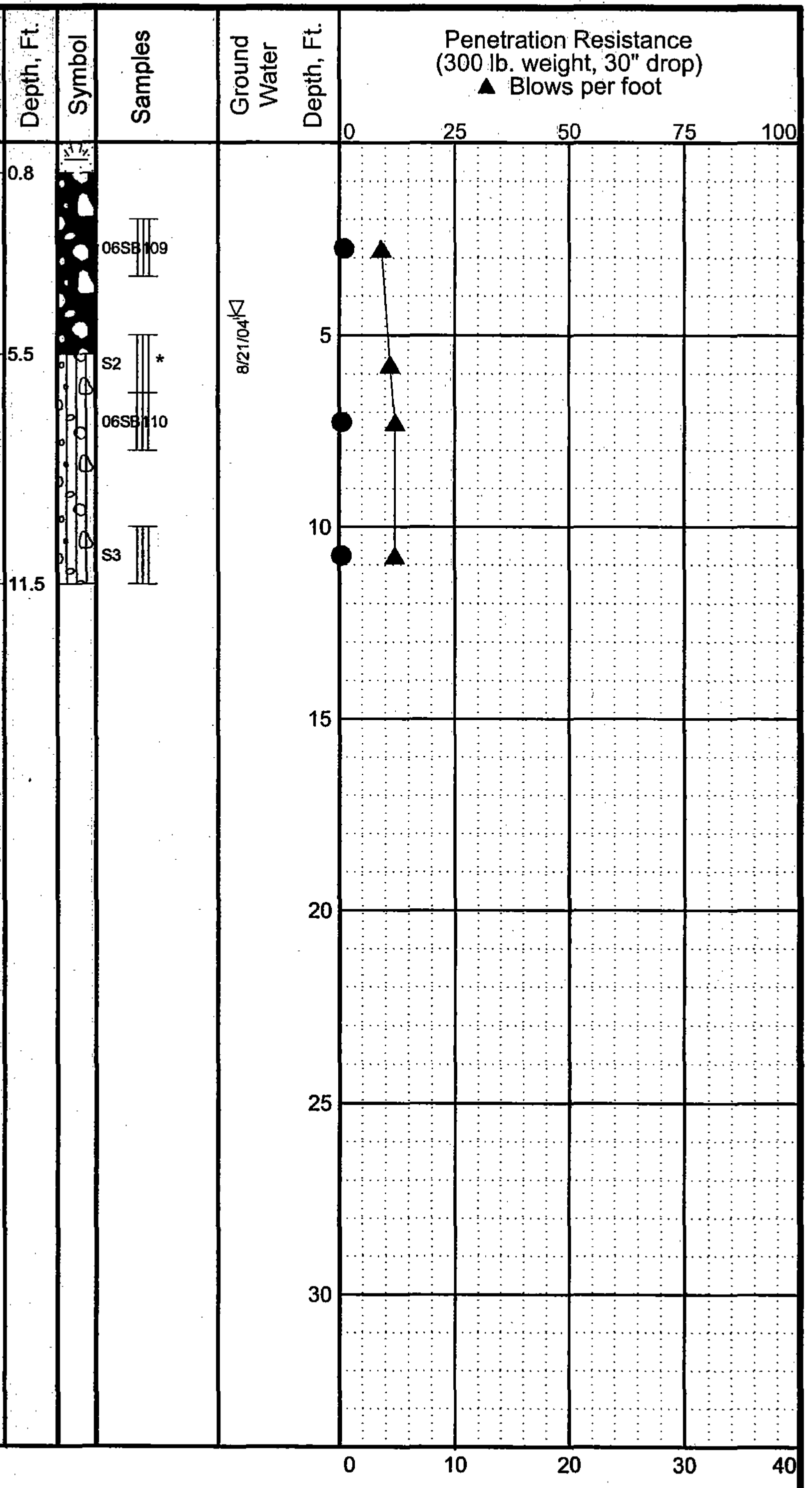
Tundra vegetation and topsoil on boulders. Topsoil would fall between gaps in rocks to while advancing auger to 5.5 ft.

Stiff, brown and gray, slightly gravelly SILT and boulders; moist to wet

Stiff, brown, gray, and rusty orange, slightly gravelly SILT; moist to wet; thin lenses of dark gray, fine SAND from 6.5 to 8 ft.

Bottom of Boring
Boring Completed 8/21/04

Boring advanced with 8-inch auger / air hammer



● PID Reading (ppm)

LEGEND

- * Sample Not Recovered
- ⌶ 3" O.D. Split Spoon Sample
- B Auger Cuttings
- ⊻ Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 06B6

June 2005 32-1-16821

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Geotechnical and Environmental Consultants

Fig. B-9a

MATERIAL DESCRIPTION

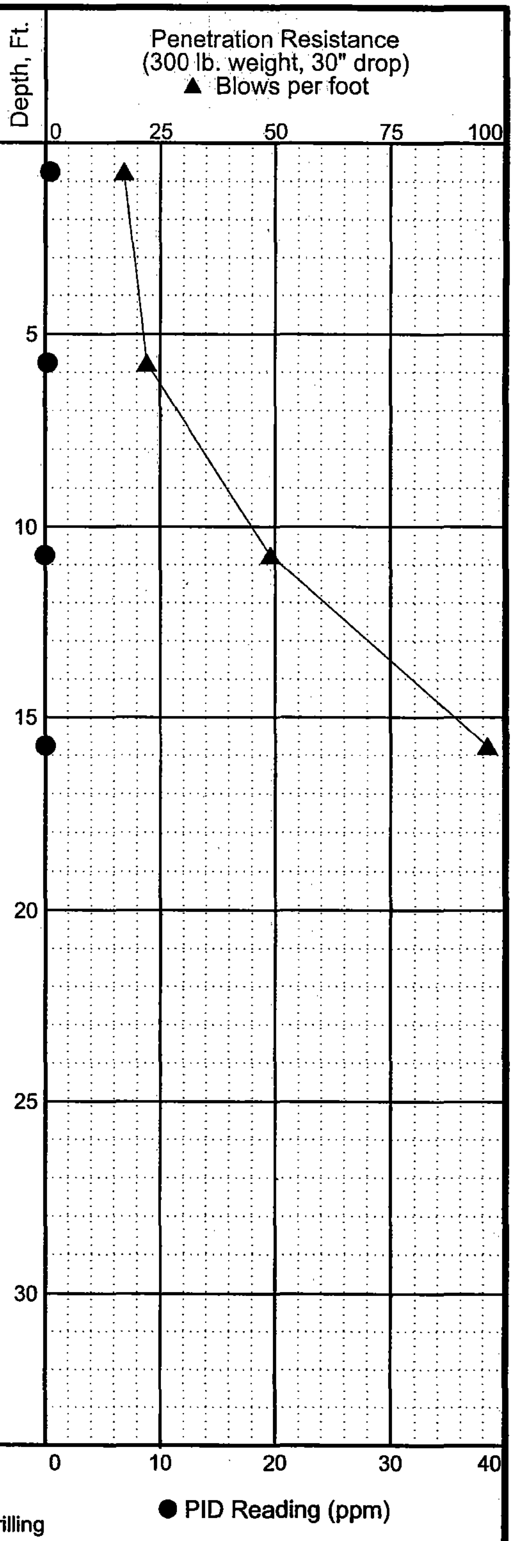
Coordinates: N: 98,303 E: 96,866

Elevation: 73.2 Ft.

MATERIAL DESCRIPTION	Depth, Ft.	Samples	Ground Water
Medium dense, brown, slightly silty, gravelly SAND; trace organics (roots); moist [Fill] Hydrocarbon (used motor oil?) odor	1.5	S1	
Medium dense, dark brown to orange-brown, slightly silty, gravelly SAND; trace organics (roots); moist	10.0	10SB104	
Dense, dark brown to gray, silty, gravelly SAND; moist; with cobbles Some sand described as crumbly rock, and wet silt on outside of sampler suggest frozen ground Groundwater suspected at 7.5 ft. based on 10MW1	16.5	10SB105 10SB106	▽ 8/23/04

Bottom of Boring
Boring Completed 8/23/04

Boring advanced with 8-inch auger



LEGEND

*	Sample Not Recovered
Ⅲ	3" O.D. Split Spoon Sample
B	Auger Cuttings
▽	Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 10B1

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-10a

MATERIAL DESCRIPTION

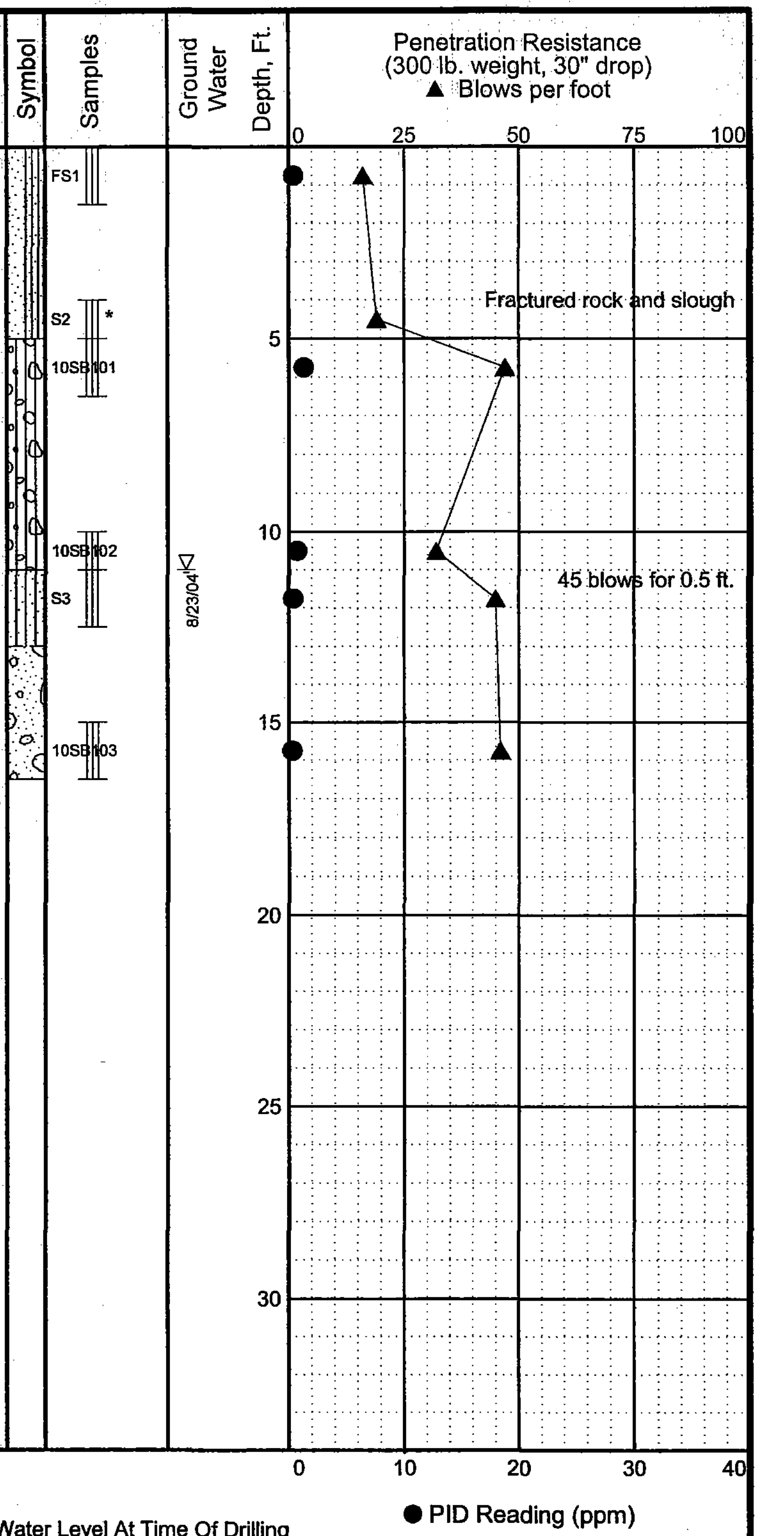
Coordinates: N: 98,175 E: 96,814

Elevation: 77.8 Ft.

MATERIAL DESCRIPTION	Depth, Ft.
Medium dense, brown, silty SAND and cobbles; scattered organics, roots; moist [Fill]	
Stiff, brown, sandy or gravelly SILT and cobbles; moist	5.0
Brown, sandy SILT; wet High blowcounts and "runny" recovered soil suggest frozen ground.	11.0
Dense, brown, silty, gravelly SAND and cobbles; wet - frozen likely	12.0 13.0
	16.5 16.5

Bottom of Boring
Boring Completed 8/23/04

Boring advanced with 8-inch auger



LEGEND

*	Sample Not Recovered	⊻	Ground Water Level At Time Of Drilling
Ш	3" O.D. Split Spoon Sample		
B	Auger Cuttings		
▮	Frozen		

NOTES

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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 10B2

June 2005 32-1-16821

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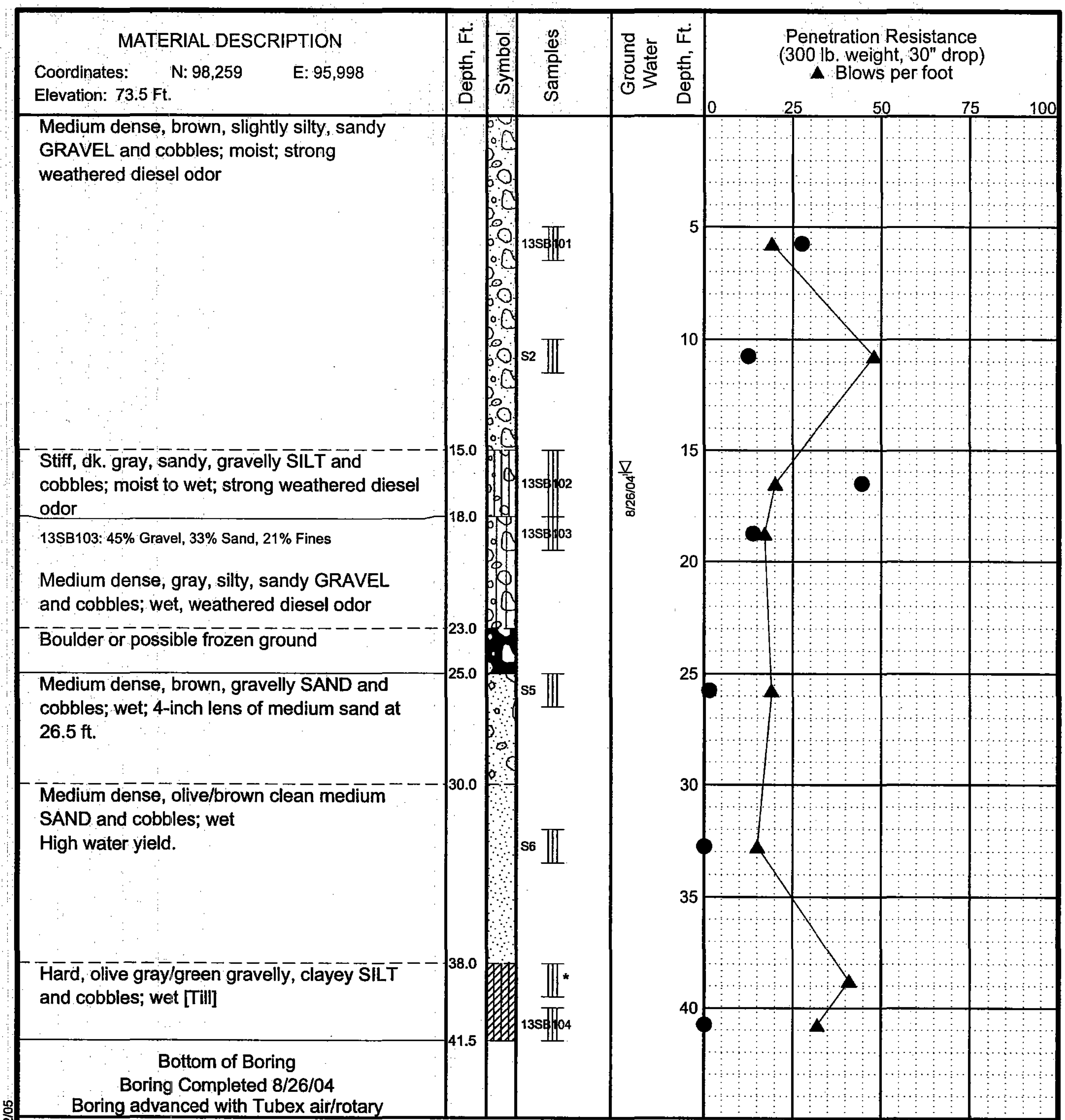
Geotechnical and Environmental Consultants

Fig. B-11a



MATERIAL DESCRIPTION

Coordinates: N: 98,259 E: 95,998

Elevation: 73.5 Ft.

Depth, Ft.	Material Description
0–15.0	Medium dense, brown, slightly silty, sandy GRAVEL and cobbles; moist; strong weathered diesel odor
15.0–18.0	Stiff, dk. gray, sandy, gravelly SILT and cobbles; moist to wet; strong weathered diesel odor
18.0–23.0	13SB103: 45% Gravel, 33% Sand, 21% Fines Medium dense, gray, silty, sandy GRAVEL and cobbles; wet, weathered diesel odor
23.0–25.0	Boulder or possible frozen ground
25.0–30.0	Medium dense, brown, gravelly SAND and cobbles; wet; 4-inch lens of medium sand at 26.5 ft.
30.0–38.0	Medium dense, olive/brown clean medium SAND and cobbles; wet High water yield.
38.0–41.5	Hard, olive gray/green gravelly, clayey SILT and cobbles; wet [Till]

Bottom of Boring
Boring Completed 8/26/04
Boring advanced with Tubex air/rotary

LEGEND

- * Sample Not Recovered
- ⌶ 3" O.D. Split Spoon Sample
- B Auger Cuttings
- ▽ Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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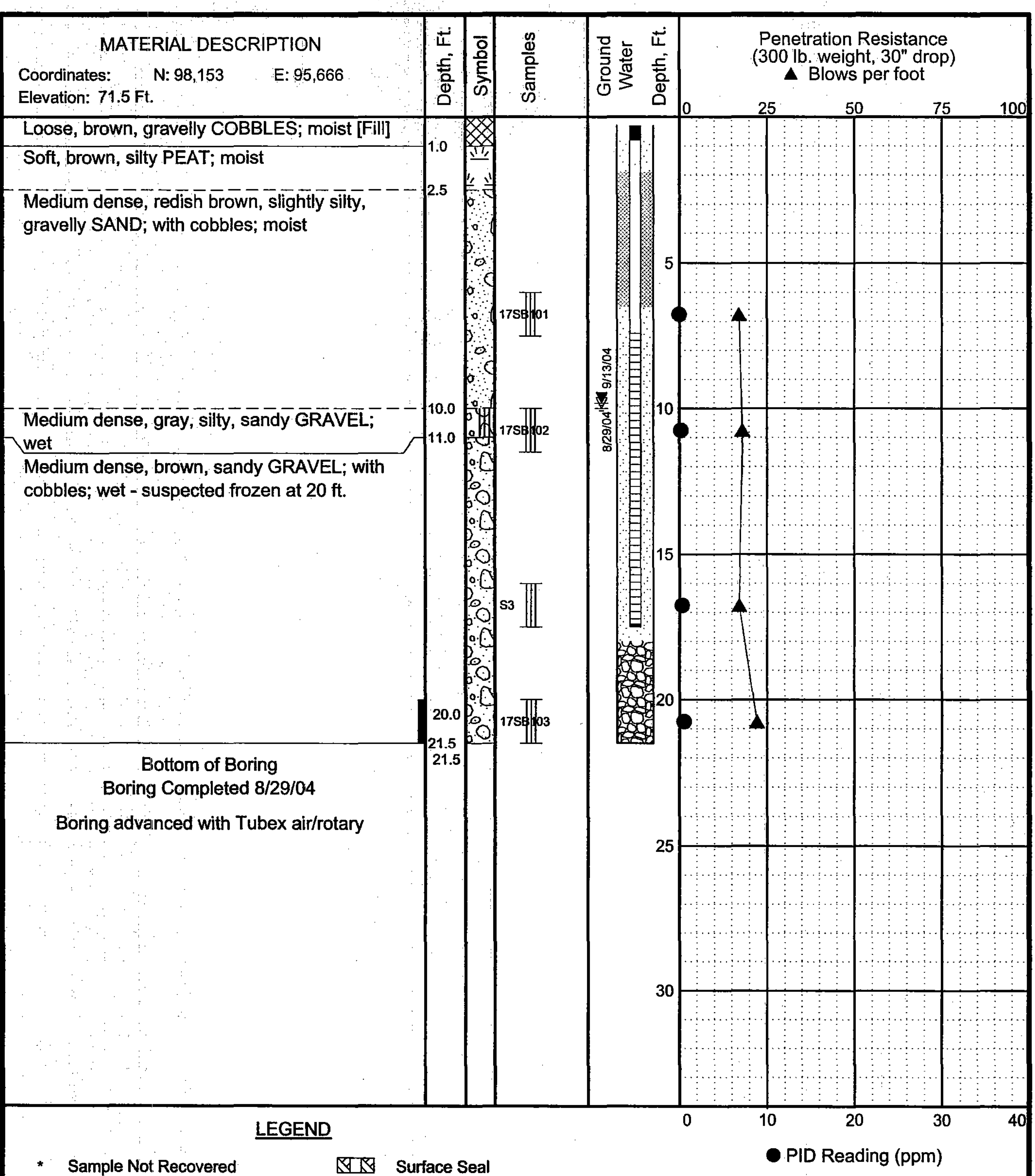
Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 13B1

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-12a



MATERIAL DESCRIPTION

Coordinates: N: 98,153 E: 95,666

Elevation: 71.5 Ft.

Loose, brown, gravelly COBBLES; moist [Fill]

Soft, brown, silty PEAT; moist

Medium dense, redish brown, slightly silty, gravelly SAND; with cobbles; moist

Medium dense, gray, silty, sandy GRAVEL; wet

Medium dense, brown, sandy GRAVEL; with cobbles; wet - suspected frozen at 20 ft.

Bottom of Boring
Boring Completed 8/29/04

Boring advanced with Tubex air/rotary

LEGEND

*	Sample Not Recovered
Ɪ	3" O.D. Split Spoon Sample
B	Auger Cuttings
▮	Frozen

⊠	Surface Seal
▩	Solid Casing and Annular Seal
▤	Well Casing and Filter Sand
▨	Cuttings Backfill
∇	Ground Water Level At Time Of Drilling
▼	Static Water Level

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 17MW1

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

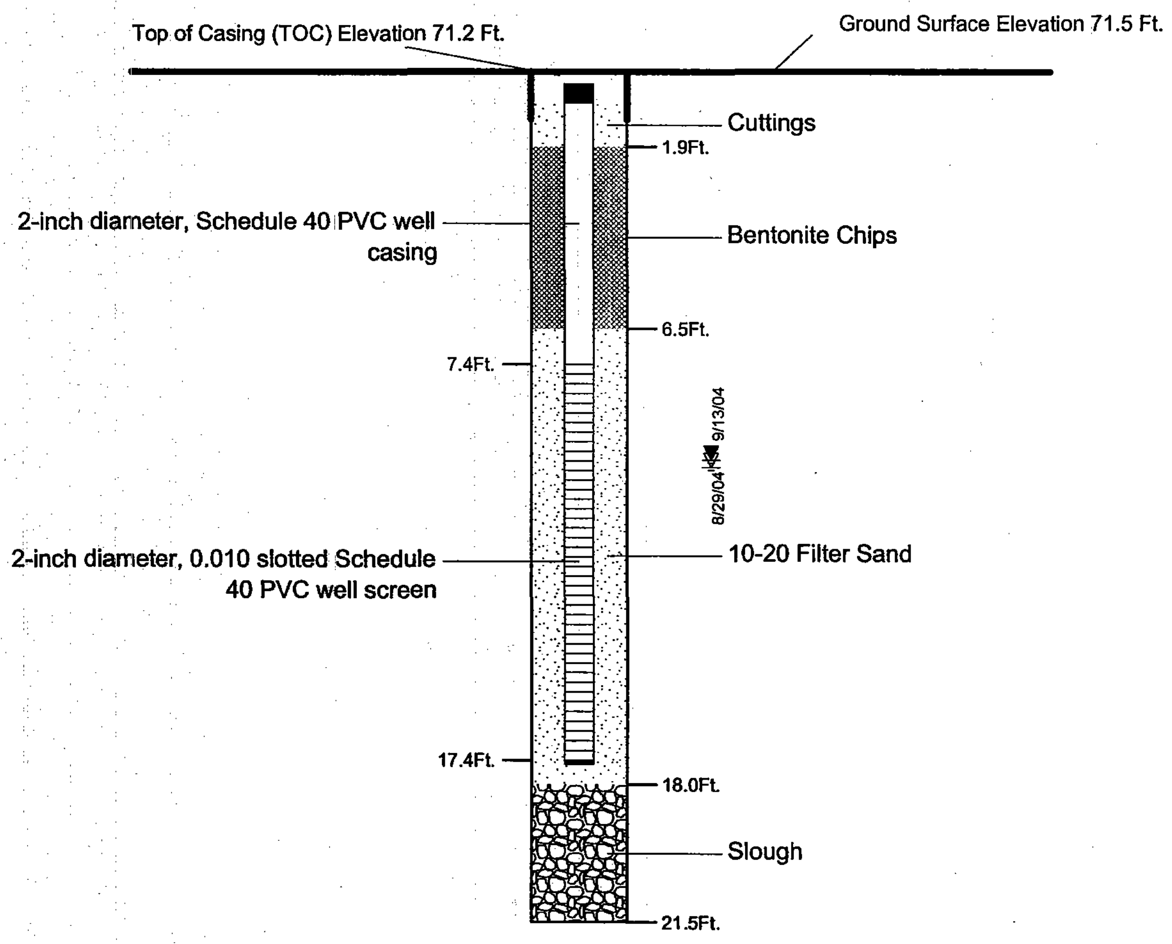
Fig. B-13a

ENVIRONMENTAL LOG 16821DRILLF.GPJ S&W GEO1.GDT 6/22/05

Coordinates: N: 98,153 E: 95,666

Casing Description

Backfill Description



LEGEND

∇	Ground Water Level ATD
▼	Static Ground Water Level

NOTES: Cover is cast iron set in concrete
Top cap is locking expansion plug with padlock
Joints are machine threaded
Botton cap is friction fit

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MONITORING WELL 17MW1
CONSTRUCTION DETAIL

June 2005 32-1-16821

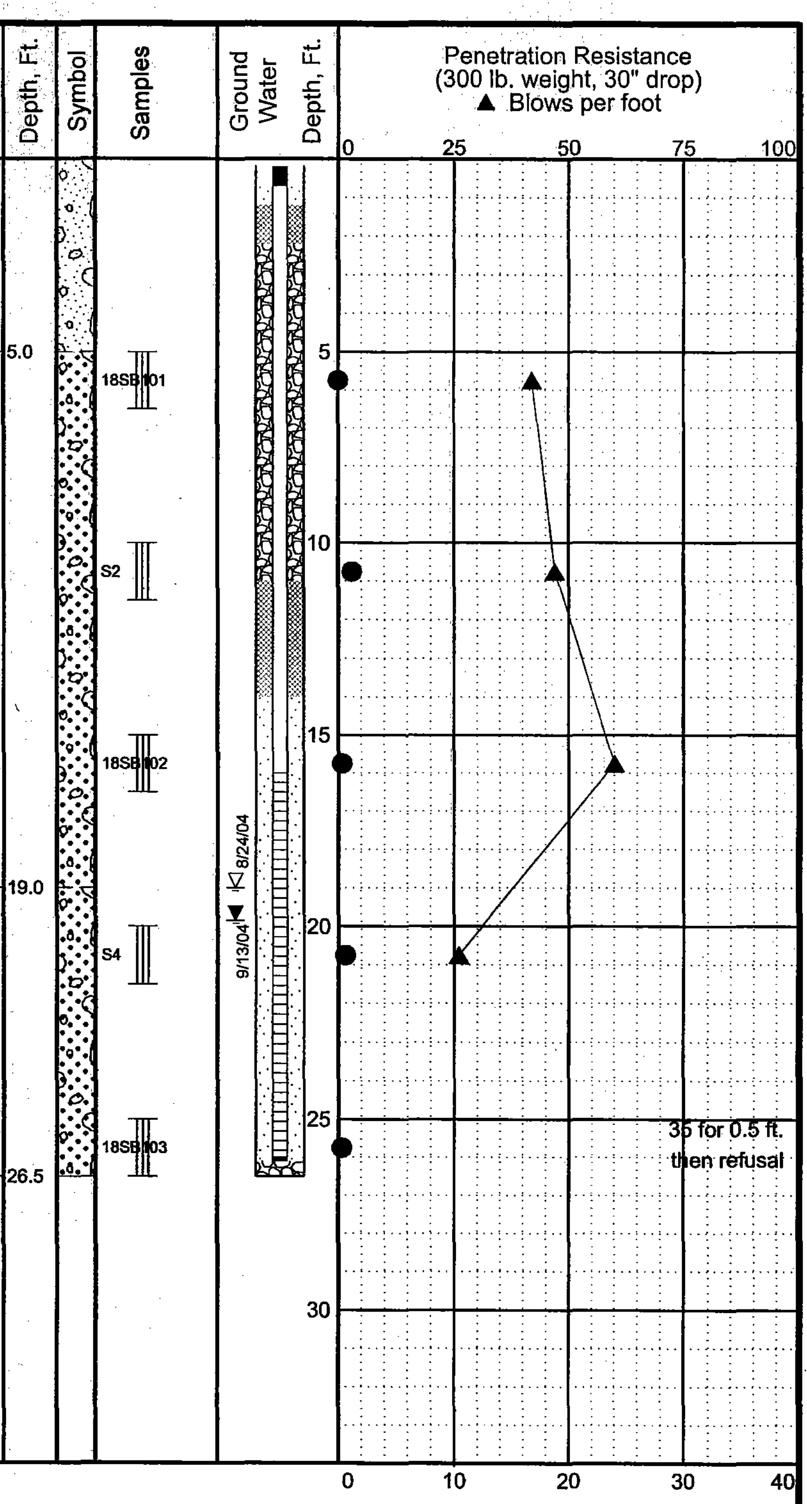
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-13b

MATERIAL DESCRIPTION

Coordinates: N: 97,784 E: 95,838

Elevation: 83.29 Ft.



Brown, silty, gravelly SAND and cobbles; moist [Fill]

Dense, lt. brown, silty, gravelly SAND to silty GRAVEL and cobbles; moist

Dense, brown, silty, gravelly SAND to silty GRAVEL and cobbles; wet

Bottom of Boring
Boring Completed 8/24/04

Boring advanced with Tubex air/rotary

LEGEND

*	Sample Not Recovered
Ⅲ	3" O.D. Split Spoon Sample
B	Auger Cuttings

⊠	Surface Seal
▩	Solid Casing and Annular Seal
▤	Well Casing and Filter Sand
▨	Cuttings Backfill
∇	Ground Water Level At Time Of Drilling
▼	Static Water Level

NOTES

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2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 18MW1

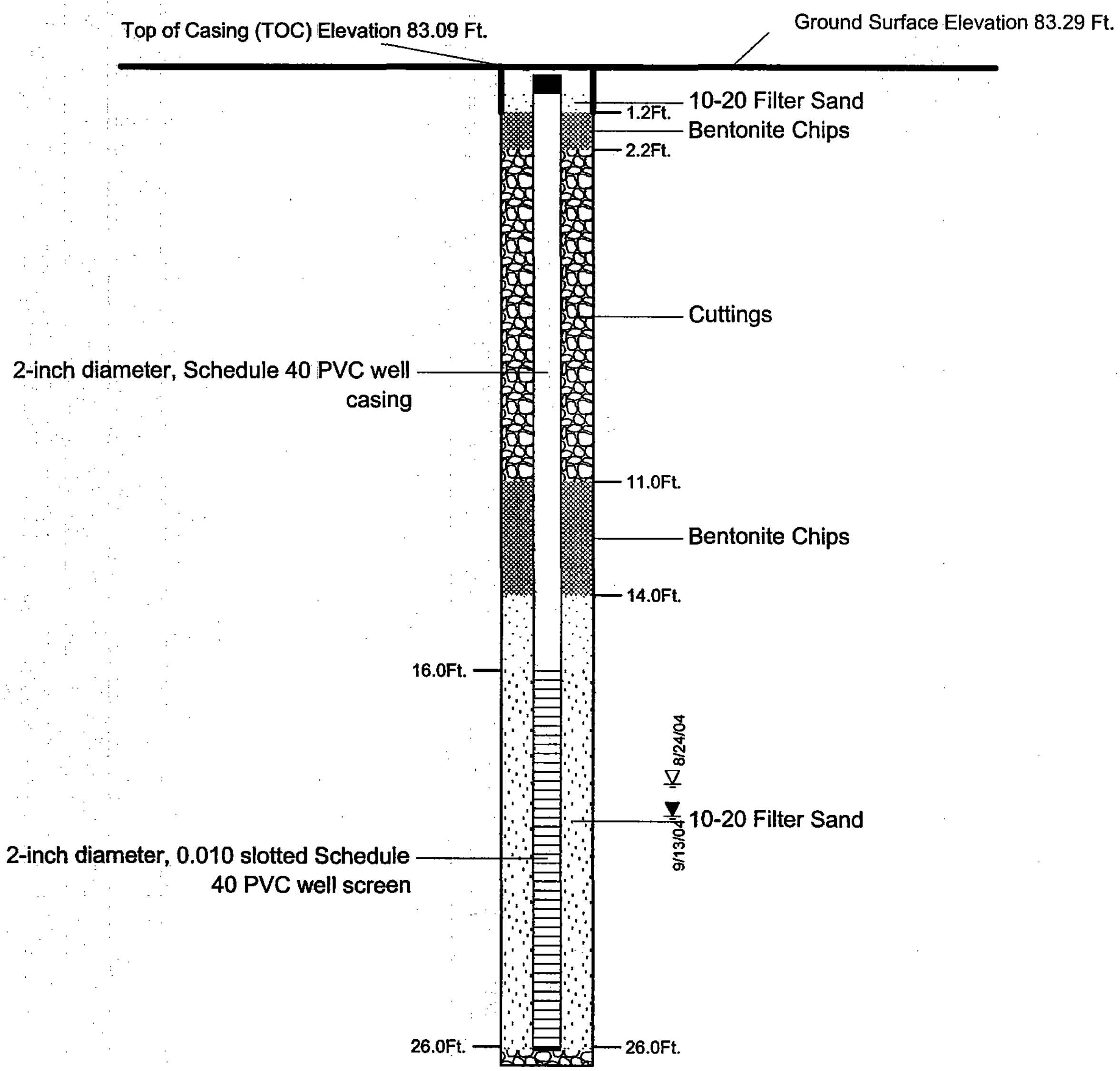
June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-14a

Coordinates: N: 97,784 E: 95,838

Casing Description **Backfill Description**



LEGEND

▽ Ground Water Level ATD
▼ Static Ground Water Level

NOTES: Cover is cast iron set in concrete
Top cap is locking expansion plug with padlock
Joints are machine threaded
Botton cap is friction fit

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MONITORING WELL 18MW1
CONSTRUCTION DETAIL

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

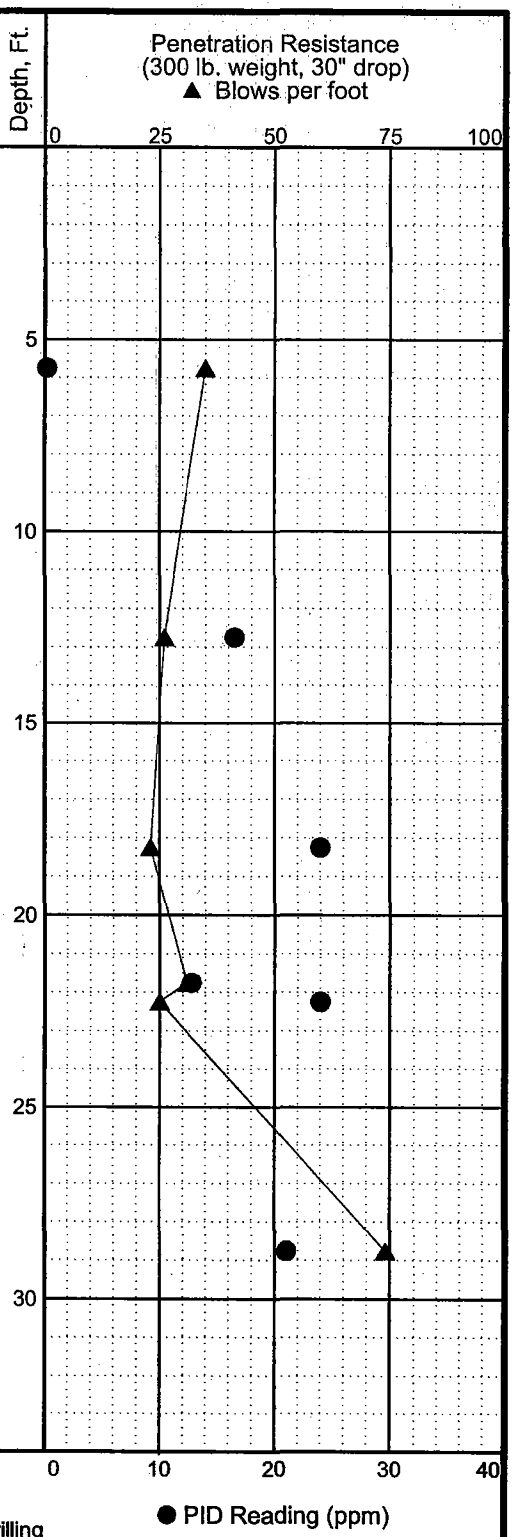
Fig. B-14b

MATERIAL DESCRIPTION

Coordinates: N: 98,068 E: 96,317

Elevation: 82.5 Ft.

MATERIAL DESCRIPTION	Depth, Ft.	Samples	Ground Water
Brown, silty, sandy GRAVEL and cobbles; moist			
Stiff, gray, slightly gravelly, sandy SILT; moist	5.3	19SB101	
Medium dense, gray/brown, gravelly, silty SAND; moist	5.7		
Medium dense, silty, gravelly SAND and cobbles; dry to moist; moderate hydrocarbon odor	10.0	19SB102	
Medium dense, silty, sandy GRAVEL; wet; Strong weathered diesel odor, slight hydrocarbon sheen on water	17.0	19SB103	8/25/04 ⊻
Fractured granite cuttings, 0.5 ft. of fractured rock in each of 3 split spoons. Moderate driving resistance for first two suggest depositional material. High driving resistance at 28.5 ft. suggests bedrock or frozen material.	21.0	S4 S5 S6	
Bottom of Boring Boring Completed 8/25/04 Boring advanced with Tubex air/rotary	29.5		



LEGEND

*	Sample Not Recovered
Ⅲ	3" O.D. Split Spoon Sample
B	Auger Cuttings
⊻	Ground Water Level At Time Of Drilling

NOTES

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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 19B1

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-15a

ENVIRONMENTAL LOG 16821DRILLF.GPJ S&W GEO1.GDT 6/22/05

MATERIAL DESCRIPTION

Coordinates: N: 97,854 E: 96,208

Elevation: 89.36 Ft.

Brown, silty coarse GRAVEL and cobbles; moist

Dense to very dense, brown, slightly silty, sandy angular GRAVEL and cobbles; moist

Medium dense to dense, brown/redish brown, silty, gravelly SAND to gravelly, silty SAND and cobbles; moist

20SB104: 19% Gravel, 55% Sand, 25% Fines

Very dense, brown, silty, gravelly SAND and cobbles; moist

wet at 22.5 ft.

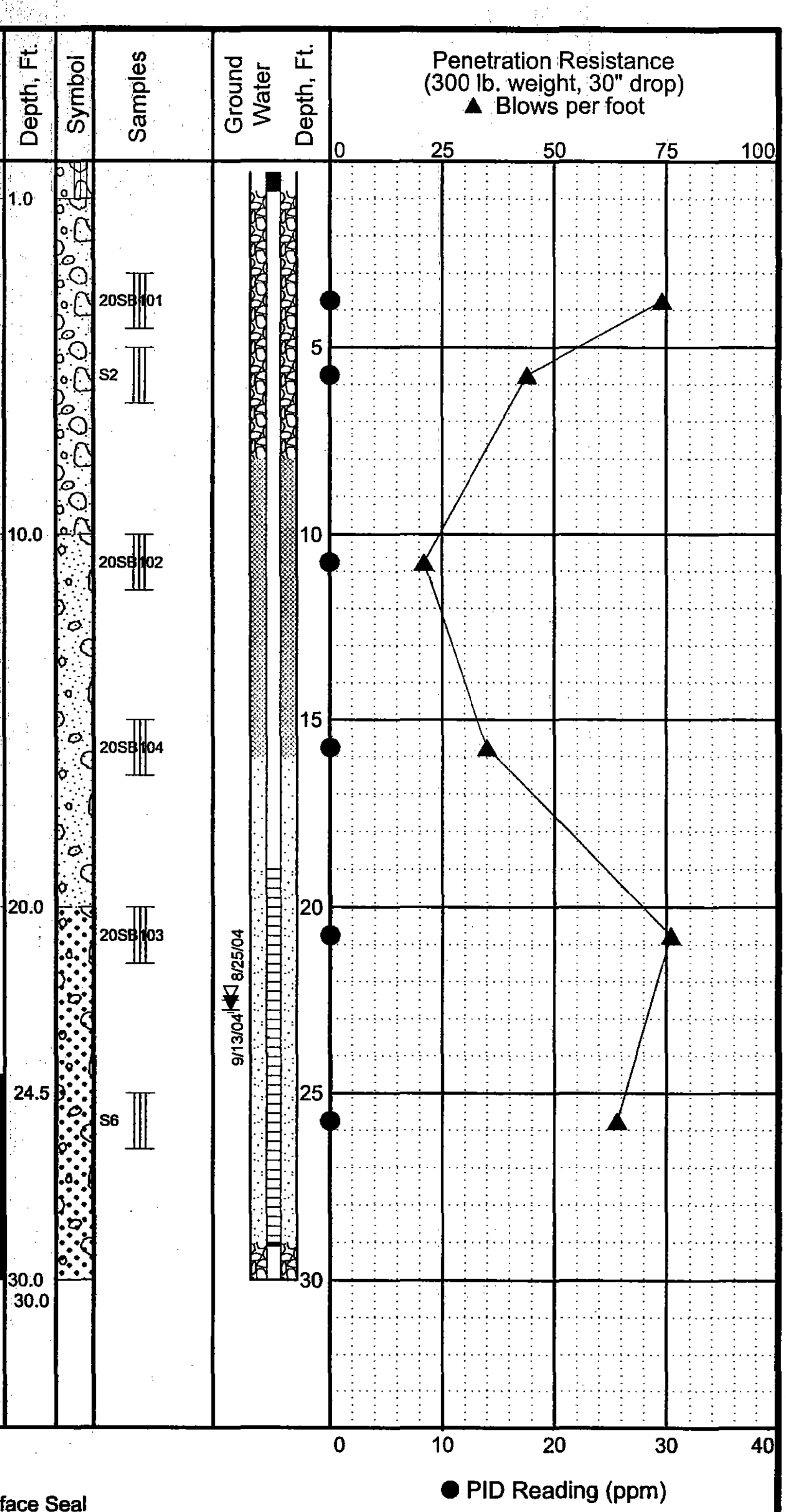
frozen suspected at 24.5 ft.

1-inch lense of gray sandy silt between angular gravel/fractured rock at 26.3 ft.

Bottom of Boring

Boring Completed 8/25/04

Boring advanced with Tubex air/rotary



LEGEND

*	Sample Not Recovered	⊠	Surface Seal
ⅢⅠ	3" O.D. Split Spoon Sample	▩	Solid Casing and Annular Seal
B	Auger Cuttings	⊟	Well Casing and Filter Sand
		▨	Cuttings Backfill
■	Frozen	∇	Ground Water Level At Time Of Drilling
		▼	Static Water Level

NOTES

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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 20MW1

June 2005 32-1-16821

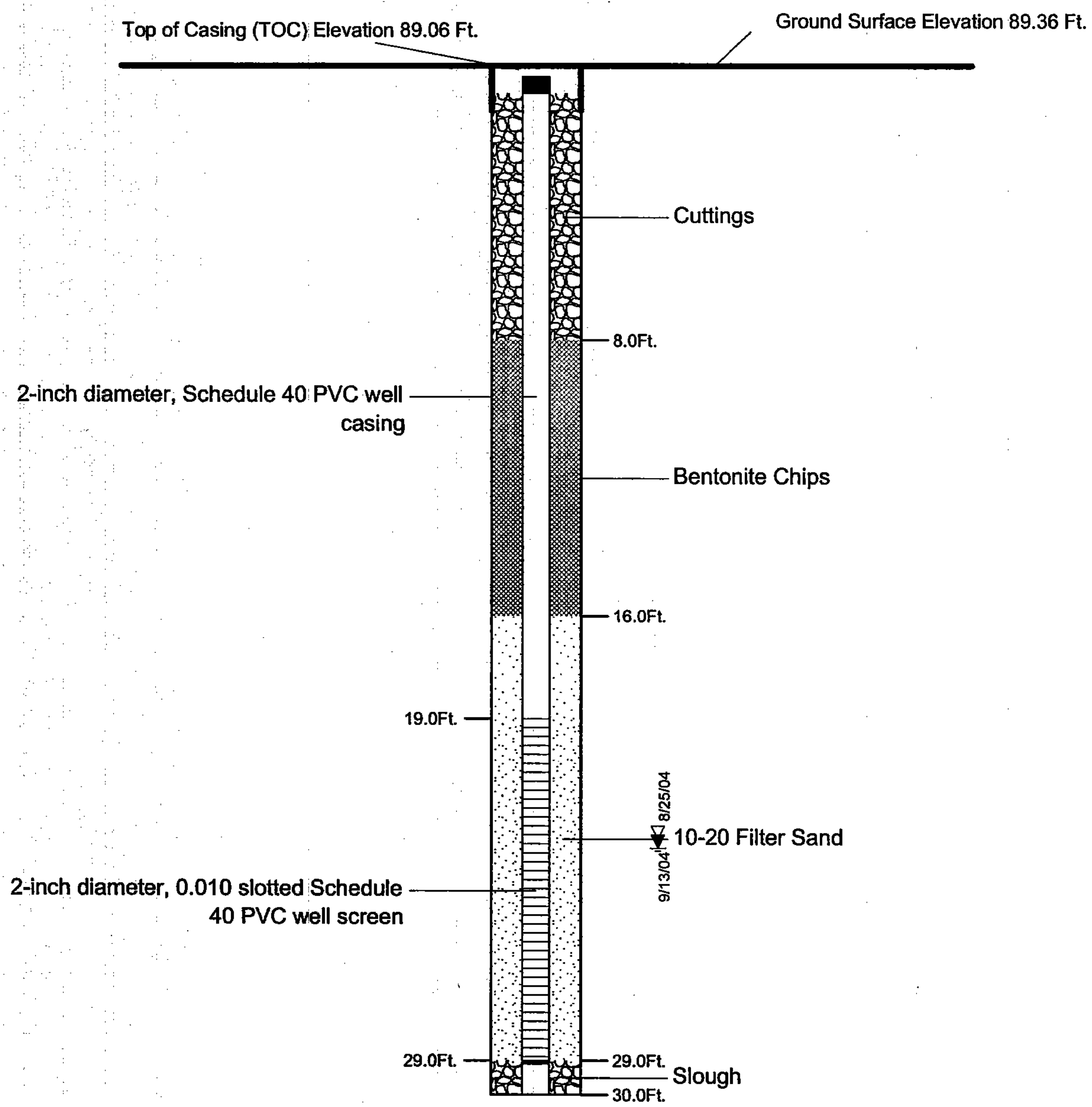
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-16a

ENVIRONMENTAL LOG 16821DRILLF.GPJ S&W GEO1.GDT 6/22/05

Coordinates: N: 97,854 E: 96,208

Casing Description **Backfill Description**



LEGEND

∇ Ground Water Level ATD
▼ Static Ground Water Level

NOTES: Cover is cast iron set in concrete
Top cap is locking expansion plug with padlock
Joints are machine threaded
Botton cap is friction fit

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MONITORING WELL 20MW1
CONSTRUCTION DETAIL

June 2005 32-1-16821

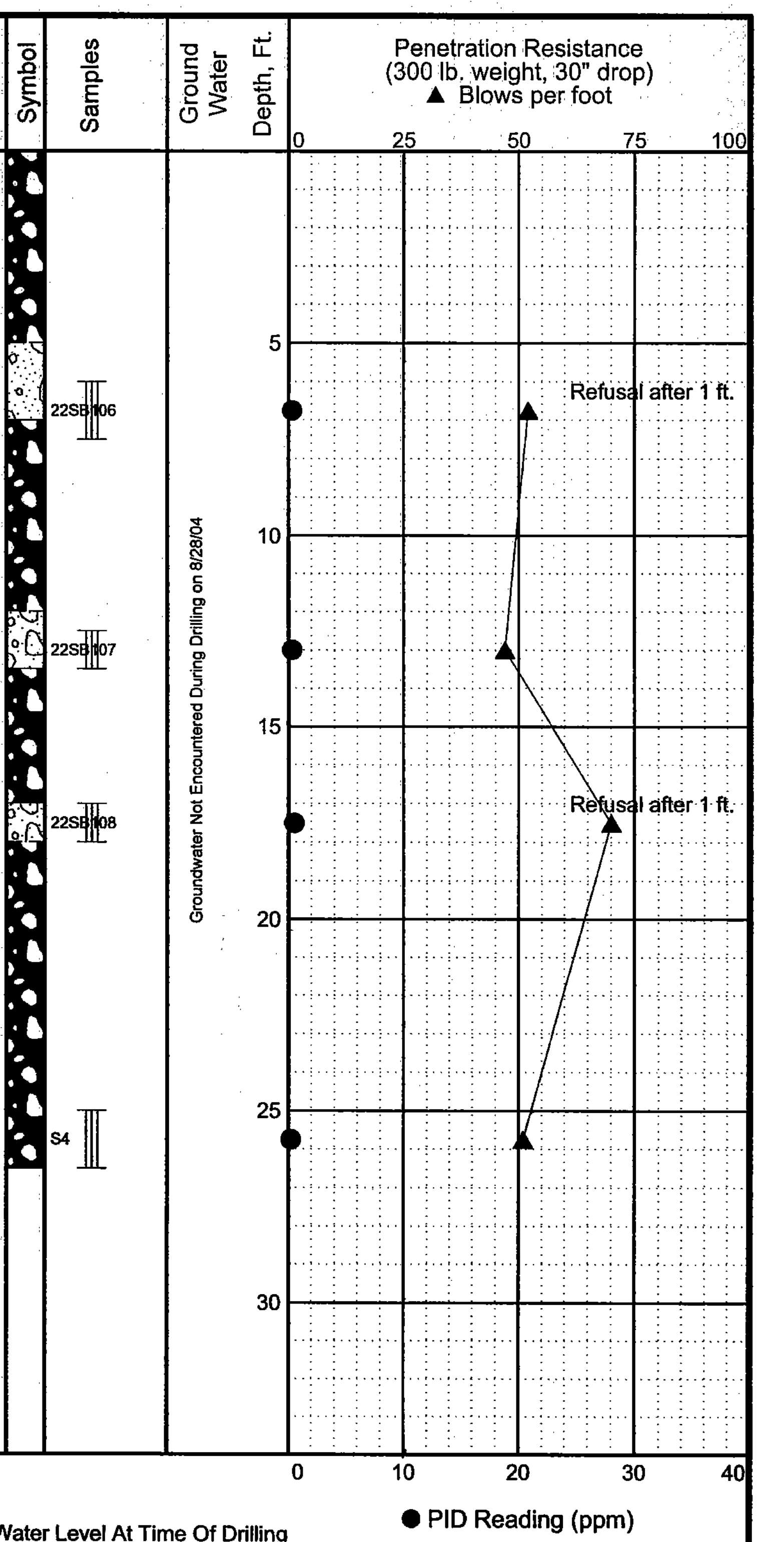
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-16b

MATERIAL DESCRIPTION

Coordinates: N: 97,612 E: 96,091
Elevation: 94.2 Ft.

Depth, Ft.	Material Description
	Brown, gravelly COBBLES; moist [Fill]
5.0	Very dense, lt. brown, gravelly SAND in cobbles; dry to moist
7.0	Drill action and cuttings suggest Rocks
12.0	Dense, brown to gray, sandy GRAVEL; moist
13.5	Drill action and cuttings suggest Rocks, possibly frozen at 15 ft.
17.0	Gray, sandy GRAVEL; dry (Cuttings?)
18.0	Drill action and cuttings suggest Rocks. The ability to drive a split spoon 18 inches and recover 6 inches of fractured rock/angular gravel suggests frozen depositional material.
26.5	Bottom of Boring Boring Completed 8/28/04 Boring advanced with Tubex air/rotary



LEGEND

* Sample Not Recovered
Ш 3" O.D. Split Spoon Sample
B Auger Cuttings
⊻ Ground Water Level At Time Of Drilling

NOTES

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2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 22B1

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-17a

ENVIRONMENTAL LOG 16821DRILLF.GPJ S&W GEO1.GDT 6/22/05

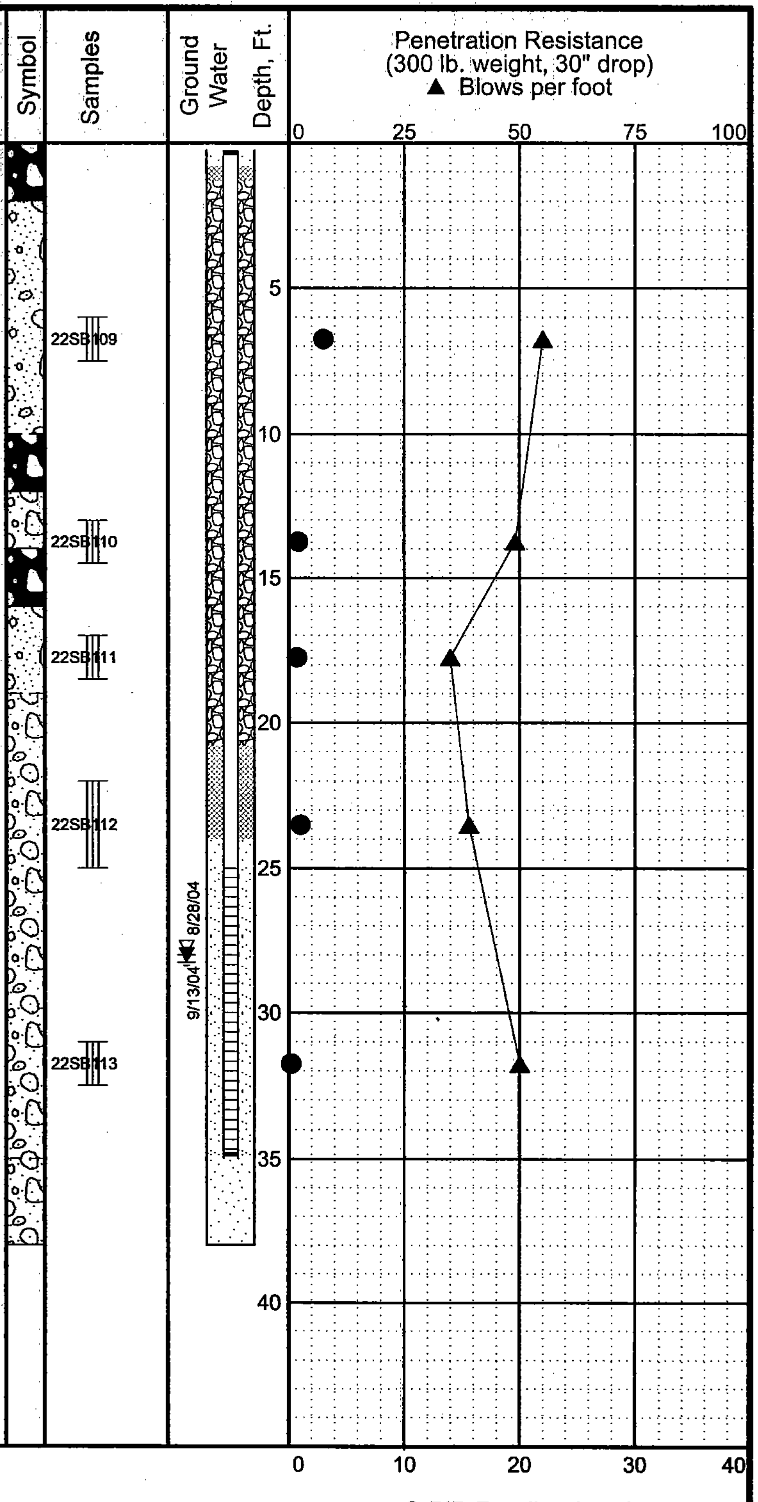
MATERIAL DESCRIPTION

Coordinates: N: 97,587 E: 96,081

Elevation: 94.02 Ft.

MATERIAL DESCRIPTION	Depth, Ft.
Cobble and boulder FILL with concrete and steel	2.0
Very dense, brown to gray, gravelly SAND and cobbles; dry to moist, slight hydrocarbon odor and staining at 7.4 ft.	10.0
Boulder	12.0
Dense, brown to gray, silty, sandy GRAVEL and cobbles; moist	14.0
Boulder	16.0
Dense, brown, gravelly SAND; moist	19.0
Dense, brown, slightly silty, sandy GRAVEL and cobbles; moist to wet. Marginal water contact at 22 ft., better water at 28 ft., frozen ground first suspected at 30 ft.	35.0 35.0
Brown, slightly silty, sandy GRAVEL and cobbles; Frozen	38.0 38.0

Bottom of Boring
Boring Completed 8/28/04
Boring advanced with Tubex air/rotary



LEGEND

*	Sample Not Recovered	⊠	Surface Seal
Ⅲ	3" O.D. Split Spoon Sample	▩	Solid Casing and Annular Seal
B	Auger Cuttings	⊟	Well Casing and Filter Sand
		▨	Cuttings Backfill
▮	Frozen	▽	Ground Water Level At Time Of Drilling
		▼	Static Water Level

NOTES

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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 22MW2

June 2005 32-1-16821

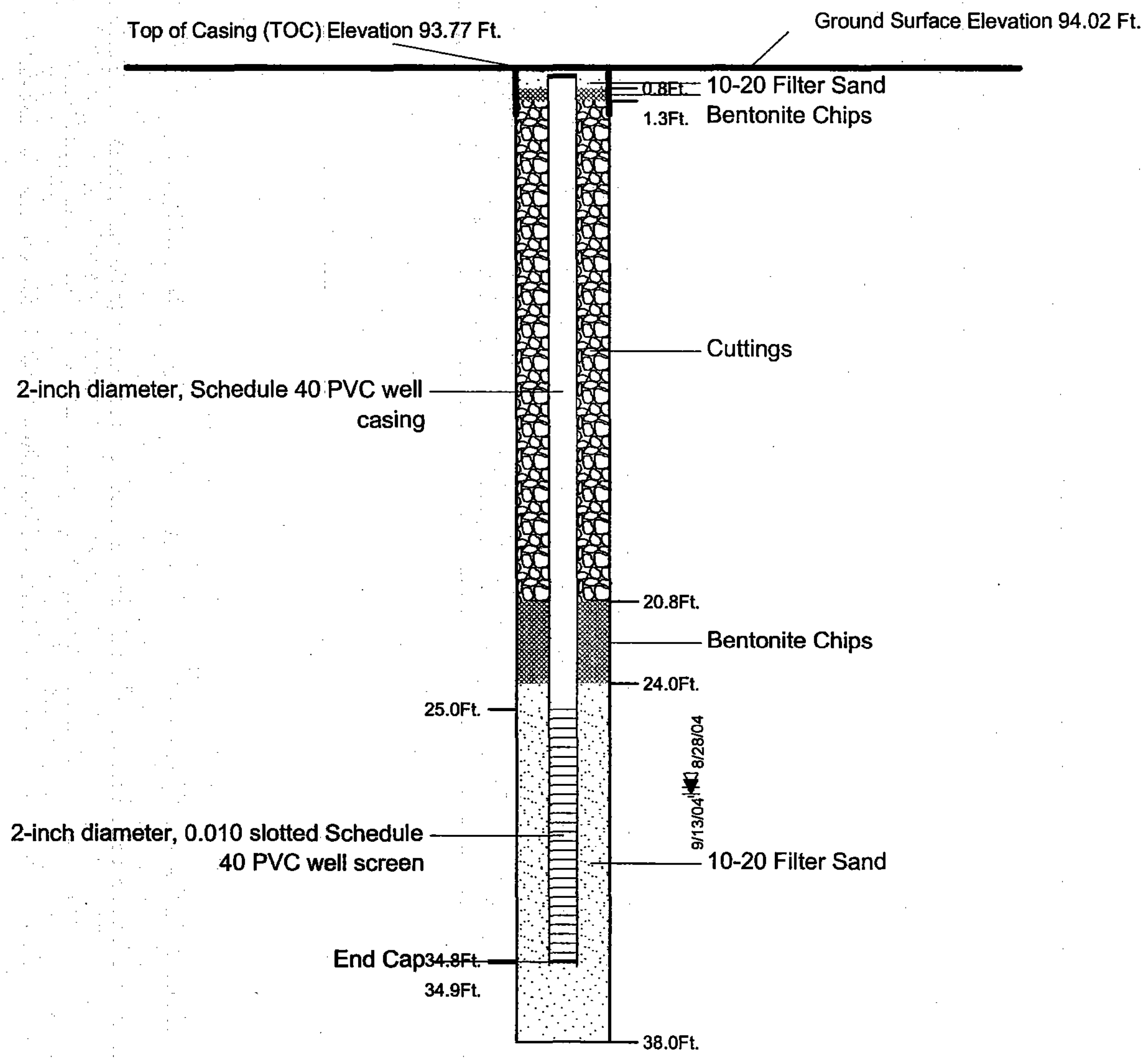
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-18a

Coordinates: N: 97,587 E: 96,081

Casing Description

Backfill Description



LEGEND

∇ Ground Water Level ATD

▼ Static Ground Water Level

NOTES: Cover is cast iron set in concrete
Top cap is locking expansion plug with padlock
Joints are machine threaded
Botton cap is friction fit

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MONITORING WELL 22MW2
CONSTRUCTION DETAIL

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

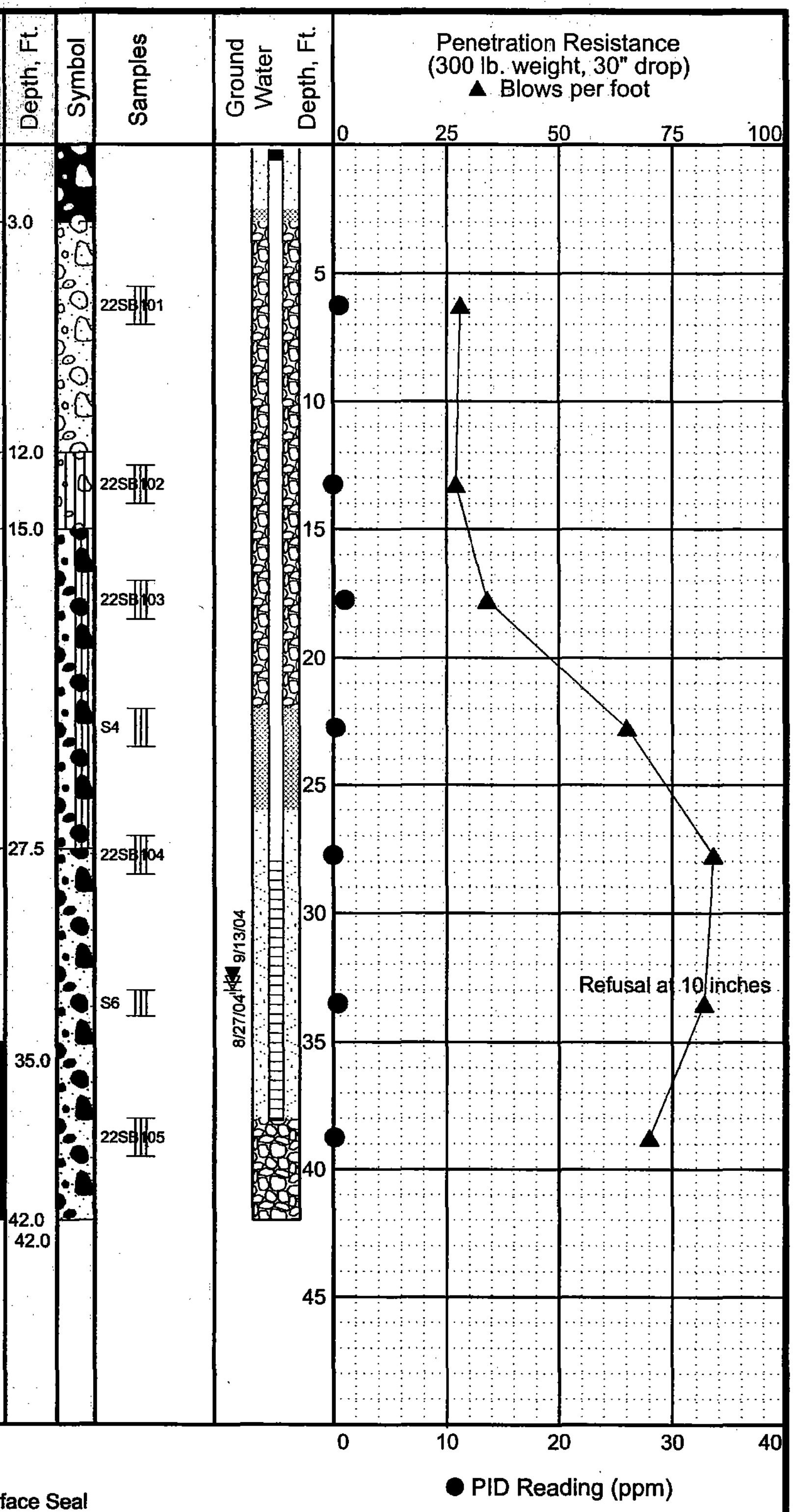
Fig. B-18b

MATERIAL DESCRIPTION

Coordinates: N: 97,538 E: 96,208

Elevation: 99.51 Ft.

Depth, Ft.	Material Description
	Gravelly COBBLES; moist [Fill]
3.0	Medium dense, brown, silty, sandy GRAVEL and cobbles; moist. 22SB101: 45% Gravel, 25% Sand, 31% Fines
12.0	Dense, grayish brown, sandy, gravelly SILT and cobbles; moist
15.0	Dense to very dense, redish brown, sandy, silty GRAVEL and cobbles; moist. Minor water at 22.5 ft.
27.5	Very dense, brown, silty, sandy GRAVEL and cobbles; water at 32 to 33 ft. Suspected frozen at 34 ft., confirmed frozen ground at 38 ft.
35.0	
42.0 42.0	Bottom of Boring Boring Completed 8/27/04 Boring advanced with Tubex air/rotary



LEGEND

*	Sample Not Recovered
Ш	3" O.D. Split Spoon Sample
B	Auger Cuttings
■	Frozen
▨	Surface Seal
▩	Solid Casing and Annular Seal
▤	Well Casing and Filter Sand
▧	Cuttings Backfill
▽	Ground Water Level At Time Of Drilling
▼	Static Water Level

NOTES

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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 22MW3

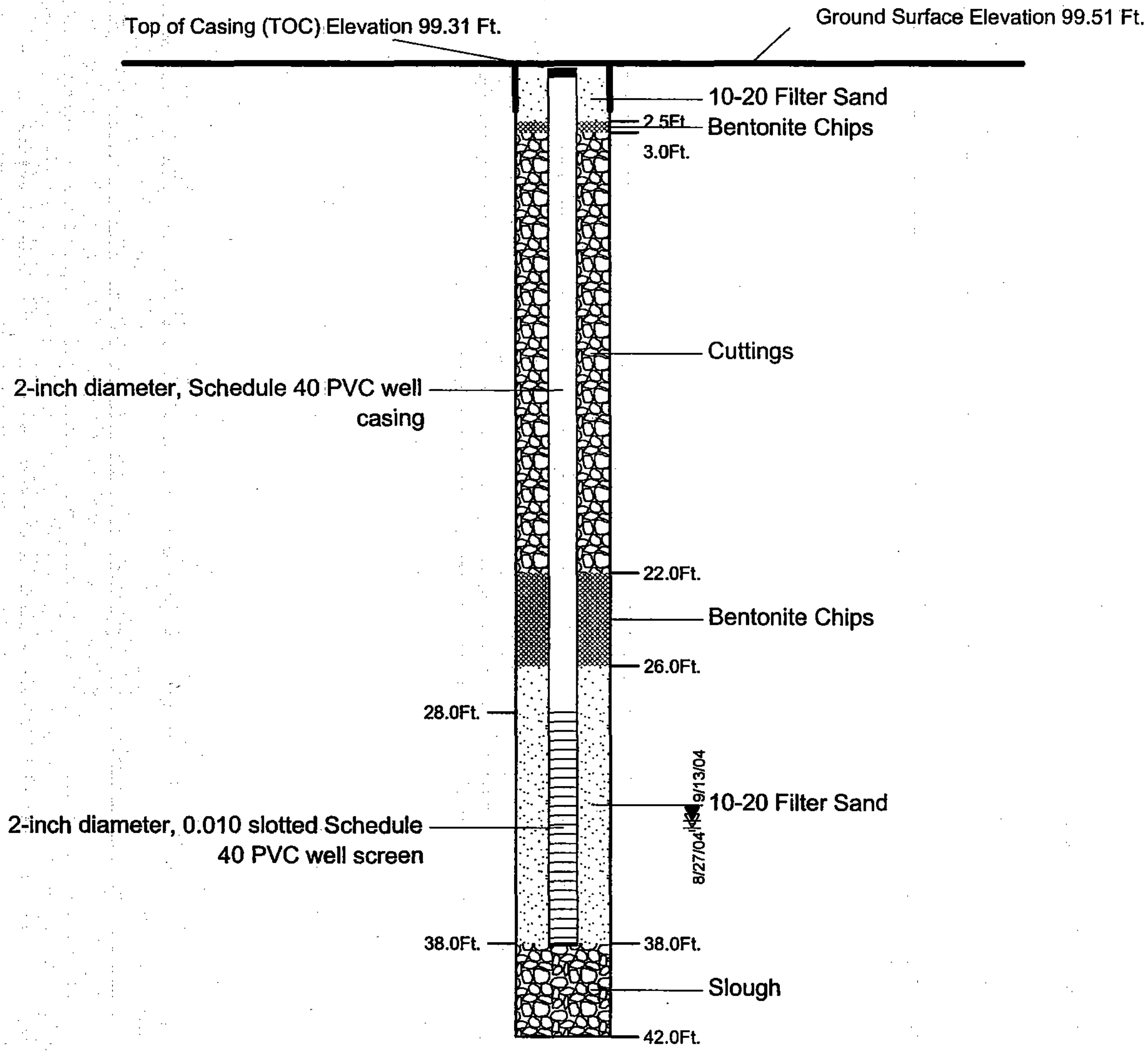
June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-19a

Coordinates: N: 97,538 E: 96,208

Casing Description **Backfill Description**



LEGEND

∇ Ground Water Level ATD

▼ Static Ground Water Level

NOTES: Cover is cast iron set in concrete
Top cap is locking expansion plug with padlock
Joints are machine threaded
Botton cap is friction fit

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MONITORING WELL 22MW3
CONSTRUCTION DETAIL

June 2005 32-1-16821

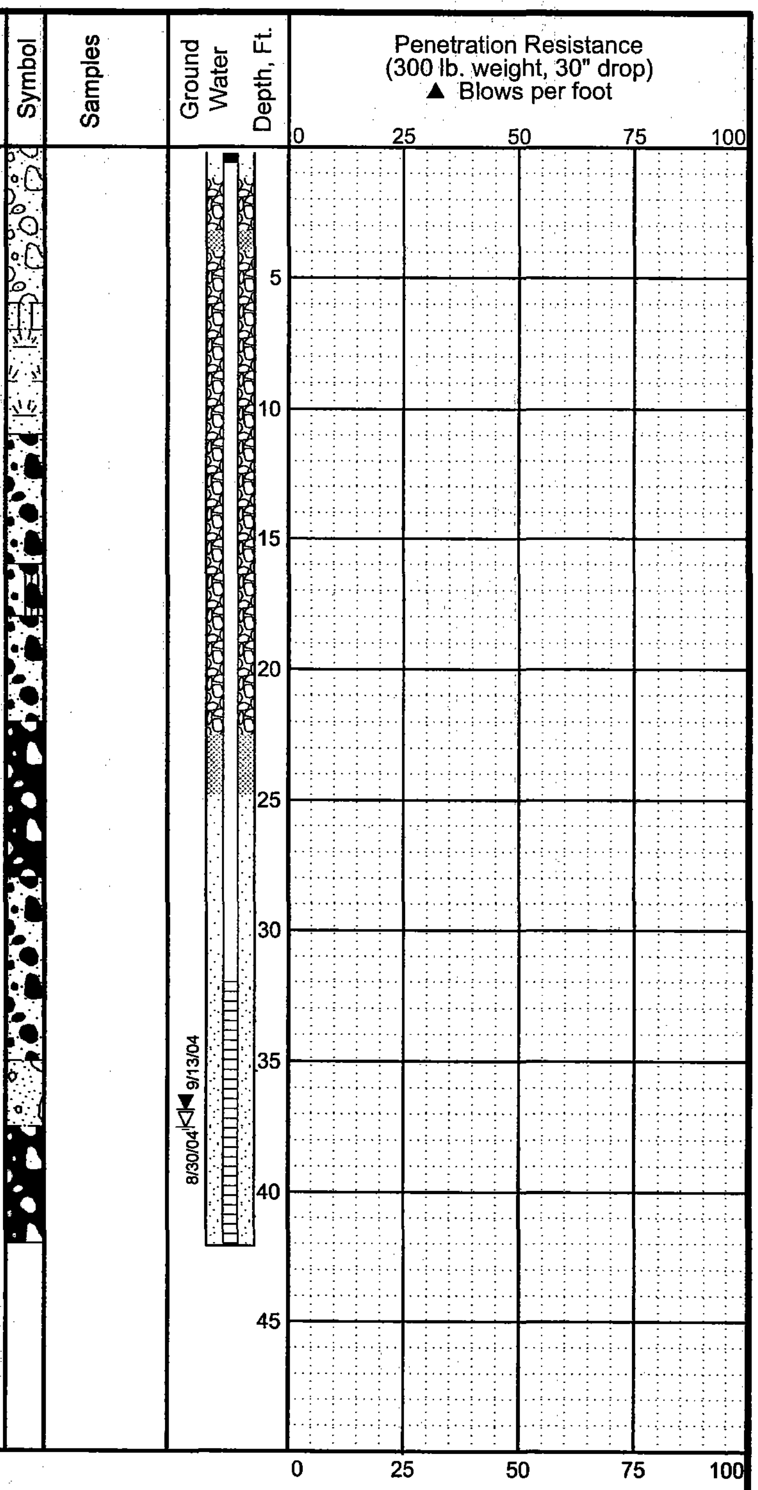
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-19b

MATERIAL DESCRIPTION

Coordinates: N: 97,608 E: 96,561
Elevation: 107.62 Ft.

MATERIAL DESCRIPTION	Depth, Ft.
Lithology based on cuttings and drill action. Brown, silty, sandy GRAVEL and cobbles; moist [Fill]	
Dk. brown, silty fine SAND; moist	6.0
Dk. brown, silty, sandy GRAVEL; moist; with organics (orginal top soil)	7.0
Lt. reddish brown, slightly silty, sandy GRAVEL and cobbles; moist	11.0
Increased silt content	16.0
Brown, slightly silty, sandy GRAVEL and cobbles; moist	18.0
Rocks	22.0
Brown, slightly silty, sandy GRAVEL to gravelly SAND and cobbles; moist	28.0
Brown, gravelly SAND and cobbles; moist to wet. Drill action similar to frozen ground	35.0
Mostly rock chips; wet	37.5
▮	40.0
	42.0
Bottom of Boring Boring Completed 8/30/04 Boring advanced with Tubex air/rotary	42.0



● PID Reading (ppm)

LEGEND

*	Sample Not Recovered	▨	Surface Seal
⌶	3" O.D. Split Spoon Sample	▩	Solid Casing and Annular Seal
B	Auger Cuttings	☐	Well Casing and Filter Sand
		▨	Cuttings Backfill
▮	Frozen	∇	Ground Water Level At Time Of Drilling
		▼	Static Water Level

NOTES

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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 26MW1

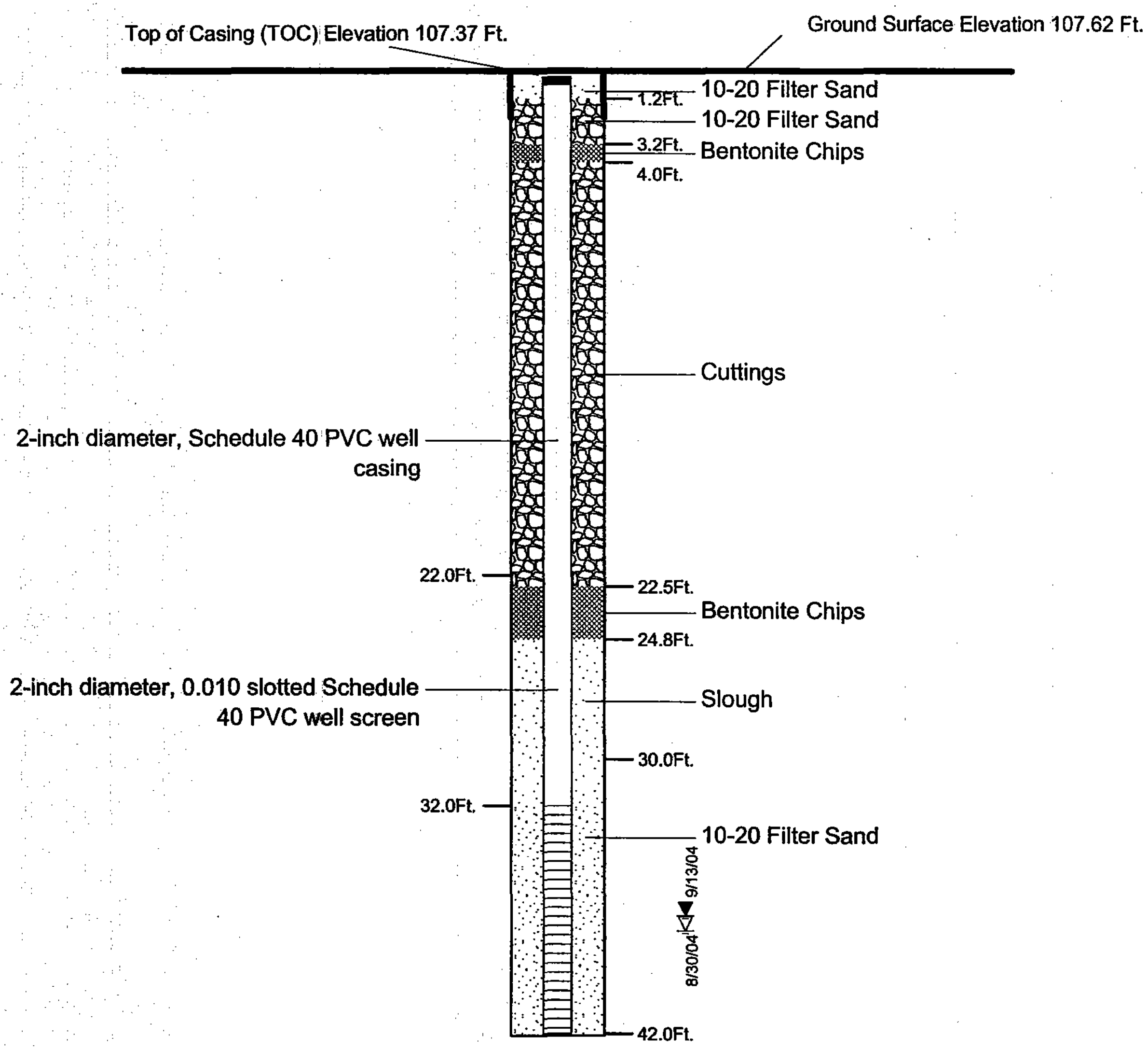
June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-20a

Coordinates: N: 97,608 E: 96,561

Casing Description **Backfill Description**



LEGEND

⊻	Ground Water Level ATD
▼	Static Ground Water Level

NOTES: Cover is cast iron set in concrete
Top cap is locking expansion plug with padlock
Joints are machine threaded
Botton cap is friction fit

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MONITORING WELL 26MW1
CONSTRUCTION DETAIL

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-20b

MATERIAL DESCRIPTION

Coordinates: N: 99,228 E: 97,287

Elevation: 56.69 Ft.

Lithology based on cuttings and drill action

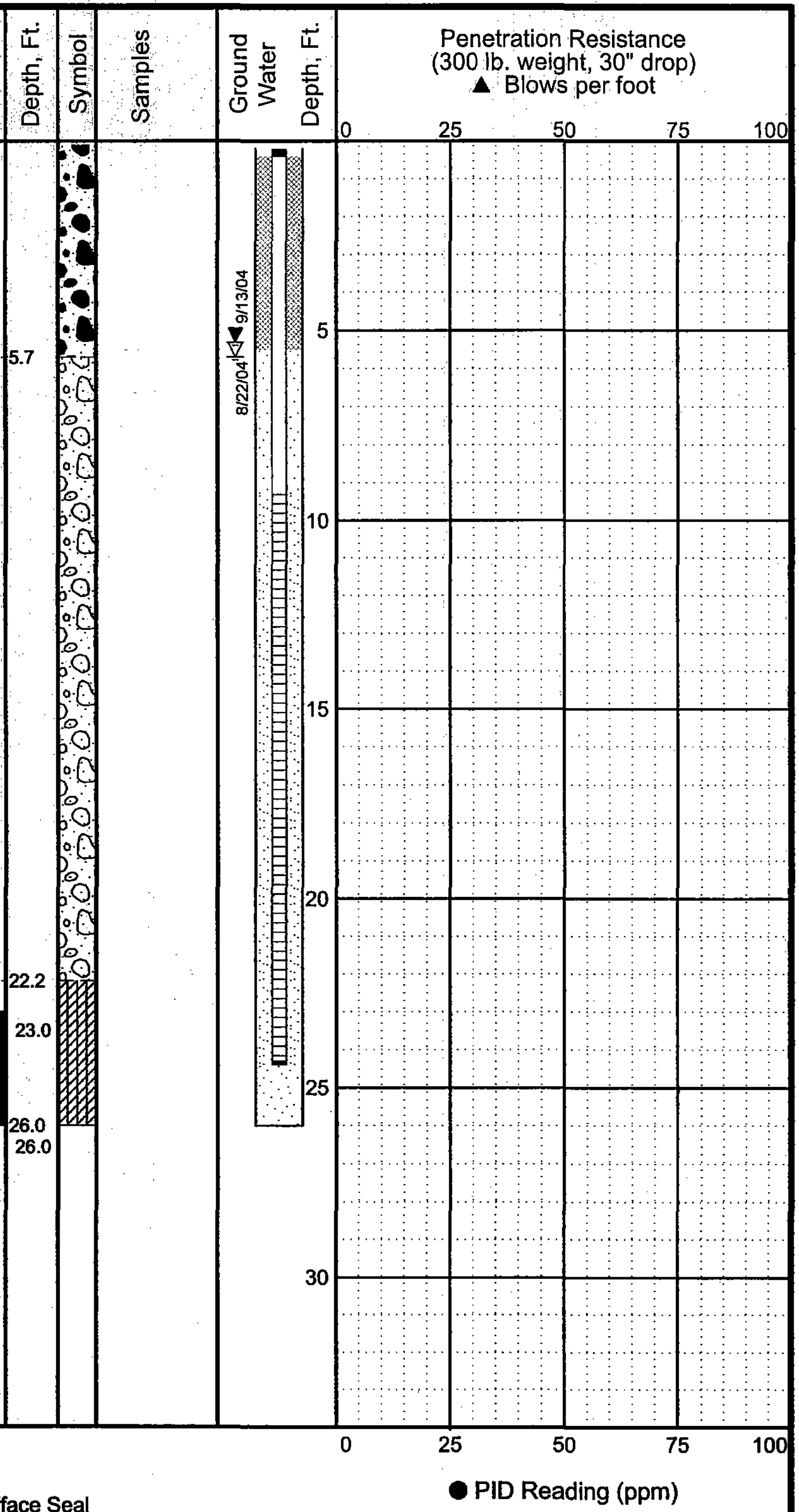
Brown, silty, sandy, GRAVEL and cobbles; moist, becoming wet at 5.5 to 5.7 ft.

Brown, medium to fine sandy, angular GRAVEL and cobbles; wet

Very stiff, gray clayey SILT; wet to frozen [Till]

Bottom of Boring
Boring Completed 8/22/04

Boring advanced with Tubex air/rotary



LEGEND

* Sample Not Recovered
Ⅲ 3" O.D. Split Spoon Sample
B Auger Cuttings

▮ Frozen

▧ Surface Seal
▩ Solid Casing and Annular Seal
▢ Well Casing and Filter Sand
▨ Cuttings Backfill
▽ Ground Water Level At Time Of Drilling
▼ Static Water Level

NOTES

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Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

LOG OF BORING 26MW3

June 2005 32-1-16821

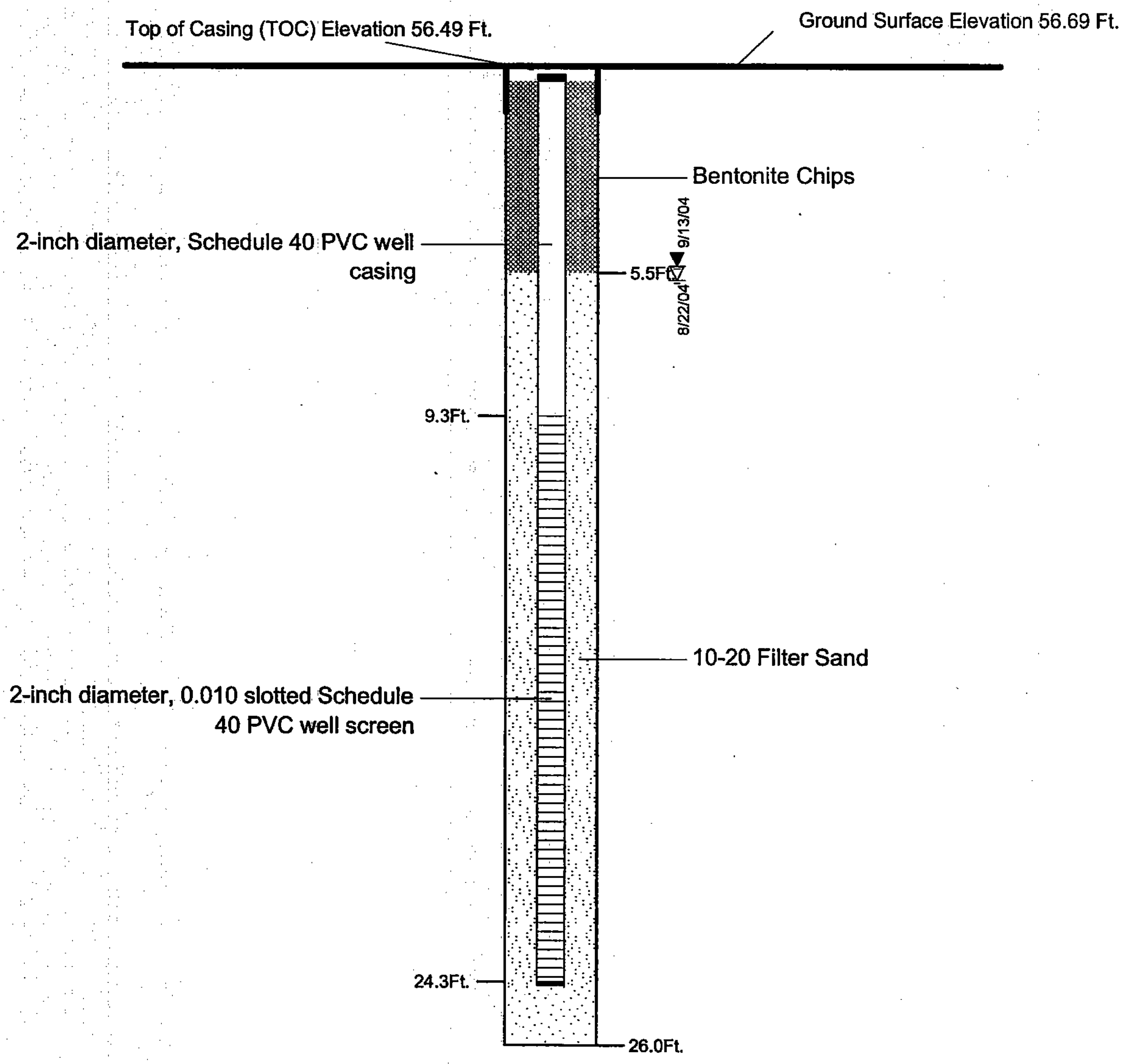
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-21a

Coordinates: N: 99,228 E: 97,287

Casing Description

Backfill Description



LEGEND

▽ Ground Water Level ATD
▼ Static Ground Water Level

NOTES: Cover is cast iron set in concrete
Top cap is locking expansion plug with padlock
Joints are machine threaded
Botton cap is friction fit

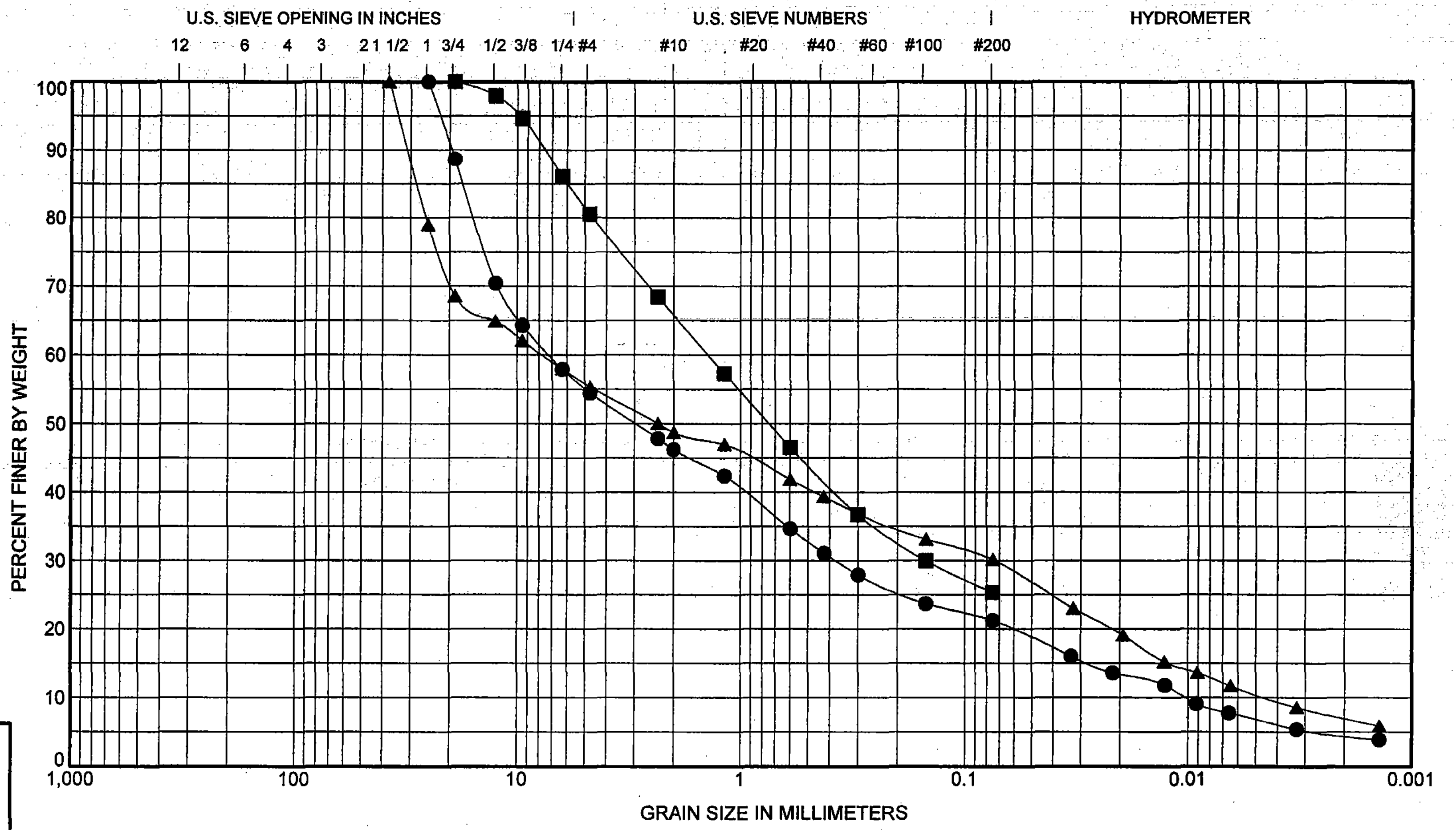
Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

MONITORING WELL 26MW3
CONSTRUCTION DETAIL

June 2005 32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. B-21b



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample	Depth, Ft	Classification	LL	PL	PI	Cc	Cu
● 13B1 13SB103	18.0 -	**Silty GRAVEL with Sand, GM, 10.3 % Moisture**				1.9	703.0
■ 20MW1 20SB104	15.0 -	**Silty SAND with Gravel, SM, 7.0 % Moisture**					
▲ 22MW3 22SB101	5.5 -	**Silty GRAVEL with Sand, GM, 8.9 % Moisture**				0.2	1720.9

Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● 13B1 13SB103	18.0 -	25	7.2	0.38	0.01	45	33	14	7
■ 20MW1 20SB104	15.0 -	19	1.4	0.15		19	55	25	
▲ 22MW3 22SB101	5.5 -	37.5	7.71	0.07	0	45	25	20	11

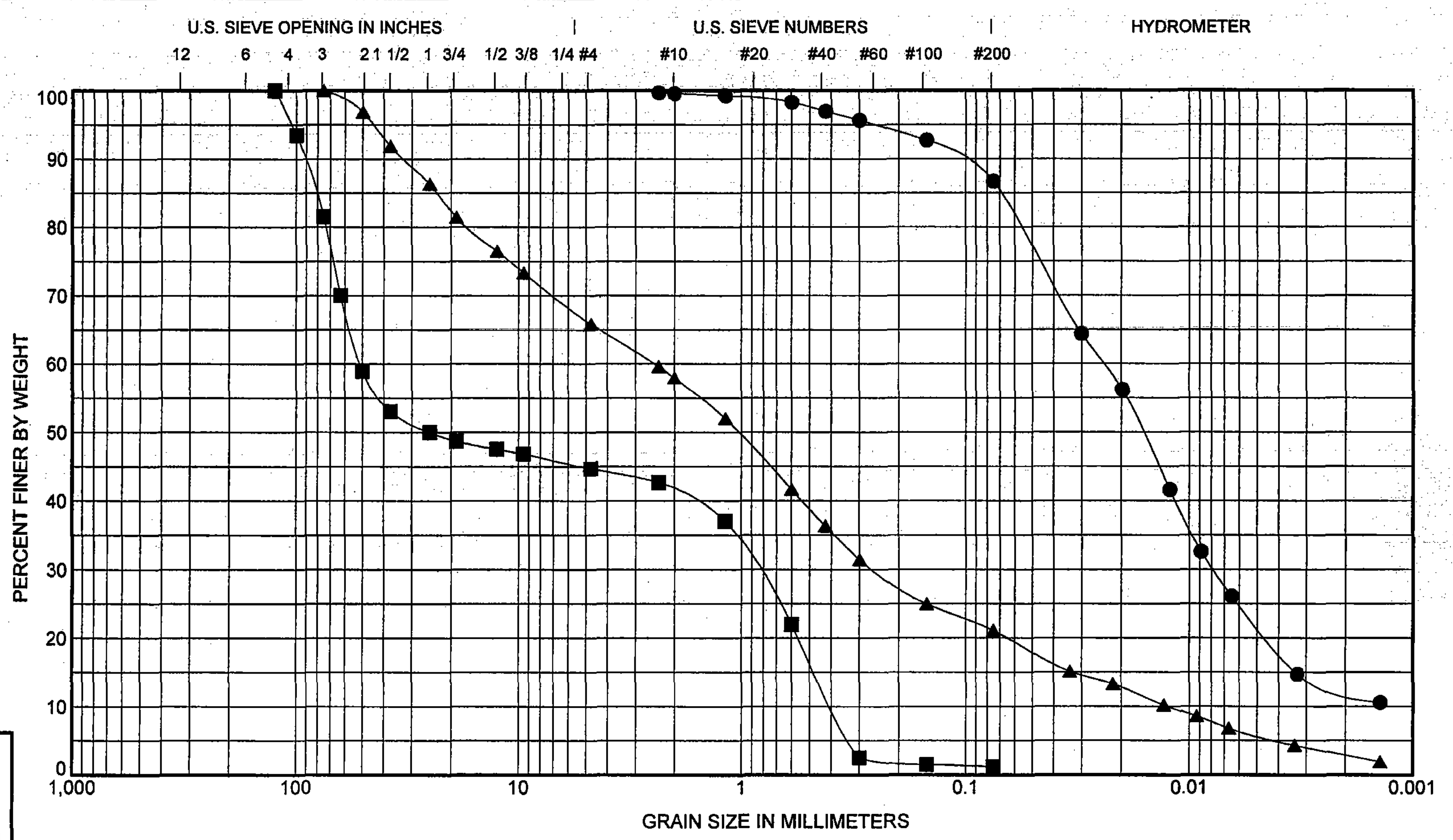
Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

GRAIN SIZE CLASSIFICATION

January 2005
32-1-16821

SHANNON & WILSON, INC.
Geotechnical and Enviromental Consultants

Fig. B-22



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Classification	LL	PL	PI	Cc	Cu
●	26MW2 - 20 ft.	Clayey SILT, ML, 24.5% Moisture	26	20	6		
■	88SS101	SAND with Gravel and Cobbles, SP, 2.7% Moisture				0.0	130.4
▲	88SS102	Silty SAND with Gravel, SM, 15.6% Moisture				2.1	198.2

Sample		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	26MW2 - 20 ft.	2.36	0.02	0.01		0	13	65	22
■	88SS101	125	51.13	0.86	0.39	37	43	1	
▲	88SS102	75	2.47	0.26	0.01	34	45	15	6

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

GRAIN SIZE CLASSIFICATION

June 2005

32-1-16821

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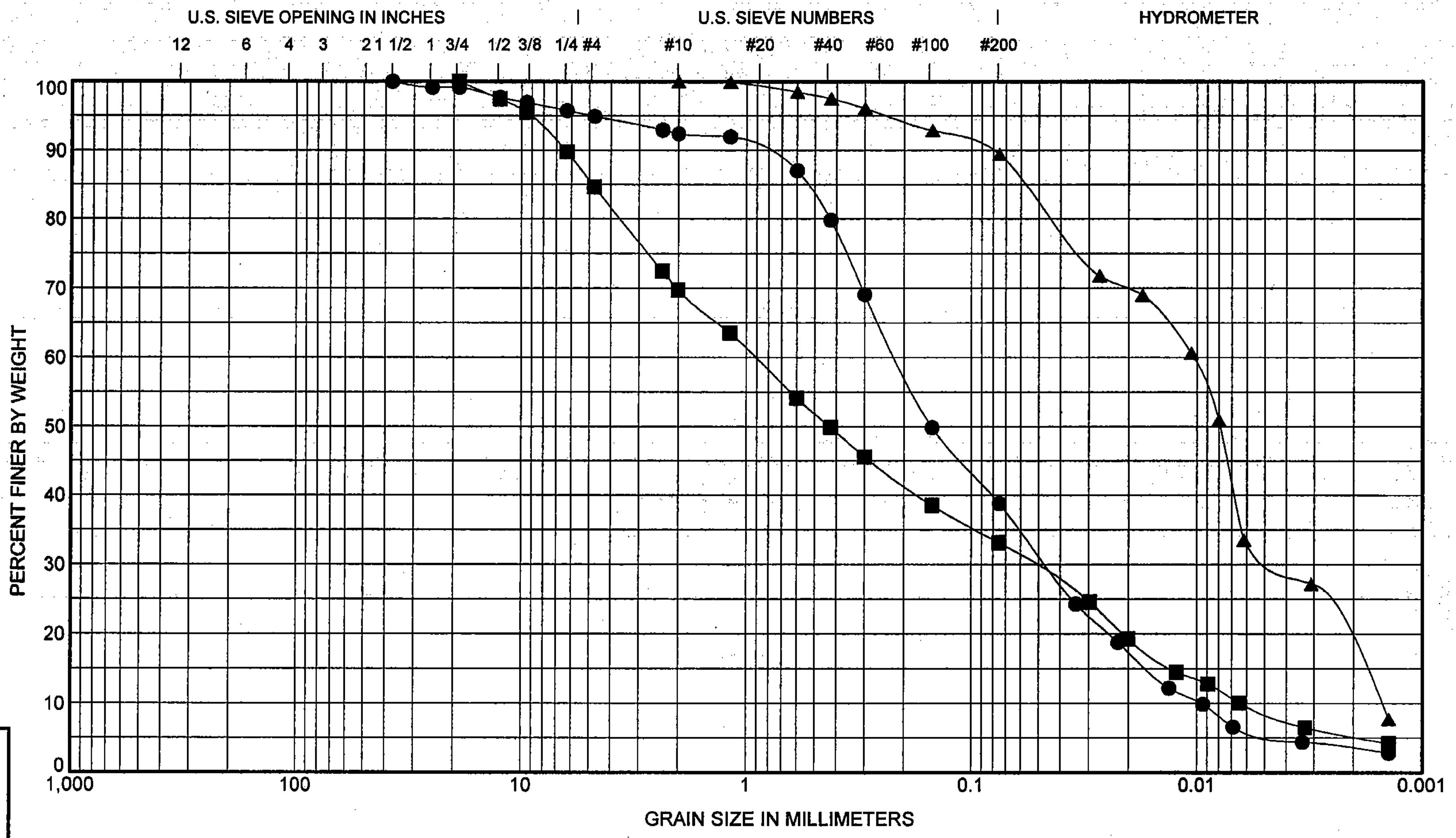
Fig. B-23



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Classification	LL	PL	PI	Cc	Cu
●	BGSD102	Silty SAND, SM, 42.2% Moisture				1.1	22.6
■	BGSS101	Silty SAND with Gravel, SM, 16.3% Moisture				0.5	143.6
▲	BGSS102	SILT with Peat, ML or PT, 136% Moisture, 29% Organics by mass				1.1	6.8

Sample		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BGSD102	37.5	0.22	0.05	0.01	5	56	33	6
■	BGSS101	19	0.92	0.05	0.01	15	52	24	9
▲	BGSS102	2	0.01	0	0	0	11	58	32

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

GRAIN SIZE CLASSIFICATION

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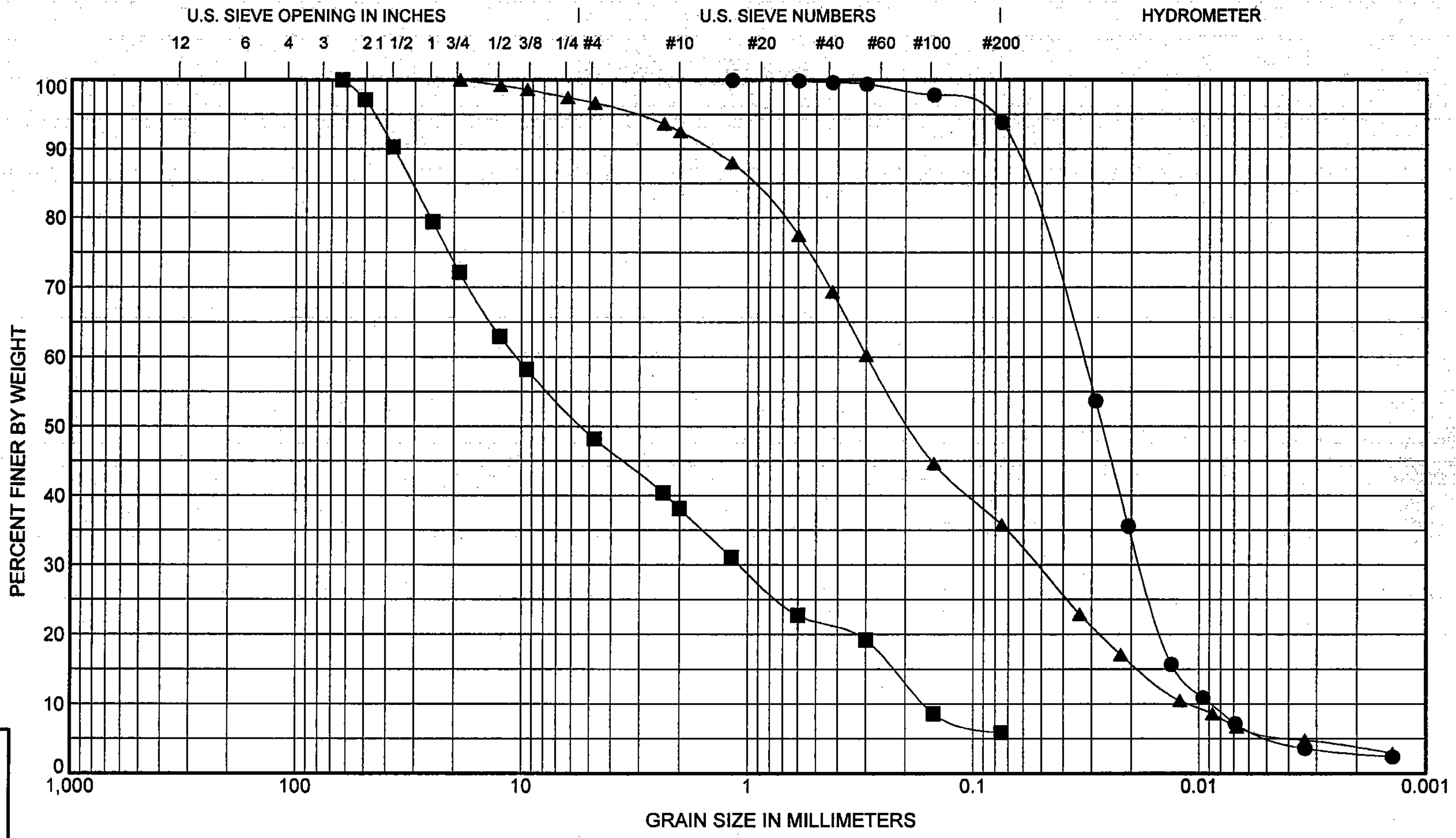
Fig. B-24



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample	Classification	LL	PL	PI	Cc	Cu
● **BGSS104**	**SILT, ML, 40.9% Moisture**				**1.1**	**3.8**
■ **BGSS106**	**GRAVEL with Sand, GP, 9.9% Moisture**				**0.7**	**64.0**
▲ **BGSS107**	**Silty SAND, SM, 26% Moisture**				**0.8**	**26.6**

Sample	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● **BGSS104**	**1.18**	**0.03**	**0.02**	**0.01**	**0**	**6**	**88**	**6**
■ **BGSS106**	**63**	**10.54**	**1.08**	**0.16**	**52**	**42**	**6**	
▲ **BGSS107**	**19**	**0.3**	**0.05**	**0.01**	**3**	**61**	**30**	**6**

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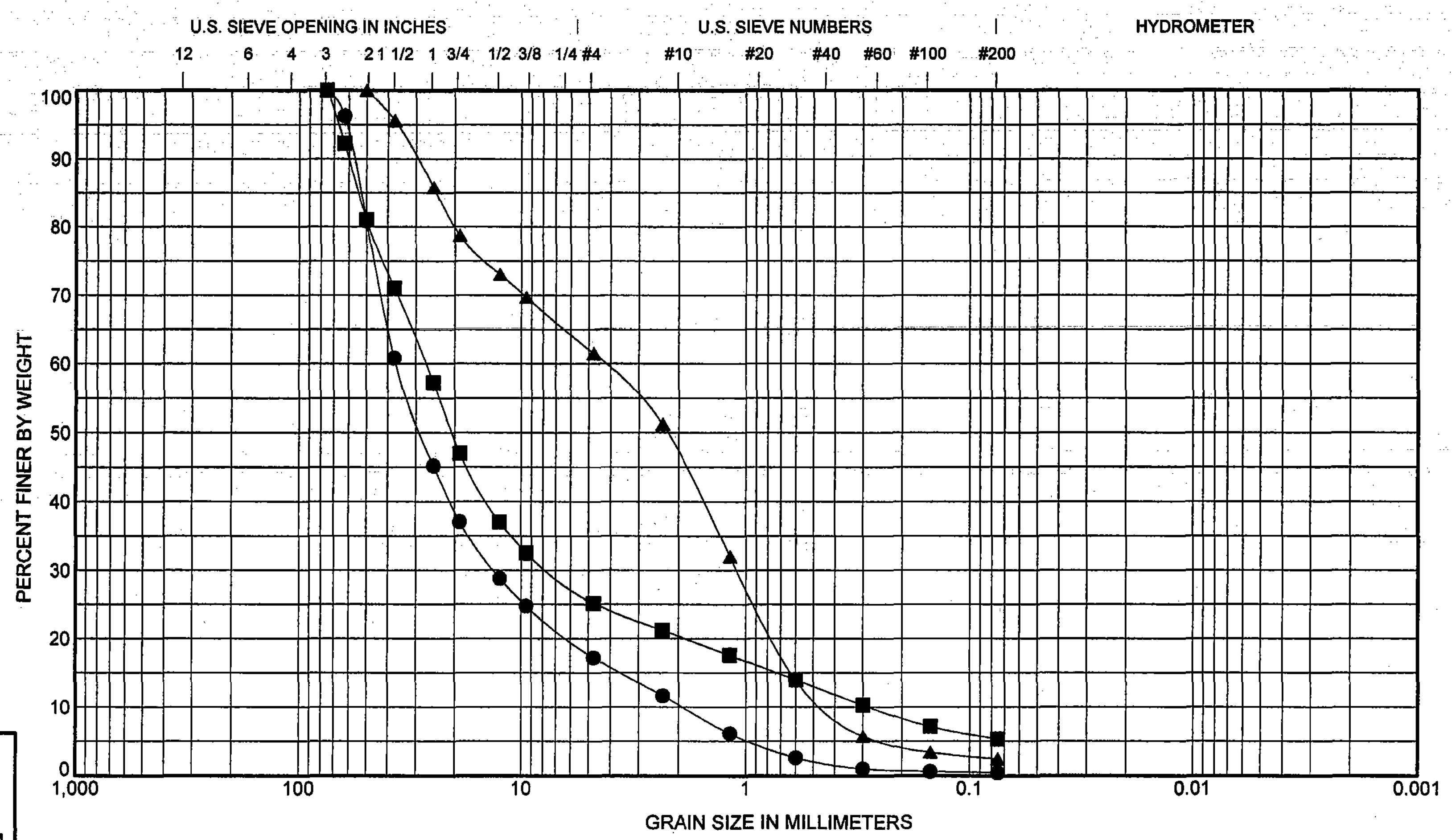
Fig. B-25



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Classification	LL	PL	PI	Cc	Cu
●	BGSS108	GRAVEL with Sand, GW, 2.0% Moisture				2.5	19.2
■	BGSS109	GRAVEL with Sand, GP, 4.8% Moisture				7.3	96.1
▲	BGSS110	SAND with Gravel, SP, 4.8% Moisture				0.6	9.9

Sample		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BGSS108	75	36.71	13.26	1.92	83	17	0	
■	BGSS109	75	27.1	7.49	0.28	75	20	5	
▲	BGSS110	50	4.29	1.1	0.43	39	59	2	

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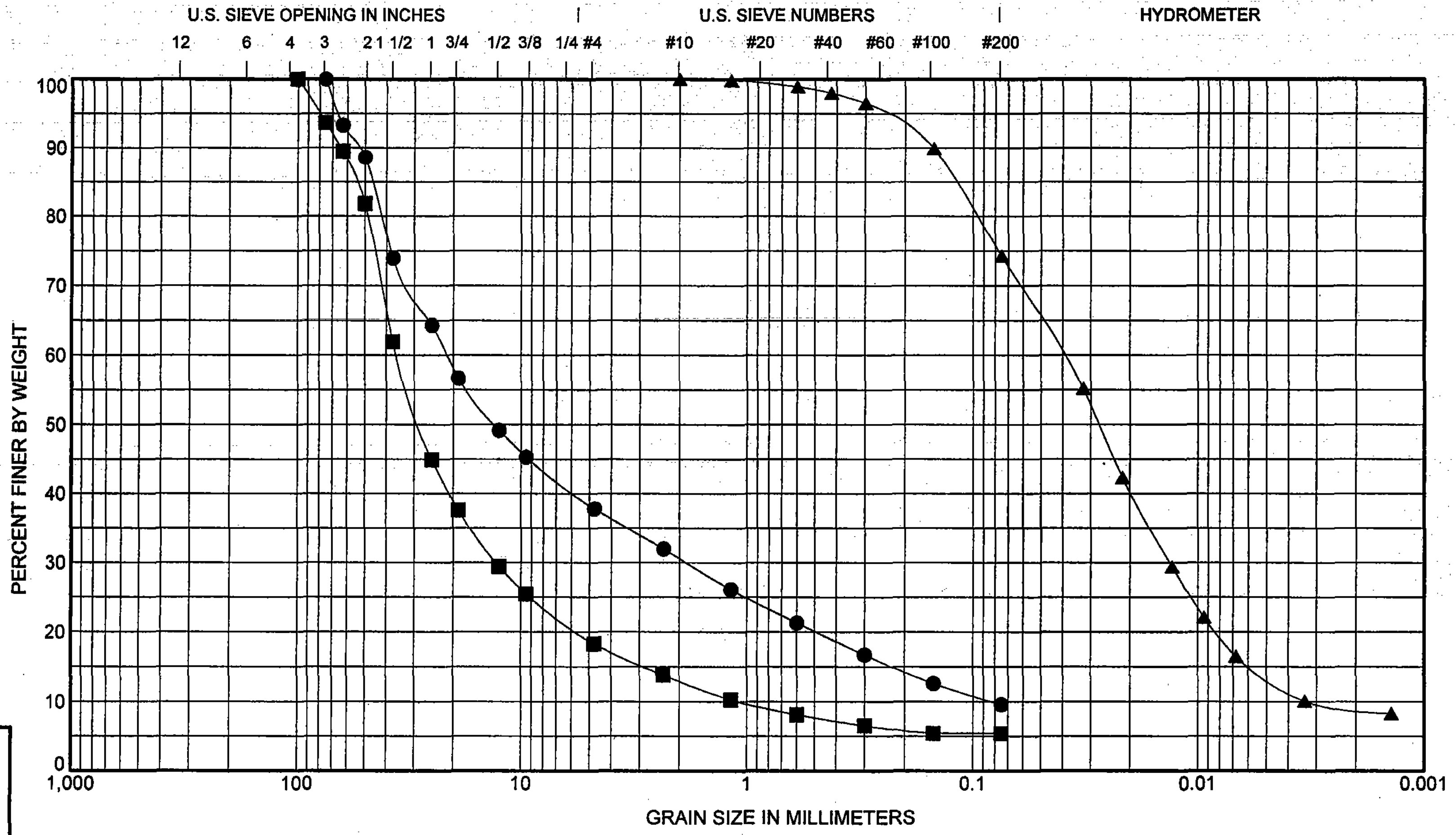
Fig. B-26



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Classification	LL	PL	PI	Cc	Cu
●	BGSS111	**GRAVEL with Silt and Sand, GP-GM, 4.9% Moisture**				2.0	260.1
■	BGSS112	**GRAVEL with Sand and Cobbles, GP, 2.3% Moisture**				4.3	33.3
▲	BGSS113	**SILT with Peat, ML or PT, 208% Moisture, 36% organics by mass**				1.4	12.4

Sample		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BGSS111	75	21.42	1.86	0.08	62	28	10	
■	BGSS112	100	35.82	12.87	1.08	75	13	5	
▲	BGSS113	2	0.04	0.01	0	0	26	61	14

Phase IV RI, Northeast Cape
St. Lawrence Island, Alaska

GRAIN SIZE CLASSIFICATION

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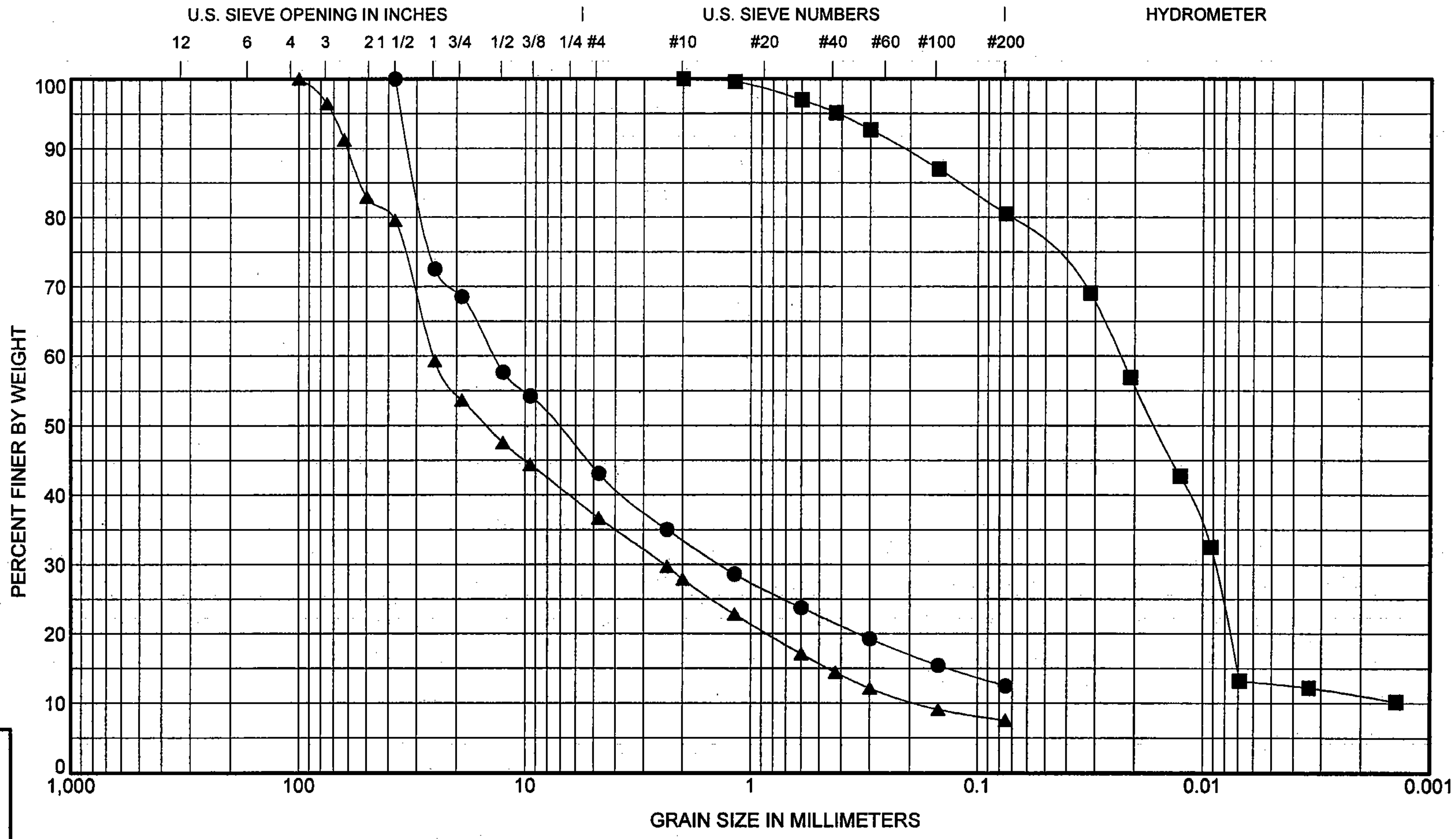
Fig. B-27



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Classification	LL	PL	PI	Cc	Cu
●	**BGSS114**	**Silty GRAVEL with Sand, GM, 5.4% Moisture**					
■	**BGSS115**	**SILT with Peat, ML or PT, 258% Moisture, 38% organics by mass**					
▲	**BGSS116**	**GRAVEL with Sand, Silt, and Cobbles GP-GM, 5.4% Moisture**				**1.3**	**138.1**

Sample		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BGSS114**	**37.5**	**13.67**	**1.37**		**57**	**31**	**13**	
■	**BGSS115**	**2**	**0.02**	**0.01**		**0**	**20**	**68**	**13**
▲	**BGSS116**	**100**	**25.36**	**2.43**	**0.18**	**60**	**29**	**8**	

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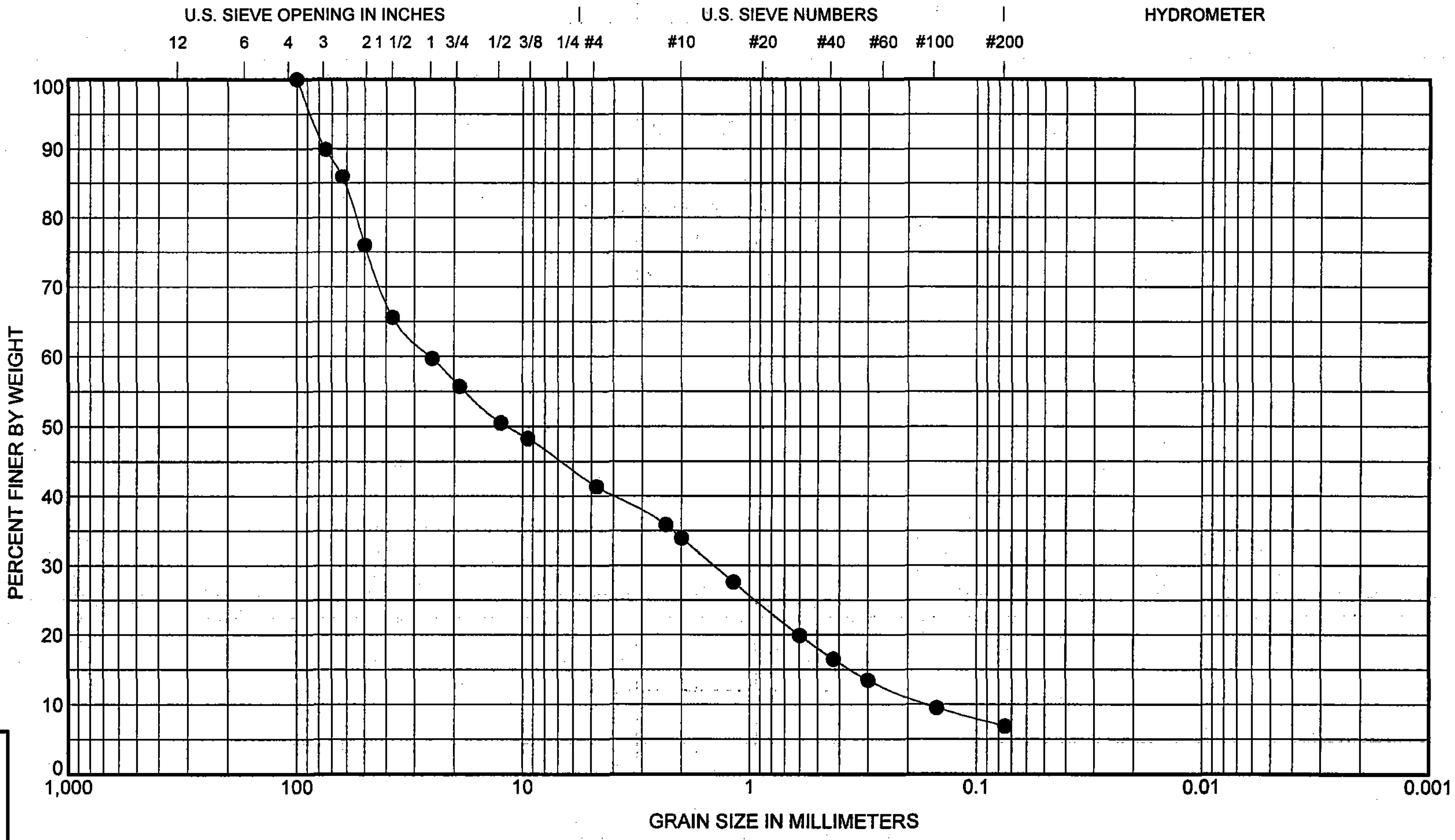
Fig. B-28



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Classification	LL	PL	PI	Cc	Cu
●	BGSS117	Gravel with Sand and Silt, GP-GM, 6.3% Moisture				0.5	156.3

Sample		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	BGSS117	100	25.47	1.44	0.16	49	34	7	

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St. Lawrence Island, Alaska

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Fig. B-29

APPENDIX C

Chemical Data Quality Assessment Report and Chemical Quality Assurance Report

CEPOA-EN-ES-M (1110-1-8100f) 16 June 2005

MEMORANDUM THRU

CEPOA-EN-ES
CEPOA-EN-ES-M

FOR CEPOA-PM-C (Cossaboom)

SUBJECT: Revised Chemical Data Quality Assessment Report for ERP030 Northeast Cape Phase IV (04-042)

1. References:

a. Shannon & Wilson, Inc. report dated June 2005, Appendix C- Chemical Data Quality Assurance Report, Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska.

b. SGS Environmental Laboratories, Inc., Anchorage Alaska, Laboratory Work Orders: 1045211, 1045444, 1045459, 1045460, 1045498, 1045529, 1045600, 1045606, 1045607, 1045711, 1045712, 1045750, 1045767, 1045812, 1046036, 1046037, 1046054, and 1046067.

c. North Creek Analytical, Inc., Bothell Washington, Laboratory Work Orders: d. B4H0458, B4I0001, B4I0142, B4I0413, and B4I0427.

d. USACE, EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic, and Radioactive Waste (HTRW) Projects, 10 October 1997.

e. ADEC, UST Procedures Manual, 7 November 2002.

f. USACE, EM 200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, App. I "Shell for Analytical Chemistry Requirements", February 2001.

g. DoD Environmental Data Quality Workshop, Department of Defense Quality Systems Manual for Environmental Laboratories, Final Version 2, June 2002.

2. Summary: This report is a revision of the Chemical Data Quality Assessment Report submitted as a Memorandum through CEPOA-EN-ES and CEPOA-EN-ES-M for CEPOA-PM-C, and dated 18 May 2005. This revised report incorporates analytical sensitivity information for the SVOC data, information that was inadvertently not included in the draft Chemical Data Quality Assurance Report submitted by Shannon & Wilson. Shannon & Wilson discovered this error while applying the qualification flags to the tabulated data in the final version of the Phase IV Remedial Investigation Northeast Cape, St. Lawrence Island, Alaska report.

This revised report should be used in conjunction with Shannon and Wilson's final Chemical Data Quality Assurance Report (enclosed). The referenced report summarizes the technical review of analytical results generated in support of the soil, sediment, and surface water sampling performed as part of the Phase IV Remedial Investigation (RI) at the former military installation Northeast Cape, St. Lawrence Island, Alaska. The criteria applied for this review are consistent with the project specific data quality objectives (DQOs); in cases where specific guidance was not available from this source, the data have been evaluated using the DoD QSM criteria, and/or EM 200-1-3 Appendix I. The review included evaluation of sample handling, sample preparation and holding time, analytical sensitivity, method blanks, matrix spike (MS) and MS duplicate recoveries, laboratory control sample (LCS) and LCS duplicate recoveries, surrogate recoveries, and field quality control (QC/QA duplicates, trip blanks and equipment blanks). Instrument calibration review and raw data verification were not performed.

3. Background: Soil, sediment and surface water samples were collected from Northeast Cape during August and September 2004, from fifteen discrete sites within the Northeast Cape installation, and from background locations outside of the installation boundary. Shannon and Wilson Inc. collected the samples from areas prescribed by USACE in order to address data gaps identified in previous investigations. Samples were collected for analysis using the Test Methods for Evaluating Solid Wastes (SW846) or Alaska Series Laboratory Methods, for field screening, for geotechnical characterization of soils, and for natural attenuation parameters. Only the data generated using the SW846 and Alaska methods were reviewed by Shannon & Wilson; the USACE Project Chemist examined the results for total organic carbon (TOC). Biogenic assessment for select soil samples was performed by SGS chemists; the assessment was not reviewed by either Shannon & Wilson, or by the USACE Chemist.

Samples collected for analysis using the SW846 methods or the Alaska methods were duplicated (QC/QA) at a rate of 10% (per method/matrix) to assess inter- and intra-laboratory precision, and both equipment and trip blanks were submitted to assess contamination introduced during sampling, shipment and/or handling. Project samples were specified as MS/MSD at a rate of 5%, and were used to assess matrix effects.

The primary and QC samples were submitted to SGS Environmental Services, Inc. of Anchorage, Alaska, and the QA samples were submitted to North Creek Analytical, Inc. (NCA) of Bothell, Washington. Analyses included GRO, DRO and RRO by Alaska Methods AK101, AK102 and AK 103; BTEX by SW8260B, SVOCS by SW8270C, PAH by SW8270C (SIM), PCBs by SW8082, pesticides by SW8081A, and metals (8 RCRA, or a chromium, lead, zinc, mercury combination) by SW6020 and SW7470A/7471A. Soil samples for GRO and/or BTEX analyses were methanol-preserved. Each cooler shipment containing samples for GRO and/or BTEX analyses contained matrix-specific trip blanks.

Composite rinsate samples, generated by rinsing the "cleaned" field equipment (the Grundfos pump, and split spoons) with deionized water were submitted for a variety of analyses; the split spoon rinsates were collected to assess potential impact on soil sample results, especially for fuels (GRO, DRO, RRO) and TOC, since corn oil was used as a lubricant for the air-rotary drill.

4. Data Quality Objectives: Analytical results will be compared to State of Alaska, Department of Environmental Conservation, 18AAC75 Oil and Other Hazardous Substances Pollution Control, and 18AAC70 Water Quality Standards (for TAH and TAqH). Data quality needs to be sufficient to compare to regulatory levels, and in some cases, for potentially assessing risk.

5. Chemical Data Quality Assessment: The majority of data are of adequate quality for project purposes. Approximately 30% of the data required qualification due to low-level contamination detected in blanks, low surrogate recovery, LCS/D or MS/D recoveries and/or precision out-side of project-established criteria, or estimated results between the method detection limit (MDL) and the sample's reporting limit (RL) [the RL, as used in the referenced review, is equivalent to the practical quantitation limit]. Only the method, equipment, or trip blanks with detections greater than ½ the RL were considered "blank contaminated." Approximately 31% of the data had a RL above the project reporting limit goal (RLG); most of these data were for soil or sediment samples with high organic matter content and/or high moisture content. In some cases the RL was greater than the relevant cleanup level; in most of these, the result was non-detect and the MDL was below the relevant cleanup level. In nine of a total of 4,673 analytical results, a result was reported that was between the MDL and the RL when the RL was above the relevant cleanup level. Several pesticides (α-, β-, δ-, and γ-BHC; dieldrin, endrin, endrin aldehyde, and endrin ketone) in the sediment samples had MDLs above the relevant cleanup levels, and several SVOCs (21 analytes from the primary lab data set and eight from the QA lab data set) had MDLs above the relevant cleanup levels.

Different extraction methods were utilized by the primary and QA laboratories for a variety of tests. Water samples for DRO, RRO, PAH, and PCB analysis were prepared by SGS using SW3510C (separatory funnel liquid-liquid extraction), while NCA used SW3520C (continuous liquid-liquid extraction); slight differences between the results were noted, especially at low-level concentrations, with the SW3520C method resulting in slightly higher concentrations of target analytes due to better extraction efficiency of the method. Soil and sediment samples for PAH or SVOC analysis were prepared by SGS using SW3550B (ultrasonic extraction), while NCA used both SW3550B and SW3545 (pressurized fluid extraction); no apparent differences between the results were noted. Water samples for metals analysis (all except mercury) were prepared by SGS using SW3015 (microwave assisted acid digestion) while NCA used SW3020A (acid digestion); no apparent differences were noted.

Contrary to the Shannon and Wilson report, the methods used to extract, introduce, and analyze the sample for GRO (and BTEX by 8260) were identical, as confirmed by the USACE Project Chemist via phone discussions with both labs: an aliquot of soil or sediment (target weight ~ 50g dry) were placed in the VOA jars and covered with methanol in the field (as described in both the AK101 and SW846 5035 methods); at each lab an aliquot of the methanol extract was taken and injected into water for purge-and trap analysis. The labs simply reported the "extraction" methods differently.

Water samples associated with equipment blank results greater than ½ RL have been B flagged as blank contaminated. Three of the split spoon rinsate samples contained GRO, DRO and RRO at (liquid) concentrations exceeding ½ the aqueous RL. The potential impact of the corn oil residue to the sample results is not quantifiable, and after discussions among the USACE Project Delivery Team members, is considered negligible. The analytical results for soil samples associated with split spoon rinsate samples have not been qualified.

Some of the qualified data may be used demonstrate that these samples were not grossly contaminated, but may be considered rejected for use in risk-assessment calculations.

a. GRO by AK101/BTEX by 8260B

(1) Water Samples:

A few of the GRO results for water samples were "J" flagged as estimated due to surrogate or MS/MSD recoveries outside of project-established limits.

All GRO results for water samples are usable as qualified.

(2) Soil and Sediment Samples:

Many of the soil and sediment samples were qualified as estimated due to low recovery of the field surrogate 4-BFB (SGS) or α,α,α-trifluorotoluene (NCA). For the majority of the soil GRO samples with failing field surrogate recoveries, SGS recalculated the surrogate results using the equation presented in section 10.6.5 of the AK101 Method in the UST Procedures Manual to confirm a matrix effect. The recalculated surrogate recovery was within the method specified criteria of 50-150% for the majority of these samples (the few exceptions were sediment samples); the prevalence of acceptable adjusted field surrogate recoveries for the GRO analysis confirm a matrix effect. This effect also impacts the BTEX data.

Approximately 26% of the soil or sediment samples analyzed for benzene by 8260B had RLs above the ADEC cleanup level of 0.020 mg/kg due to matrix effects; approximately one-half of these samples also had MDLs above the cleanup level. These results are typical for the method when field samples with high organic content and/or elevated moisture content are field preserved with methanol. These benzene results, in conjunction with the GRO data, may be used to delineate areas as "not grossly contaminated" but are rejected for use in risk-assessment calculations.

All other GRO/BTEX data are usable as qualified.

b. DRO/RRO by AK102/103

(1) Water Samples:

The majority of the DRO and RRO RLs did not meet the RLGs when the sample result was less than the RL. RLs for all of the RRO samples were slightly above but RLs for all DRO analyses were below the PQLs specified in the UST Procedures Manual. Some of the results were "J" flagged as estimated due to laboratory QC falling outside of project-established limits (surrogate or MS/MSD recoveries, or LCS/D precision not met). Some DRO and RRO results for water samples were "B" flagged as blank contaminated; impacted sample results between the MDL and the RL were reported as non-detect at the RL ("ND [RL]").

The DRO and RRO data for water samples are usable as qualified.

(2) Soil and Sediment Samples:

The three split spoon rinsate (composite) samples submitted for fuels analysis were reported to contain DRO and RRO at concentrations greater than ½ the RL for water samples. No data were flagged due to this low-level, unquantifiable contamination, since the impact of the corn oil on the usability of the soil sample data is thought to be negligible. DRO results, field notes, and select chromatograms (for the soil samples associated with the highest split spoon rinsate sample results, 04NE22SQ201) were carefully examined to determine if soil with DRO results near the cleanup level had been impacted; only two samples, 04NE10SB104 & -106, were close to the cleanup level. These samples were not noted by field samplers to have a fuel odor. The laboratory chemists have identified these two DRO results (619 mg/kg for 04NE10SB104 and 275 mg/kg for 04NE10SB106) as "resembling a weathered middle distillate" and the chromatograms for these two samples did not show any evidence of corn oil.

Approximately 14% of the surrogate recoveries for DRO, and ~26% of the surrogate recoveries for RRO were above the control limits. The elevated surrogate recoveries were attributed to high DRO concentrations in the samples or biogenic interferences, and thus do not impact data usability.

The DRO and RRO data for soil and sediment samples are usable as qualified.

c. SVOCs by 8270C

(1) Water Samples: Water samples were not submitted for SVOC analysis.

(2) Soil Samples:

The three surrogates for the acid fraction of the SVOCs were below the project specific control limits for three of the four primary samples submitted for this analysis (04NE01SS01, -102, and -103); the surrogates for the base/neutral fraction were within control limits. The analytical results for the following analytes should be considered estimated data, biased low: 4-chloro-3-methylphenol, 2-chlorophenol, 2,4-dichlorophenol, 2,6-dichlorophenol, 2,4-dimethylphenol, 4,6-dintro-2-methylphenol, 2,4-dinitrophenol 2-methylphenol, 3- & 4-methylphenol (coelution), 2-nitrophenol, 4-nitrophenol, pentachlorophenol, phenol, 2,4,5-trichlorophenol, and 2,4,6-trichlorophenol. Contrary to the Shannon & Wilson report, the results for the base/neutral fraction are not considered impacted, since these surrogates met recovery criteria.

Both the primary and the referee laboratories had difficulty meeting the RLs, and some cases the MDLs for a variety of the SVOCs, due to a combination of high moisture and organic matter content of the samples, as well as sample dilution at the lab(s). Table 6 of the Chemical Data Quality Assurance Report identify the analytes that have MDLs greater than the cleanup levels, and were reported as non-detects; these samples were all collected from Site 01.

The qualified results for the acid fraction, and the results for the SVOCs from Site 01 that could not be detected at the cleanup level may be used to delineate areas as "not grossly contaminated", but are rejected for use in risk-assessment calculations. All other results are usable as qualified.

d. PAHs by 8270C (SIM)

(1) Water Samples:

Laboratory QC criteria were met for PAH analysis by both analytical laboratories. The QA lab extracted two of the three water samples submitted for analysis 1 day past technical hold time; these results were not qualified as estimated due to passing QC and comparability to the primary data. Some of the naphthalene results were "B" flagged as blank contaminated. All of the benzo(a)pyrene and dibenzo(a,h)anthracene results failed to meet the project RLGs, however in no case was the RL higher than the ADEC cleanup level.

The PAH data for water samples are usable as qualified.

(2) Soil and Sediment Samples:

Matrix spike/spike duplicate recoveries were highly variable for a number of the samples submitted for PAH analysis; all other laboratory QA/QC criteria were generally met. Samples from Site 08 had low or no MS/MSD recovery, and no or low-level results; the high organic matter content in samples collected from this site may have interfered with the reliability of the analytical results; therefore, all PAH results for sediment samples from Site 08 should also be used with caution.

The PAH results from sediments collected from Site 08 are rejected for use in risk-assessment calculations, but may be used to delineate areas as "not grossly contaminated". All other PAH data for soil and sediment samples are usable as qualified.

e. PCBs by 8082

(1) Water Samples:

None of the PCB water RLs met the project RLG of 0.05 μg/L, but all were at or below the cleanup level of 0.5 μg/L. SGS was able to report to ~0.1 μg/L with a MDL less than the project specified RLG of 0.05 μg/L, whereas NCAs MDL was generally less than 5 times less than the cleanup level; these reporting limits are typical for the method.

Laboratory QC criteria were met for PCB analysis by the primary laboratory. One of the two QA samples submitted to NCA required re-extraction past the hold time due to LCS/D failure; these results have not been qualified due to the stability of PCBs, and the comparability among the primary, QC and QA triplicate results.

The PCB data for water samples are usable as qualified, but the NCA results are rejected for use in risk-assessment calculations due to elevated RL/MDL.

(2) Soil and Sediment Samples:

Laboratory QC criteria were generally met by both analytical laboratories. MS/MSD recoveries were low for a few samples, and surrogate recoveries were below the control limit for four of the sediment samples (04NE29SD207, -108, -109, and -307); since samples -207 and -307 are QC/QA duplicates, the preferred result is for the primary sample -107.

The PCB data for samples are usable as qualified, but results for sediment samples 04NE29SD108 and -109 are rejected for use in risk-assessment calculations.

f. Pesticides by 8081A

(1)Water Samples:

The only aqueous sample analyzed for pesticides during this investigation was a rinsate sample collected from the dredge used to collect the sediment samples. Laboratory QC criteria were met, and although the QAPP specified RLs were not met for a number of the pesticides, none of these pesticides were detected above the MDL.

The pesticide data for water samples is usable as qualified.

(2) Sediment Samples:

Neither of the analytical laboratories could achieve the RLG for the sediment samples, and for some analytes the MDL was above the appropriate cleanup level (see Section 5.0). All of the sediment samples submitted for this analysis were collected from Site 29, which had high levels of naturally occurring organic matter, and high moisture content. Three of the sample had low surrogate recoveries below control limits (04NE29SD108, -109, and -207).

The pesticide results for sediments may be used, as qualified, to delineate areas as "not grossly contaminated", but are rejected for use in risk-assessment calculations.

g. Metals by 6020 and 7471A or 7470A

(1) Water Samples:

Laboratory QC criteria were met for metals analysis by both analytical laboratories. The RLG was not always achieved for some of the metals, however, the resultant RLs were all below cleanup levels. Lead and mercury were detected in the Grundfos pump rinsate sample at concentrations greater than ½ the QAPP specified RL, and the impacted analytical results were "B" flagged as blank contaminated; all B flagged results were below the cleanup level.

The metals data for water samples is usable as qualified.

(2) Soil and Sediment Samples:

Laboratory QC criteria were met for metals analysis by both analytical laboratories. MS/MSD recoveries for a variety of metals were either above or below control limits, or had high RPDs; analytical results for these samples are considered estimated results.

The metals data for soil samples is usable as qualified.

6. Total Organic Carbon (TOC): Total Organic Carbon was determined by SGS using a project-approved in-house SOP. The SGS analysis is performed by high temperature catalytic combustion using a non-dispersive infrared carbon dioxide detector; it is reported as Method E415.1. Cursory examination of associated laboratory QC show the analyses met the laboratory established limits; the relative percent difference (RPD) between the four QC duplicate samples were 12.4% (04NE29SD107 & -207), 6.74% (04NE31SB106 & -206), 13.1% (04NEBGSD101 & -201), and 10.3% (04NEBGSS101 & -201). None of the data were qualified.

The TOC data for soil samples must be used with caution. Some of the soil/sediment collected for this analysis contained DRO and RRO; if these data are to be used in Method Three calculations, the DRO and RRO results, in conjunction with the field screening notes (fuel odor?) and the biogenic assessment, must be examined to determine if the TOC results are usability in this calculation.

7. QC/QA Triplicates: The majority of the triplicate results were very comparable. When the results were not in agreement the Shannon and Wilson project chemist, through review of each laboratory's associated batch QC/QA information, chose which result was the preferred result for triplicate set.

a. Comparison of Water Triplicates:

(1) Four sets of QC/QA triplicates were collected and analyzed for GRO, DRO, and RRO. One set was in disagreement for DRO, another was in disagreement for RRO; the GRO results were all in agreement.

(2) Four sets of QC/QA triplicates were collected and analyzed for BTEX. All results were in agreement.

(3) QC/QA samples were not collected or analyzed for SVOCs but three sets of QC/QA triplicates were collected and analyzed for PAH. Two sets were in disagreement for naphthalene; one set was in major disagreement for acenaphthene, fluorene, and phenanthrene, with the primary sample showing low-level detects, but no detects in the QC or QA duplicates. Since the analytical results for the major fuel classes, GRO, DRO, and RRO are all estimated results, and since the presence of acenaphthene indicates a fresher fuel, it is likely the primary result is in error.

(4) Two sets of QC/QA triplicates were collected and analyzed for PCBs. All results were in agreement (non-detects).

(5) Water samples were not collected for pesticide analysis.

(6) Two sets of QC/QA triplicates were collected and analyzed for metals. A majority of the results were in agreement; disagreement was generally among low-level detect/non-detect results where higher variability is to be expected.

b. Comparison of Soil/Sediment Triplicates

(1) Eleven sets of QC/QA triplicates were collected and analyzed for GRO, DRO, and RRO. Five sets were in agreement. The majority of the differences was between the primary and the QA laboratory (in five of the six cases where the data disagreed, the primary results were comparable), and was due to disagreements among low-level results. The USACE Project Chemists concurs with Shannon & Wilson's selection of the preferred results (Section 6.0 of the CDQR).

(2) Seven sets of QC/QA triplicates were collected and analyzed for BTEX. Six of the sets were in agreement. The seventh set is not in agreement due to a suspicious toluene result for the QA sample; the QA result for this set is not the preferred result.

(3) Six sets of QC/QA triplicates were collected and analyzed for PAH. Three sets were in disagreement. The USACE Project Chemists concurs with Shannon & Wilson's selection of the preferred results.

(4) One set of QC/QA triplicates were collected and analyzed for SVOCs. Differences in reporting limits between the labs resulted in a major disagreement for pentachlorophenol (only).

(5) Nine sets of QC/QA triplicates were collected and analyzed for PCBs. Seven were in agreement, one was in slight disagreement (due to low-level detects and differences between the primary and QA lab detection limits) and one set was in major disagreement. Although the QC and QA duplicate results were comparable, the highest result is above the ADEC cleanup level of 1 mg/kg. Contrary to the Shannon and Wilson report, the preferred result for the set in disagreement is the primary sample (04NE13SB124) result of 5.34 mg/kg, which is more than 10 times higher than the QC and QA results (5.34 compared to 0.41 and 0.33 ppm); the USACE chemist, with permission granted by Shannon & Wilson's Project Chemist, contacted the laboratory and confirmed the original (non-diluted) and final sample result.

(6) Two sets of QC/QA triplicates were collected and analyzed for pesticides. One set had major disagreement between the primary and QA laboratory for a few analytes; these differences were a result of low-level detects at the QA laboratory, due to lower detection and reporting limits.

(7) Four sets of QC/QA triplicates were collected and analyzed for metals. Two sets were in agreement. The USACE Project Chemists concurs with Shannon & Wilson's selection of the preferred results.

8. Statement of Contract Compliance: A complete data package was not received from NCA (QA lab) until more than 2 months after the data was due to USACE. The contract was set up so that the analytical results from the QA lab should have been received by early October; the Contracting Officer was involved, and the data was finally received late, but complete, by early December.

SGS failed to "J" flag estimated results between the MDL and RL. This oversight was caught at the data review stage, causing all EDDs to be resubmitted with results between the MDL and RL J-flagged, as per USACE requirements. The USACE Project Chemist did not require a revised set of hardcopy data, but instead accepted a memo that indicates which samples have been J-flagged, to be included with the hardcopy data.

Shannon & Wilson's Project Chemist, Jon Lindstrom, did an exceptional job ensuring that the data review firm had correct(ed) electronic data files (EDFs) available for review. This task was not trival; due to the multitude of errors found in the EDFs, and the time required to obtain corrected EDFs, the completion date for the project was extended to accommodate the intensive data review effort. The referenced report includes a variety of "lessons learned" (Section 8.0 *Project-Specific Concerns*) that if properly addressed in future work, could decrease the time required to perform auto-validation.

Julie Sharp-Dahl
JULIE SHARP-DAHL
Chemist

Encl

APPENDIX D

Table D-1 Assessment of Biogenic Influence on DRO/RRO, and

Table D-2 Summary of Analytical Results - Trip and Equipment Blanks

TABLE D-1 ASSESSMENT OF BIOGENIC INFLUENCE ON DRO/RRO

LOCID	Sample ID	SGS Work Order	Lab ID	AK102 DRO		AK103 RRO		TOC	PAH or BTEX detections		Field Observations / Comments	SGS Environmental Services, Inc. BIOGENIC ASSESSMENT	Lab Classification of Hydrocarbon Origin*	
				ppm	Analyst Note	ppm	Analyst Note	ppm	ppb	Compound			DRO	RRO
SITE 3 - FUEL LINE CORRIDOR AND PUMPHOUSE														
03B2-2	04NE03SB101	1045459	005	168	Unknown HC	1,160		-	-		Organics present, but next to obvious impacts - Mix	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
03B2-6	04NE03SB102	1045459	006	126	Unknown HC	1,150 J	HC interference	-	-		In permafrost - Biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
03B1-2	04NE03SB103	1045459	007	373 J	Unknown HC	2,790 J	HC interference	-	-		Just up from known impact, but adjacent to peat	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
03B1-6	04NE03SB104	1045459	008	971 J	Unknown HC	6,120 J	HC interference	-	-		In permafrost - Biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
03B3-1	04NE03SB105	1045459	009	20,500 J	Weathered middle distillate	4,000 J	Unknown HC	-	-		High level of fuel overrides bio	GC/MS TIC - DRO range library search spectra have good quality match with sample spectra of unknown peak responses. Spectra were consistent with even and odd number alkanes and branched alkanes. RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database.	Diesel	Biogenic
03B3-3	04NE03SB106	1045459	010	15,900 J	Weathered middle distillate	3,020 J	Unknown HC	-	-		High level of fuel overrides bio	GC/MS TIC - DRO range library search spectra have good quality match with sample spectra of unknown peak responses. Spectra were consistent with even and odd number alkanes and branched alkanes. RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database.	Diesel	Biogenic
03SD107	04NE03SD107	1045460	003	2,610 J	Unknown HC	17,300 J	HC interference	-	-		Downstream of fuel facility - Mix	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
03SD108	04NE03SD108	1045460	004	3,720 J	Unknown HC	28,500 J	HC interference	-	-		Up-gradient of site but near pipeline	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
03WP5	04NE03GW101	1045529	019	1.7	Unknown HC	2.6	Unknown HC	-		Toluene	Up gradient of site, in Pipeline corridor	Library search was not requested. Chromatographic pattern typical of biogenic type compounds		
03WP103	04NE03GW102	1045529	020	0.433	Unknown HC	0.641	Unknown HC	-		Toluene	Down from known, but in peat - Mix	Library search was not requested. Chromatographic pattern typical of biogenic type compounds		
03WP6	04NE03GW103	1045498	001	0.826	Unknown HC	1.38	Unknown HC	-	ND		Odor in well, stain nearby, tidal - diesel	Library search was not requested. Chromatographic pattern typical of biogenic type compounds		
03WP102	04NE03GW104	1045750	007	3.4	Weathered middle distillate	3.4	Unknown HC	-	ND		Down from known, but in peat - Mix	GC/MS TIC - DRO range library search spectra have good quality match with sample spectra of unknown peak responses. Spectra were consistent with even and odd number alkanes and branched alkanes. RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database.	Diesel	Biogenic
SITE 6 - CARGO BEACH ROAD DRUM FIELD														
06WP7	04NE06GW101 & 201	1045750	001 002	0.189 F 0.213 F	-	0.204 F 0.185 F	-	-	-		Concentration too low to assess			
06WP6	04NE06GW102	1045750	003	0.213 F	-	0.268 F	-	-	-		Too low to assess			
06WP5	04NE06GW103	1045750	004	0.385	Unknown HC	0.728	Unknown HC	-	-		Topsoil fell into rock voids while driving - biogenic	GC/MS library search did not have sufficient response. Sample extract did not contain a significant amount of hydrocarbons.		
06WP103	04NE06GW104	1045750	005	0.164 F	-	0.217 F	-	-	-		Too low to assess			

TABLE D-1 ASSESSMENT OF BIOGENIC INFLUENCE ON DRO/RRO

				AK102 DRO		AK103 RRO		TOC	PAH or BTEX detections			SGS Environmental Services, Inc.	Lab Classification of Hydrocarbon Origin*	
LOCID	**Sample ID**	**SGS Work Order**	**Lab ID**	ppm	Analyst Note	ppm	Analyst Note	ppm	ppb	Compound	**Field Observations / Comments**	**BIOGENIC ASSESSMENT**	**DRO**	**RRO**
SITE 8 - POL SPILL SITE														
08SD102	04NE08SD102	1045459	001	19,500	Weathered middle distillate	3,880		-	1240	Naphthalene	High level of fuel overrides bio	GC/MS TIC - DRO range library search spectra have good quality match with sample spectra of unknown peak responses. Spectra were consistent with even and odd number alkanes and branched alkanes. RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database.	Diesel	Biogenic
08SD103	04NE08SD103	1045459	002	6,760	Weathered middle distillate	4,360	HC interference	-			Diesel and biogenic mix	GC/MS TIC - DRO range library search spectra have good quality match with sample spectra of unknown peak responses. Spectra were consistent with even and odd number alkanes and branched alkanes. RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database.	Diesel	Biogenic
08SD103	04NE08SD203	1045459	003	6,700	Weathered middle distillate	3,430		-			QC duplicate	GC/MS TIC - DRO range library search spectra have good quality match with sample spectra of unknown peak responses. Spectra were consistent with even and odd number alkanes and branched alkanes. RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database.	Diesel	Biogenic
SITE 22 - WATER STORAGE BUILDING														
22MW3	04NE22GW114	1046037	014	ND	-	ND	-	-	-		Concentration too low to assess			
22MW2	04NE22GW115	1046037	015	ND	-	ND	-	-	-		Too low to assess			
SITE 29 - SUQITUGHNEQ RIVER & ESTUARY														
29SD104	04NE29SD104	1045767	008	653 J	Unknown HC	1,370 J		42,700	ND		Sediment nearest creek outfall, downstream of main site - Mix possible	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
29SD105	04NE29SD105	1045767	009	988 J	Unknown HC	4,060 J		117,000	ND		Sediment has high organic content	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
29SD106	04NE29SD106	1045767	010	173 J	weathered middle distillat	393 J	Unknown HC	22,700	ND		"	GC/MS TIC - DRO range library search spectra have good quality match with sample spectra of unknown peak responses. Spectra were consistent with even and odd number alkanes and branched alkanes. RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database.	Diesel	Biogenic
29SD107	04NE29SD107	1045767	013	447 J	Unknown HC	1,870 J		46,000	ND		"	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
29SD107	04NE29SD207	1045767	014	232 J	Unknown HC	917 J		52,100	ND		QC duplicate	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
29SD108	04NE29SD108	1045767	015	456 J	Unknown HC	1,600 J		31,600	Fluorene, Naphthalene		"	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
29SD109	04NE29SD109	1045767	016	302 J	Unknown HC	1,170 J	HC interference	39,100	ND		"	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
29SW101	04NE29SW101	1045211	004	0.111 F	-	0.325 F		-	0.261 low	Naphthalene 2 others	Creosote in bridge upstream. DRO/RRO too low to assess?			
29SW101	04NE29SW201	1045211	005	0.122 F	-	0.346 F		-	ND		Too low to assess			
29SW102	04NE29SW102	1045211	007	0.0846 F	-	0.252 F		-	ND		Too low to assess			
29SW103	04NE29SW103	1045211	001	0.127 F	-	0.369 F		-	ND		Too low to assess			

TABLE D-1 ASSESSMENT OF BIOGENIC INFLUENCE ON DRO/RRO

LOCID	Sample ID	SGS Work Order	Lab ID	AK102 DRO		AK103 RRO		TOC	PAH or BTEX detections		Field Observations / Comments	SGS Environmental Services, Inc.	Lab Classification of Hydrocarbon Origin*	
				ppm	Analyst Note	ppm	Analyst Note	ppm	ppb	Compound		BIOGENIC ASSESSMENT	DRO	RRO
BACKGROUND SEDIMENT														
BGW101	04NEBGSD101	1046067	020	661 F	-	2,050	Unknown HC	193,000	ND		Sediment has high organic content	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW101	04NEBGSD201	1046067	025	119 F	-	524	Unknown HC	220,000	ND		QC duplicate	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW102	04NEBGSD102	1046067	021	135 F	-	613	Unknown HC	255,000	ND		Sediment has high organic content	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW103	04NEBGSD103	1046067	022	798 F	-	4,260 J	Unknown HC	384,000	ND		"	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW104	04NEBGSD104	1046067	023	98.7	-	494	Unknown HC	31,800	ND		"	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW105	04NEBGSD105	1046067	001	178	Unknown HC	1,220		373,000	ND		"	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW106	04NEBGSD106	1046067	008	3.84 F	-	17.2 F	-	658	ND		Low conc. - review of TICs not requested			
BGW107	04NEBGSD107	1046067	009	24.3 F	-	59.2	-	3,060	ND		Low conc. - review of TICs not requested			
BGW108	04NEBGSD108	1046067	024	399 F	-	1,650 J	Unknown HC	171,000	ND		Sediment has high organic content	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW109	04NEBGSD109	1046067	002	160	Unknown HC	1,270 J	HC interference	57,300	ND		Sediment has moderate organic content	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGW110	04NEBGSD110	1046067	027	104 F	-	784	Unknown HC	311,000	ND		Sediment has high organic content	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BACKGROUND SOIL														
BGSS101	04NEBGSS101	1046067	034	20.5 F	-	175 J	Unknown HC	15,200	-		Low concentration - review of TICs not requested			
BGSS102	04NEBGSS102	1046067	036	219 J	Unknown HC	1,260 J	HC interference		-		Peat - biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGSS103	04NEBGSS103	1046067	037	404 J	Unknown HC	2,050 J	HC interference	164,000	-		Peat - biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic

TABLE D-1 ASSESSMENT OF BIOGENIC INFLUENCE ON DRO/RRO

LOCID	Sample ID	SGS Work Order	Lab ID	AK102 DRO		AK103 RRO		TOC	PAH or BTEX detections		Field Observations / Comments	SGS Environmental Services, Inc.	Lab Classification of Hydrocarbon Origin*	
				ppm	Analyst Note	ppm	Analyst Note	ppm	ppb	Compound		BIOGENIC ASSESSMENT	DRO	RRO
BGSS104	04NEBGSS104	1046067	038	198 J	Unknown HC	1,240 J	HC interference	67,800	-		Biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGSS105	04NEBGSS105	1046067	003	269 F	-	2,080 J	Unknown HC	434,000	-		Peat - biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGSS106	04NEBGSS106	1046067	010	22.3 F	-	139 J	Unknown HC	7,450	-		Review not requested			
BGSS107	04NEBGSS107	1046067	011	40.5 J	-	255	Unknown HC	11,800	-		Topsoil - biogenic			
BGSS108	04NEBGSS108	1046067	039	4.01 F	-	18 F	-	1,320	-		Review not requested			
BGSS109	04NEBGSS109	1046067	004	50.8 J	-	357 J	Unknown HC	46,100	-		Gravelly with some organics	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGSS110	04NEBGSS110	1046067	005	12 J	-	76.3	Unknown HC	7,660	-		Review not requested			
BGSS111	04NEBGSS111	1046067	006	6.25 J	-	40.4	Unknown HC	4,510	-		Review not requested			
BGSS112	04NEBGSS112	1046067	007	6.29 F	-	42.8	Unknown HC	4,780	-		Review not requested			
BGSS113	04NEBGSS113	1046067	041	379	Unknown HC	1,910	HC interference	93,600	-		Some peat - biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGSS114	04NEBGSS114	1046067	030	5.95 F	-	28.6	Unknown HC	3,740	-		Review not requested			
BGSS114	04NEBGSS214	1046067	033	6.60 F	-	44.8	Unknown HC	-	-		QC duplicate			
BGSS115	04NEBGSS115	1046067	042	205	-	1,440 J	Unknown HC	269,000	-		Peat - biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic
BGSS116	04NEBGSS116	1046067	043	15.9 J	-	79.7	Unknown HC	11,700	-		Review not requested			
BGSS117	04NEBGSS117	1046067	044	8.09 F	-	62.2	Unknown HC	6,070	-		Review not requested			
BGSS118	04NEBGSS118	1046067	029	825 F	-	5,080 J	Unknown HC	319,000	-		Beach gravel and sand on top of peat - biogenic	GC/MS TIC - DRO/RRO library search spectra have poor quality match with sample spectra of unknown peak responses. This is typical of biogenic type compounds as these are not common in the library database. AK102/103 chromatographs for DRO/RRO are consistent with typical biogenic patterns.	Biogenic	Biogenic

KEY	DESCRIPTION
DRO	Diesel range organics
RRO	Residual range organics
TOC	Total organic carbon by SGS SOP method
PAH	Polynuclear aromatic hydrocarbons
BTEX	Benzene, toluene, ethylbenzene, and xylenes
ppm	Parts per million - used in place of mg/kg of mg/L
ppb	Parts per billion - used in place of µg/kg or µg/L
*	Shannon & Wilson summary of SGS assessment
HC	Hydrocarbon
GC/MS TIC	Gas chromatography / mass spectroscopy tentatively identified compounds
J	Estimated quantity, see Appendix C for data qualifications
F	Estimated value less than the practical quantitation limit (PQL)

TABLE D-2a SUMMARY OF EQUIPMENT BLANK ANALYTICAL RESULTS

Equipment Rinsate Blanks

			Location ID:	S.Spoon	S.Spoon	Dredge	S.Spoon	Grundfos
			Sample ID:	04NE06WQ202	04NE22SQ201	04NE29SQ201	04NE31SQ202	04NE88WQ202
			Cooler Number:	8	13	20	20	27
			Sample Date:	8/21/2004	8/27/2004	9/4/2004	9/2/2004	9/9/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**					
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	0.0208 J	0.102	0.0163 J	0.0408 J	0.0232 J
Diesel Range Organics (DRO)	AK102	mg/L	1.5	0.12 J	0.515	0.165 J	0.239 J	0.176 J
Residual Range Organics (RRO)	AK103	mg/L	1.1	0.311 J	1.7	0.149 J	0.362 J	0.385 J
Aromatic Organic Compounds (BTEX)								
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	[1]	[1]
Toluene	SW8260B	µg/L	1000	[1]	[1]	[1]	[1]	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	[1]	[1]
Xylene, Isomers m & p	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	[2]	[2]
Polynuclear Aromatic Hydrocarbons (PAH SIM)								
Acenaphthene	PAHSIM	µg/L	2,200	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Acenaphthylene	PAHSIM	µg/L	2,200	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Anthracene	PAHSIM	µg/L	11,000	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Benzo(a)anthracene	PAHSIM	µg/L	1	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Benzo(a)pyrene	PAHSIM	µg/L	0.2	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Benzo(b)fluoranthene	PAHSIM	µg/L	1	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Benzo(g,h,i)perylene	PAHSIM	µg/L	1,100	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Benzo(k)fluoranthene	PAHSIM	µg/L	10	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Chrysene	PAHSIM	µg/L	100	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Dibenzo(a,h)anthracene	PAHSIM	µg/L	0.1	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Fluoranthene	PAHSIM	µg/L	1,460	[0.116]	[0.115]	[0.11]	–	[0.105]
Fluorene	PAHSIM	µg/L	1,460	[0.0581]	0.029 J	[0.0549]	–	0.0192 J
Indeno(1,2,3-cd)pyrene	PAHSIM	µg/L	1	[0.0581]	[0.0575]	[0.0549]	–	[0.0526]
Naphthalene	PAHSIM	µg/L	700	0.0377 J	0.0455 J	0.0291 J	–	0.296
Phenanthrene	PAHSIM	µg/L	11,000	[0.116]	[0.115]	[0.11]	–	[0.105]
Pyrene	PAHSIM	µg/L	1,100	[0.0581]	0.0603	[0.0549]	–	[0.0526]
Total Metals								
Arsenic	SW6020	µg/L	50	[10]	–	–	–	–
Barium	SW6020	µg/L	2000	69.6	–	–	–	–
Cadmium	SW6020	µg/L	5	[2]	–	–	–	–
Chromium	SW6020	µg/L	100 (Total)	[4]	2.42 J	–	–	[4]
Lead	SW6020	µg/L	15	[1]	3.33	–	–	0.91 J
Mercury	SW7470A	µg/L	2	[0.2]	[0.2]	0.108 J	–	0.116 J
Selenium	SW6020	µg/L	50	[10]	–	–	–	–
Silver	SW6020	µg/L	180	[2]	–	–	–	–
Zinc	SW6020	µg/L	11,000	–	18.3 J	–	–	[25]

Analytes continued on next page

Key on next page

TABLE D-2a SUMMARY OF EQUIPMENT BLANK ANALYTICAL RESULTS

Equipment Rinsate Blanks			Location ID:	S.Spoon	S.Spoon	Dredge	S.Spoon	Grundfos
			Sample ID:	04NE06WQ202	04NE22SQ201	04NE29SQ201	04NE31SQ202	04NE88WQ202
			Cooler Number:	8	13	20	20	27
			Sample Date:	8/21/2004	8/27/2004	9/4/2004	9/2/2004	9/9/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**					
Polychlorinated Biphenyls (PCBs)								
PCB-1016 (Aroclor 1016)	SW8082	µg/L	0.5	[0.109]	-	[0.114]	–	–
PCB-1221 (Aroclor 1221)	SW8082	µg/L	0.5	[0.109]	-	[0.114]	–	–
PCB-1232 (Aroclor 1232)	SW8082	µg/L	0.5	[0.109]	-	[0.114]	–	–
PCB-1242 (Aroclor 1242)	SW8082	µg/L	0.5	[0.109]	-	[0.114]	–	–
PCB-1248 (Aroclor 1248)	SW8082	µg/L	0.5	[0.109]	-	[0.114]	–	–
PCB-1254 (Aroclor 1254)	SW8082	µg/L	0.5	[0.109]	-	[0.114]	–	–
PCB-1260 (Aroclor 1260)	SW8082	µg/L	0.5	[0.109]	-	[0.114]	–	–
PCB-1262 (Aroclor 1262)	SW8082	µg/L	0.5	-	-	–	–	–
PCB-1268 (Aroclor 1268)	SW8082	µg/L	0.5	-	-	–	–	–
Total Organic Carbon (TOC)	E415.1	mg/L		–	3.66	0.756	–	–
Pesticides								
4,4'-DDD	SW8081A	µg/L	3.6	–	–	[0.034]	–	–
4,4'-DDE	SW8081A	µg/L	2.5	–	–	[0.034]	–	–
4,4'-DDT	SW8081A	µg/L	2.5	–	–	[0.034]	–	–
Aldrin	SW8081A	µg/L	0.05	–	–	[0.057]	–	–
Dieldrin	SW8081A	µg/L	0.05	–	–	[0.034]	–	–
Endosulfan I	SW8081A	µg/L	200	–	–	[0.034]	–	–
Endosulfan II	SW8081A	µg/L	–	–	–	[0.034]	–	–
Endosulfan sulfate	SW8081A	µg/L	–	–	–	[0.034]	–	–
Endrin	SW8081A	µg/L	2	–	–	[0.034]	–	–
Endrin aldehyde	SW8081A	µg/L	–	–	–	[0.057]	–	–
Endrin ketone	SW8081A	µg/L	–	–	–	[0.034]	–	–
Heptachlor	SW8081A	µg/L	0.4	–	–	[0.11]	–	–
Heptachlor epoxide	SW8081A	µg/L	0.2	–	–	[0.034]	–	–
Methoxychlor	SW8081A	µg/L	40	–	–	[0.034]	–	–
Toxaphene	SW8081A	µg/L	3	–	–	[1.1]	–	–
alpha-BHC	SW8081A	µg/L	–	–	–	[0.034]	–	–
alpha-Chlordane	SW8081A	µg/L	–	–	–	[0.034]	–	–
beta-BHC	SW8081A	µg/L	–	–	–	[0.11]	–	–
delta-BHC	SW8081A	µg/L	–	–	–	[0.034]	–	–
gamma-BHC (Lindane)	SW8081A	µg/L	0.2	–	–	[0.034]	–	–
gamma-Chlordane	SW8081A	µg/L	–	–	–	[0.034]	–	–

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
J	Estimated concentration; refer to Appendix C for data qualifier information

TABLE D-2b SUMMARY OF WATER TRIP BLANK ANALYTICAL RESULTS

Trip Blanks (Water)			Location ID:	C01WT	C02WT	C04WT	C05WT	C08WT	C10WT	C11WT	C13WT	C18WT	C19WT
			Sample ID:	04NE29WQ201	04NE29WQ301	04NE29WQ202	04NE29SW203	04NE06WQ203	04NE03WQ201	04NE26WQ201	04NE22WQ202	04NE06WQ302	04NE06WQ201
			Cooler Number:	1	2	4	5	8	10	11	13	18	19
			Sample Date:	8/12/2004	8/12/2004	8/14/2004	8/15/2004	8/21/2004	8/24/2004	8/25/2004	8/24/2004	9/5/2004	9/5/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**										
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	0.0127 J	0.00972 B	0.0116 J	[0.090]	0.0207 J	0.016 J	0.0144 J	0.013 J	[0.050]	[0.090]
Aromatic Organic Compounds (BTEX)													
Benzene	SW8260B	µg/L	5	[0.4]	[0.5]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.5]	[0.4]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Toluene	SW8260B	µg/L	1000	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Xylene, Isomers m & p	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]

Trip Blanks (Water)			Location ID:	C20WT	C23WT	C24WT	C25WT	C26WT	C27WT	C29WT	C30WT	C32WT	C38WT
			Sample ID:	04NE31WQ202	04NE11WQ201	04NE88WQ201	04NE88WQ203	04NE20WQ201	04NE17WQ201	04NEBGWQ301	04NEBGWQ201	04NEBGWQ202	04NE06WQ303
			Cooler Number:	20	23	24	25	26	27	29	30	32	38
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**										
Gasoline Range Organics (GRO)	AK101	mg/L	1.3	[0.090]	[0.090]	0.0106 J	0.0173 J	0.0167 J	0.015 J	0.0142 J	[0.090]	[0.090]	[0.050]
Aromatic Organic Compounds (BTEX)													
Benzene	SW8260B	µg/L	5	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.4]	[0.5]	[0.4]	[0.4]	[0.5]
Ethylbenzene	SW8260B	µg/L	700	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Toluene	SW8260B	µg/L	1000	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
o-Xylene	SW8260B	µg/L	10,000 (Total Xylenes)	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Xylene, Isomers m & p	SW8260B	µg/L	10,000 (Total Xylenes)	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]	[2]

KEY	DESCRIPTION
–	Measurement not recorded or not applicable
mg/L	milligrams per liter
µg/L	micrograms per liter
Cleanup Levels	Cleanup values are based on ADEC groundwater cleanup levels listed in 18 ACC 75.345, Table C
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
J	Estimated concentration; refer to Appendix C for data qualifier information.
0.00972 B	Analyte concentration biased due to detection in method blank.

TABLE D-2c SUMMARY OF SOIL TRIP BLANK ANALYTICAL RESULTS

Trip Blanks (Soil)			Location ID:	C02ST	C06ST	C07ST	C09ST	C12ST	C14ST	C15ST
			Sample ID:	04NE08SQ303	04NE08SQ202	04NE06SQ201	04NE10SQ201	04NE06SQ301	04NE22SQ202	04NE13SQ201
			Sample Date:	8/15/2004	8/15/2004	8/19/2004	8/23/2004	8/21/2004	8/28/2004	8/26/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**							
Gasoline Range Organics (GRO)	AK101	mg/kg	300	[2.5] B	0.907 J	1.06 J	1.51 J	0.848 J	0.903 J	1.51 J
Aromatic Organic Compounds (BTEX)										
Benzene	SW8260B	µg/kg	20	[100]	[13.3]	[13.2]	[13.3]	[100]	[13.3]	[13.2]
Ethylbenzene	SW8260B	µg/kg	5,500	[100]	[25.6]	[25.3]	[25.6]	[100]	[25.5]	[25.4]
Toluene	SW8260B	µg/kg	5,400	[100]	[51.2]	[50.7]	[51.1]	[100]	[51.1]	[50.8]
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[300] (total Xylenes)	[25.6]	[25.3]	[25.6]	[100]	[25.5]	[25.4]
Xylene, Isomers m & p	SW8260B	µg/kg	78,000 (total Xylenes)		[51.2]	[50.7]	[51.1]	[200]	[51.1]	[50.8]

Trip Blanks (Soil)			Sample Type:							
			Location ID:	C17ST	C18ST	C22ST	C29ST	C35ST	C37ST	C38ST
			Sample ID:	04NE31SQ201	04NE31SQ301	04NE29SQ202	04NEBGSQ301	04NEBGSQ202	04NEBGSQ203	04NEBGSQ302
			Sample Date:	8/31/2004	8/31/2004	9/3/2004	9/8/2004	9/8/2004	9/8/2004	9/12/2004
Parameter Tested	**Test Method**	**Units**	**Cleanup Level**							
Gasoline Range Organics (GRO)	AK101	mg/kg	300	1.42 J	0.461 J	0.573 J	0.658 J	1.04 J	1.17 J	–
Aromatic Organic Compounds (BTEX)										
Benzene	SW8260B	µg/kg	20	[13.5]	[100]	[13.6]	[100]	[13.4]	[13.2]	[126]
Ethylbenzene	SW8260B	µg/kg	5,500	[26]	[100]	[26.1]	[100]	[25.7]	[25.4]	[126]
Toluene	SW8260B	µg/kg	5,400	[52]	[100]	[52.1]	[100]	[51.4]	[50.9]	36.6 J
o-Xylene	SW8260B	µg/kg	78,000 (total Xylenes)	[26]	[100]	[26.1]	[300] (total Xylenes)	[25.7]	[25.4]	[126]
Xylene, Isomers m & p	SW8260B	µg/kg	78,000 (total Xylenes)	[52]	[200]	[51.2]		[51.4]	[50.9]	[253]

KEY	DESCRIPTION
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
Cleanup Levels	Cleanup values are based on the most stringent ADEC Method 2 default soil cleanup levels listed in 18 ACC 75.341, Tables B1 and B2 for the "Under 40 inches" precipitation zone.
36	Concentration detected
[0.0072]	Analyte not detected above Practical Quantitation Limit (PQL)
J	Estimated concentration; refer to Appendix C for data qualifier information
[2.5] B	Result qualified as not detected due to method blank detection.

APPENDIX E

Waste Disposal Documentation

TABLE E-1: WASTE TRACKING LOG

Waste Container Number	Waste Stream Type	Date	Point of Generation - Site and Location	Contaminants of Concern	Storage Location	Comments (label designations, condition, treatment date, treatment method, etc.)	Manifest Document Number
Site 3	Purge/Decon Water	8/22/2004	Site 3	Fuels	Site 3	Pumped through activated carbon on gravel pile from former pad.	2566A
Site 6	Purge/Decon Water	8/22/2004	Site 6	Fuels/Metals/PCBs	Site 6	Pumped through activated carbon onto "center" of site	2566A
Sites 3 and 6 trough	Auger/Decon Water	8/22/2004	Camp/Sites 3 & 6	Fuels/Metals/PCBs	Camp	Pumped through activated carbon onto gravel pad.	2566A
Drums Sites 3 and 6	Drill steel Decon/ Water	8/22/2004	Sites 3 &6	Fuels/Metals/PCBs	Drill rig	Pumped through activated carbon onto gravel pad.	2566A
26MW3 Purge H2O	Develop/Purge Water	8/25/2004	26MW3	low potential - Fuels/Metals/PCBs	26MW3	Pumped through activated carbon (GAC) onto site surface 8/26/04	
Air Cooler Cleaner	Solvent on beach leaking	9/2/2004	Unknown fishing boat?	Diesel, nonphenol ~ 3 gal.	Fuel containment cell in poly tote	CAS Nos.: Diesel Fuel = 06834305 "non regulated" on label; Nonphenol = 251545123	2566
"	"	9/23/2004	"	"	S&W Annex	Emerald Alaska, Keith, Samples + 1,000 ppm, halogen, salt?	2566
MOC Drill Decon	Decon water	9/2/2004	All MOC area drilling	Fuels/Metals/PCBs	Drill rig	Pumped/siphoned through activated carbon onto gravel pad	2566A
Camp Spill soil	Diesel impacted soil	8/14/2004	Camp	Diesel	Camp	Added settled solids from all decon/purge water and unused samples	2566A
"	"	9/13/2004	"	"	"	"	2566A
"	"	9/23/2004	"	"	S&W Annex	Collect and submit sample 04NEIDWSC1 for analysis of 8260, AK102/103, PCBs, RCRA metals	2566A
Site 11	Purge water	9/9/2004	10MW1, 11MW3, 88MW1, 88MW2	Fuels/PCBs	Treated on site	Treated at Site 11 w/GAC (9/8-shut down and modified system for better treatment)	2566A
Site 88	Purge water	9/9/2004	88MW4, MW5, MW6, MW8	Fuels/PCBs	Treated on site	Treated near 88MW6 w/GAC	2566A
Site 17	Purge water	9/10/2004	17MW1	Fuels/PCBs	Treated on site	Treated at Site 17 w/GAC, solids added to camp spill drum	2566A
Site 18	Purge water	9/10/2004	18MW1	Fuels/PCBs	Treated on site	Treated at Site 18 w/GAC, solids added to camp spill drum	2566A
Site 20/88	Purge water	9/11/2004	88MW10, 20MW1	Fuels/PCBs	Treated on site	Treat at Site 20 w/GAC; had to repair outlet screen on GAC	2566A
Site 22	Purge water	9/12/2004	22MW3, 22MW2	Fuels/PCBs	Treated on site	Treat at Site 22 w/GAC	2566A
26MW1	Purge water	9/12/2004	26MW1	Fuels/PCBs	Treated on site	Treat at Site 26 w/GAC	2566A

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
SEATTLE · RICHLAND · FAIRBANKS · ANCHORAGE · ST. LOUIS · BOSTON

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ANCHORAGE, ALASKA 99518-1263
907·561·2120 FAX 907·561·4483

FAX TRANSMISSION

Attn	Roxanne	Fax	258-3049
Company	Emerald	Phone	
Location		Date	11-3-04
From	John Spielman	Time	
Subject	Soil		

TOTAL NUMBER OF PAGES (including cover sheet) 6

MESSAGE: Roxanne, these test results are from a drum of soil generated during an investigation at Northeast Cape, St. Lawrence Island. Can you please review and give us an estimate for treatment/disposal?

Thanks
John

The original of this fax ________ *will* [✓ *will not*] be mailed.

Drummed soil/sed

SGS

Laboratory Analysis Report

200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: http://www.sgsenvironmental.com

John Spielman
Shannon & Wilson Inc.
5430 Fairbanks Street Ste 3
Anchorage. AK 99518

Work Order: 1046302
32-1-16821-3 NE Cape

Client: Shannon & Wilson Inc.

Report Date: October 18, 2004

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. A copy of our Quality Control Manual that outlines this program is available at your request. The laboratory ADEC certification numbers are AK08-03 (DW), UST-005 (CS) and AK00971 (Micro).

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS Quality Assurance Program Plan and the National Environmental Laboratory Accreditation Conference.

If you have any questions regarding this report or if we can be of any other assistance, please call your SGS Project Manager a (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

PQL	Practical Quantitation Limit (reporting limit).
U	Indicates the analyte was analyzed for but not detected.
F	Indicates an estimated value that falls below PQL, but is greater than the MDL.
J	The quantitation is an estimation.
B	Indicates the analyte is found in a blank associated with the sample.
*	The analyte has exceeded allowable regulatory or control limits.
GT	Greater Than
D	The analyte concentration is the result of a dilution.
LT	Less Than
!	Surrogate out of control limits.
Q	QC parameter out of acceptance range.
M	A matrix effect was present.
JL	The analyte was positively identified, but the quantitation is a low estimation.
E	The analyte result is high outside of calibrated range.

Note: Soil samples are reported on a dry weight basis unless otherwise specified

SGS

SGS Ref.# 1046302001
Client Name Shannon & Wilson Inc.
Project Name/# 32-1-16821-3 NE Cape
Client Sample ID 04NEIDWSL1
Matrix Soil/Solid

All Dates/Times are Alaska Standard Time
Printed Date/Time 10/18/2004 11:13
Collected Date/Time 09/23/2004 15:15
Received Date/Time 09/24/2004 16:50
Technical Director Stephen C. Ede

Released By

Sample Remarks:

DRO - The pattern is consistent with a weathered middle distillate.
8260 - Surrogate recovery for BFB is biased high. Sample was in-house extracted and contained residual BFB surrogate.

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Metals Department									
Mercury by Cold Vapor	0.0446 U	0.0446	mg/Kg	SW7471A	B		09/29/04	09/29/04	TK
RCRA Metals	TCLP								
Arsenic	3.46	2.00	mg/Kg	SW6020	B		09/27/04	09/28/04	WAW
Barium	68.5	1.67	mg/Kg	SW6020	B		09/27/04	09/28/04	WAW
Cadmium	0.466	0.222	mg/Kg	SW6020	B		09/27/04	09/28/04	WAW
Chromium	27.1/20 = 1.36	0.445	mg/Kg	SW6020	B		09/27/04	09/28/04	WAW
Lead	32.1/20 = 1.61	1.11	mg/Kg	SW6020	B		09/27/04	09/28/04	WAW
Selenium	0.556 U	0.556	mg/Kg	SW6020	B		09/27/04	09/28/04	WAW
Silver	0.203	0.111	mg/Kg	SW6020	B		09/27/04	09/28/04	WAW
Semivolatile Organic Fuels Department									
Diesel Range Organics	488	54.0	mg/Kg	AK102/103	B		09/28/04	10/11/04	MCM
Residual Range Organics	203	54.0	mg/Kg	AK102/103	B		09/28/04	10/11/04	MCM
Surrogates									
5a Androstane <surr>	97.2		%	AK102/103	B	50-150	09/28/04	10/11/04	MCM
n-Triacontane-d62 <surr>	72.6		%	AK102/103	B	50-150	09/28/04	10/11/04	MCM
Polychlorinated Biphenyls									
Aroclor-1016	0.0559 U	0.0559	mg/Kg	SW8082	B		09/27/04	09/27/04	WAA
Aroclor-1221	0.0559 U	0.0559	mg/Kg	SW8082	B		09/27/04	09/27/04	WAA
Aroclor-1232	0.0559 U	0.0559	mg/Kg	SW8082	B		09/27/04	09/27/04	WAA
Aroclor-1242	0.0559 U	0.0559	mg/Kg	SW8082	B		09/27/04	09/27/04	WAA
Aroclor-1248	0.0559 U	0.0559	mg/Kg	SW8082	B		09/27/04	09/27/04	WAA
Aroclor-1254	0.0559 U	0.0559	mg/Kg	SW8082	B		09/27/04	09/27/04	WAA
Aroclor-1260	0.0559 U	0.0559	mg/Kg	SW8082	B		09/27/04	09/27/04	WAA

SGS

SGS Ref.#	1046302001	**All Dates/Times are Alaska Standard Time**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	10/18/2004 11:13
Project Name/#	32-1-16821-3 NE Cape	**Collected Date/Time**	09/23/2004 15:15
Client Sample ID	04NEIDWSL1	**Received Date/Time**	09/24/2004 16:50
Matrix	Soil/Solid	**Technical Director**	Stephen C. Ede

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Polychlorinated Biphenyls									
Surrogates									
Decachlorobiphenyl <surr>	97.7		%	SW8082	B	60-125	09/27/04	09/27/04	WAA
Volatile Gas Chromatography/Mass Spectroscopy									
Dichlorodifluoromethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Chloromethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Vinyl chloride	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Bromomethane	94.9 U	94.9	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Acetone	237 U	237	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Trichlorofluoromethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Chloroethane	94.9 U	94.9	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,1-Dichloroethene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Methylene chloride	94.9 U	94.9	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Carbon disulfide	94.9 U	94.9	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
trans-1,2-Dichloroethene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,1-Dichloroethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
2,2-Dichloropropane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
cis-1,2-Dichloroethene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
2-Butanone (MEK)	237 U	237	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Bromochloromethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Chloroform	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Carbon tetrachloride	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,1,1-Trichloroethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,1-Dichloropropene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Benzene	12.3 U	12.3	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2-Dichloroethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2-Dichloropropane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Trichloroethene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Dibromomethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Bromodichloromethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
2-Chloroethyl Vinyl Ether	94.9 U	94.9	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
cis-1,3-Dichloropropene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV

SGS

SGS Ref.# 1046302001
Client Name Shannon & Wilson Inc.
Project Name/# 32-1-16821-3 NE Cape
Client Sample ID 04NEIDWSL1
Matrix Soil/Solid

All Dates/Times are Alaska Standard Time
Printed Date/Time 10/18/2004 11:13
Collected Date/Time 09/23/2004 15:15
Received Date/Time 09/24/2004 16:50
Technical Director Stephen C. Ede

Volatile Gas Chromatography/Mass Spectroscopy

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Toluene	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,1,2-Trichloroethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Tetrachloroethene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
trans-1,3-Dichloropropene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,3-Dichloropropane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Dibromochloromethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2-Dibromoethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Chlorobenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,1,1,2-Tetrachloroethane	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Ethylbenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
P & M -Xylene	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
o-Xylene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Styrene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Bromoform	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Isopropylbenzene (Cumene)	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Bromobenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,1,2,2-Tetrachloroethane	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2,3-Trichloropropane	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
n-Propylbenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
2-Chlorotoluene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
4-Chlorotoluene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,3,5-Trimethylbenzene	259	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
tert-Butylbenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2,4-Trimethylbenzene	143	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
sec-Butylbenzene	30.4	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,3-Dichlorobenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
4-Isopropyltoluene	104	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,4-Dichlorobenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2-Dichlorobenzene	23.7 U	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
n-Butylbenzene	49.3	23.7	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2-Dibromo-3-chloropropane	94.9 U	94.9	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
1,2,4-Trichlorobenzene	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Hexachlorobutadiene	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Naphthalene	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV

SGS Ref.#	1046302001	**All Dates/Times are Alaska Standard Time**	
Client Name	Shannon & Wilson Inc.	**Printed Date/Time**	10/18/2004 11:13
Project Name/#	32-1-16821-3 NE Cape	**Collected Date/Time**	09/23/2004 15:15
Client Sample ID	04NEIDWSL1	**Received Date/Time**	09/24/2004 16:50
Matrix	Soil/Solid	**Technical Director**	**Stephen C. Ede**

Parameter	Results	PQL	Units	Method	Container ID	Allowable Limits	Prep Date	Analysis Date	Init
Volatile Gas Chromatography/Mass Spectroscopy									
1,2,3-Trichlorobenzene	47.4 U	47.4	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
4-Methyl-2-pentanone (MIBK)	237 U	237	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
2-Hexanone	237 U	237	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Methyl-t-butyl ether	37.9 U	37.9	ug/Kg	SW8260B	A		09/28/04	10/06/04	RMV
Surrogates									
1,2-Dichloroethane-D4 <surr>	107		%	SW8260B	A	83-122	09/28/04	10/06/04	RMV
Toluene-d8 <surr>	102		%	SW8260B	A	87-115	09/28/04	10/06/04	RMV
4-Bromofluorobenzene <surr>	232	!	%	SW8260B	A	46-133	09/28/04	10/06/04	RMV
Dibromofluoromethane <surr>	106		%	SW8260B	A	83-119	09/28/04	10/06/04	RMV
Solids									
Total Solids	88.5		%	SM20 2540G	B			09/29/04	AHP

*** IN CASE OF EMERGENCY CALL 1-800-424-9300 ***

93-916-AK02566

NON-HAZARDOUS WASTE MANIFEST

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

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. C E S Q G

Manifest Document No. 2 5 6 6 A

2. Page 1 of 1

3. Generator's Name and Mailing Address
SHANNON AND WILSON
5430 FAIRBANKS
ANCHORAGE, AK 99518

4. Generator's Phone ((907) 561-2120

5. Transporter 1 Company Name EMERALD SERVICES, INC.
6. US EPA ID Number W A D 0 5 8 3 6 4 6 4 7

A. State Transporter's ID
B. Transporter 1 Phone (206) 832-3000

7. Transporter 2 Company Name
8. US EPA ID Number

C. State Transporter's ID
D. Transporter 2 Phone

9. Designated Facility Name and Site Address
EMERALD ALASKA, INC.
2020 VIKING DRIVE
ANCHORAGE, AK 99501

10. US EPA ID Number A K R 0 0 0 0 0 4 1 8 4

E. State Facility's ID
F. Facility's Phone (907) 258-1558

GENERATOR

11. WASTE DESCRIPTION	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol.
a. MATERIAL NOT REGULATED BY D.O.T.	1	DM	120 ~~500~~ RH	P
b. MATERIAL NOT REGULATED BY D.O.T.	1	DM	500	P
c.				
d.				

G. Additional Descriptions for Materials Listed Above
a) AK00504 GRANULAR ACTIVATED CARBON
b) AK00504 NORTHEAST CAPE, ST. LAWRENCE ISLAND IDW SOIL

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

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

Printed/Typed Name Randy Hessong
Signature
Date Month 11 Day 10 Year 04

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name Keith Chadwell
Signature
Date Month 11 Day 10 Year 04

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator; Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name M.L. HERFINDAHL
Signature
Date Month 11 Day 23 Year 04

NON-HAZARDOUS WASTE

CF14

Emerald Alaska Inc
800 East Ship Creek
Anchorage, AK 99501
www.emeraldnw.com *(907) 258-1558 fax (907) 258-3049*

Certificate of Disposal / Recycle

Generator: SHANNON & WILSON, INC.
5430 FAIRBANKS STREET
ANCHORAGE, AK 99518-1263

Document: Manifest # 2566A

Date of Disposal / Recycle: NOVEMBER 23, 2004

Line Item	Description	Profile Number	Quantity
1a	Material Not Regulated by D.O.T. (Non-regulated Granular Activated Carbon)	AK00504	1 DM 120 lb
1b	Material Not Regulated by D.O.T. (Non-regulated IDW Soil from Northeast Cape, St. Lawrence Island)	AK00504	1DM 500 lb

Roxanne Pedersen

Roxanne Pedersen, Facility Operator December 3, 2004

JOB WORK ORDER

800 E. Ship Creek Ave.
Anchorage, AK 99501
907-258-1558 • FAX 907-258-3049

www.emeraldnw.com

JOB NUMBER: 93-916-90130

JOB DATE: 9-23-04

PROJECT NAME/TANK NUMBER: Shannon & wilson

PROJECT ADDRESS: 5430 FAIRBANKS ST. SUITE #3

CUSTOMER BILLING NAME:

CUSTOMER CONTACT: Randy HeFong **PHONE NO** 561-2120

BASE WORK ☒ **CHANGE ORDER WORK** ☐

SUMMARY OF WORK REQUIRED: Chlor-d-Tect 5 gallon Drum that Shannon & wilson Picked up on ST. LAWRence Island IF it Passes Bring BACK TO FACILITY on PT Form. IF NOT leave There FOR Pick up And Disposal next week.
NOTE: DRum Failed Chlor-d-Tect TEST 71000 PPM

PROJECT EQUIPMENT	EQUIP. #	HOURS	TANK CLEANING EQUIPMENT	EQUIP. #	HOURS
AIR MONITORING			VACUUM TRUCK		
BOX TRUCK			VACUUM TRAILER		
FORK LIFT			SKID MOUNT		
PICK UP	672	1	AIR MOVERS		
FLAT BED TRUCK			BREATHING AIR EQUIP		
DUMPTRUCK-SIDE DUMP			HOTSEY		
ROLL OFF TRUCK			GENERATOR		
SUPPORT TRUCK			AIR COMPRESSOR		

MATERIAL	QUAN.	UNIT	MATERIALS/SUBS/STOCK REQS		INVOICE #
CHLOR-D-TECT	1				
ABSORBANT MATERIAL					
DRUMS					
PPE					
~~Ch~~	~~1~~				

EMPLOYEE NAME	EQUIP. NO.	START	STOP	ST HOURS	OT HOURS
Keith Chadwell		11:00	12:00	1	
SUBTOTAL LABOR					

% OF COMPLETION 100%

Date 9-23-04
EMERALD ALASKA SIGNATURE

Date
CUSTOMER SIGNATURE

*** IN CASE OF EMERGENCY CALL 1-800-424-9300 ***

93-916-AK02566

NON-HAZARDOUS WASTE MANIFEST

8347205/833310

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

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. C E S Q G

Manifest Document No. 0 2 5 6 6

2. Page 1 of 1

02566 IN

3. Generator's Name and Mailing Address
SHANNON AND WILSON
5430 FAIRBANKS
ANCHORAGE, AK 99518

4. Generator's Phone (907) 561-2120

5. Transporter 1 Company Name EMERALD SERVICES, INC.

6. US EPA ID Number W A D 0 5 8 3 6 4 6 4 7

A. State Transporter's ID

B. Transporter 1 Phone (907) 258-1558

7. Transporter 2 Company Name TRIAD TRANSPORT

8. US EPA ID Number O K D 9 7 8 1 5 8 8 7 9

C. State Transporter's ID

D. Transporter 2 Phone (918) 426-475

9. Designated Facility Name and Site Address
POLLUTION CONTROL IND.
4343 KENNEDY AVE.
EAST CHICAGO, IN 46312

10. US EPA ID Number I N D 0 0 0 6 4 6 9 4

E. State Facility's ID

F. Facility's Phone (219) 397-3951

GENERATOR

11. WASTE DESCRIPTION	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt./Vol.
HW				
a. X RQ, TOXIC LIQUID, ORGANIC, N.O.S. (XYLENOL, 1,2-DICHLOROBENZENE), 6.1, UN2810, PG-III MARINE POLLUTANT, RQ=100, ERG#153	1	DM	70	P
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

a) PCI280077 CLEANING AGENT

H. Handling Codes for Wastes Listed Above

S01

15. Special Handling Instructions and Additional Information

C# 18085A

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

Printed/Typed Name Randy Hessong

Signature

Date Month 11 Day 10 Year 04

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name Keith Chadwell

Signature

Date Month 11 Day 10 Year 04

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name Gary Neville

Signature

Date Month 12 Day 1 Year 04

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Name Yvonne Hoffman

Signature Yvonne Hoffman

Date Month 12 Day 2 Year 04

CF14

APPENDIX F

Important Information about Your Geotechnical/Environmental Report

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 32-1-16821

Date:	June 2005
To:	U.S. Army Corps of Engineers – Alaska District
Re:	Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors, which were considered in the development of the report, have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

APPENDIX G

Survey Report

Mammoth Consulting, L.L.C.
Land Research ◆ Surveying ◆ Mapping
11001 Ridgecrest Drive Anchorage, Alaska 99516
Tele. (907) 346-3767

October 11, 2004

Shannon & Wilson, Inc.
5430 Fairbanks Street, Suite 3
Anchorage AK 99518-1263

Attn: John Spielman

Dear John:

Submitted herewith is the survey data for the Phase IV Remedial Investigation at Northeast Cape, St. Lawrence Island, Alaska. Enclosed are the following:

- Eleven (11) 8 1/2'" x 11" drawings showing survey point locations
- Spreadsheet print-out of all points from this survey, based on local grid
- Spreadsheet print-out of NAD83 geographic coordinates for background sample locations only
- Sketches, data collector raw data files, and misc. information organized by general location
- Copies of field notes
- CD-ROM with
    - NEC_2004.txt (ASCII file of points this survey)
    - NEC_2004.xls (EXCEL spreadsheet of (a) all points from 2001-2004 and (b) points this survey)
    - Pdf's of the 11 survey point location drawings

Following is a brief survey report.

The field survey commenced September 3, 2004 and was substantially completed by Mammoth Consulting on September 8. Shannon and Wilson personnel collected GPS data (for background samples) between September 8 and September 13th and also obtained "swing ties" for eight locations sampled after September 8.

Survey control information provided to Mammoth Consulting at the onset of this project consisted of:

➢ nec-2001 field pts.txt	(Mullikin Surveys, 2001)
➢ 2002.txt	(Mullikin Surveys, 2002)
➢ Terra Surveys Workbook.xls	(Terra Surveys, 2003)

The point data was merged, with some points re-numbered so that point numbering used this survey would not be in conflict. See NEC_2004.xls "2001-2004 all points" tab for the complete listing, which includes the source of each data point (M01, M02 = Mullikin 2001, 2002; T03 = Terra 2003; 2004 = this survey).

Four existing control stations were used:

BM-B – This is the Basis of Coordinates for the local grid. Coordinate is 100000, 100000; elevation is 75.97 ft. The monument is a 3 5/8" brass cap, marked "B," on 1 ½" iron pipe that extends 0.7' above the ground.

LOUNSBURY – This is a 2-inch aluminum cap monument on 5/8" rebar at Site 7. It is marked "LOUNSBURY LS-8535 1994." The monument was loose in its hole, but otherwise in good condition, with the cap 0.2' above the ground. The coordinate used this survey was from the Mullikin 2001 data set. The elevation was determined using the vertical difference measured this survey between BM-B and LOUNSBURY (-7.39 ft) and the elevation of BM-B (75.97 ft), or **68.58 ft**. This compares to 69.65 ft as reported by Mullikin 2001. This point was not part of either the Mullikin 2002 or the Terra 2003 data sets.

GPS 3201 – This is a 2-inch aluminum cap monument on 5/8" rebar at the Main Complex Area. It is marked "4469-S GPS 3201 2002." It was found in good condition 0.45 ft above the ground surface. The coordinate and elevation reported in the Mullikin 2002 data set were held. Terra's 2003 elevation (67.22 ft) closely matched this elevation (**67.29 ft**), and their coordinate was slightly to the south (Northings differed by 0.75'). The Mullikin 2002 coordinate was used because it is from the same data set as the monitoring wells that were re-measured this survey.

BM-H – This is a 1 ½" iron pipe with wood and a tack in the center. It was found projecting 0.8' above the ground. The coordinate reported in the Mullikin 2001 data set was held. As with GPS 3201, the Terra 2003 position was slightly to the south of this (Northings differed by 0.5'). The elevation used this survey was computed from the difference measured this survey between GPS3201 and BM-H (2.67 ft) and the Mullikin 2002 elevation for GPS 3201 (67.29 ft), for an elevation of **69.96 ft**. In comparison, the Mullikin 2001 elevation reported for this station is 71.23 ft, and the Terra 2003 elevation, 70.04 ft.

Auxillary control at some of the sites was required and was established using conventional surveying methods. Redundant measurements were made and mean values determined for coordinates and elevations. See control sketches for additional information. The auxillary control consisted of:

BEACH – a spike set in the top of the gravel pile at Site 3
DRUM – a spike set at Site 6
FILL – a spike set at Site 7
ALICE – a nail set at Site 31
ESTUARY – a spike set at Site 29
AIRSTRIP – a 2-inch alum. cap found at the airstrip marked "4469-S 98-2 GPS 1998"

The majority of the sample locations determined this survey were by conventional survey techniques. Data was recorded both manually in the field book and automatically by the on-board data collection system. See field book copies and raw data print-outs for specific sideshot information.

The locations and elevations of monitoring wells were determined at the sampling reference mark on the top of casing. For the well points at Sites 3 and 6, the positions were measured at the pipe center at ground surface, and the elevations, at the top of the threaded pipe. See field notes for observed heights above ground of well points

The locations of surface water samples were determined using the offset distances reported by the sampling crew and the reference lath locations as determined by the conventional survey.

Swing tie data provided by the sampling crew was used to determine locations of three samples at Site 7, three samples at Site 13, and the two bulk samples at the Main Complex Area.

The locations of the Background Sample Sites were determined using differentially-corrected GPS data. Positions were collected using a Trimble GeoXT receiver. Pathfinder Office software was used to correct the positions using data from a continuously operating reference station (CORS station). Horizontal precisions for the points collected were in the 6-meter range before processing and the 1-meter range afterwards.

To transform the WGS84 GPS coordinates to the local plane grid, a "global coordinate system" was defined using Softdesk Land Development Desktop software. The coordinate system is a modified NAD83 Zone 9 (Transverse Mercator) projection with the origin at NGS Station BM-B and units in U.S. survey feet. The GPS data set included coordinates for Station AIRSTRIP and for the lath set near sample site 04NE29SW102. The local grid coordinates determined by the transformation of GPS data for these two points were compared with the local grid coordinates determined by conventional survey. Both GPS-derived positions were within a meter of their conventionally-determined counterpart.

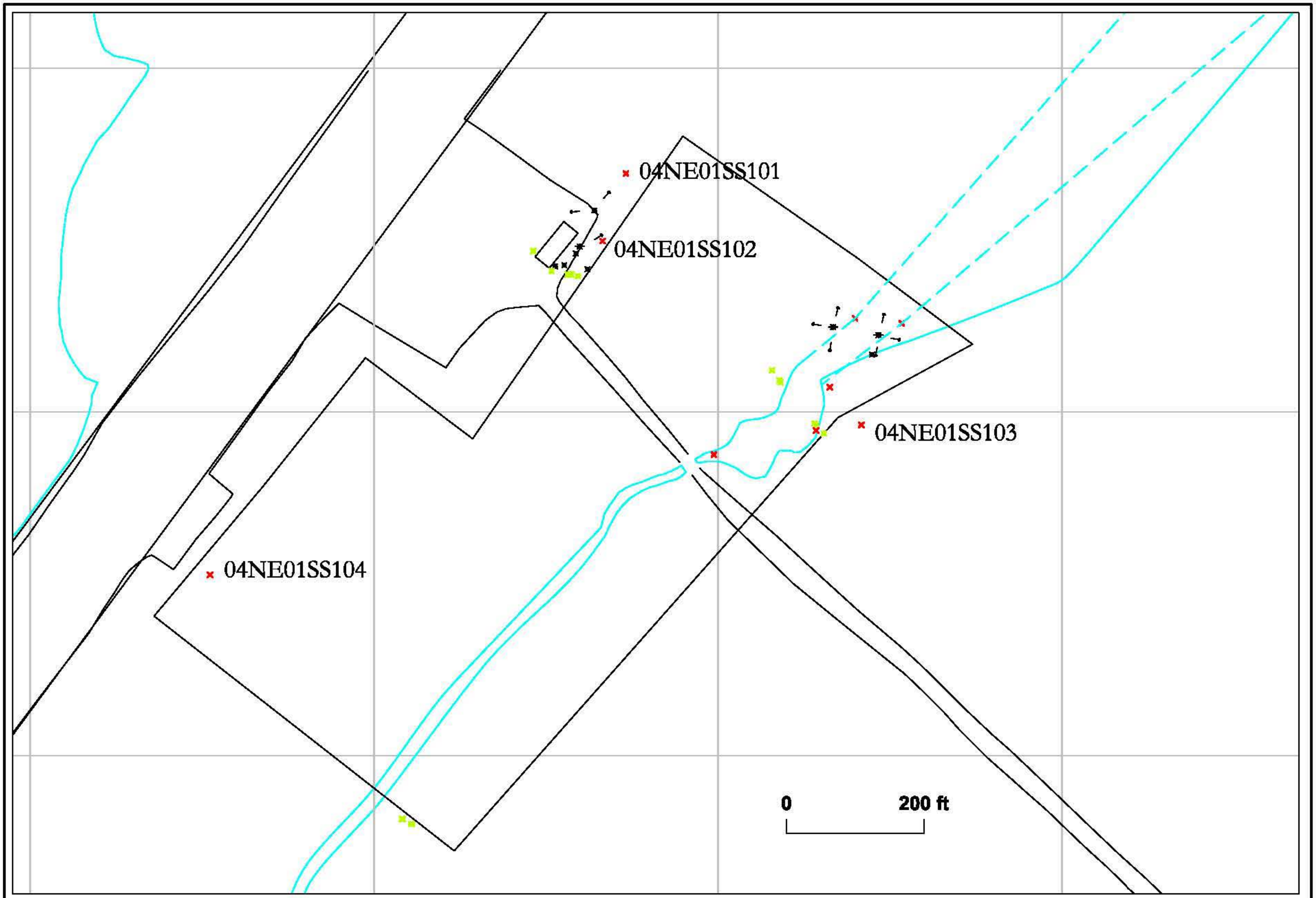
The means by which each location point was determined (conventional, swing tie or offset, GPS) is noted along the left side of the spreadsheet print-out being provided.

Thank you for the opportunity to perform this work. Please do not hesitate to call if you have any questions or need additional information.

Sincerely,

Shelley Williams

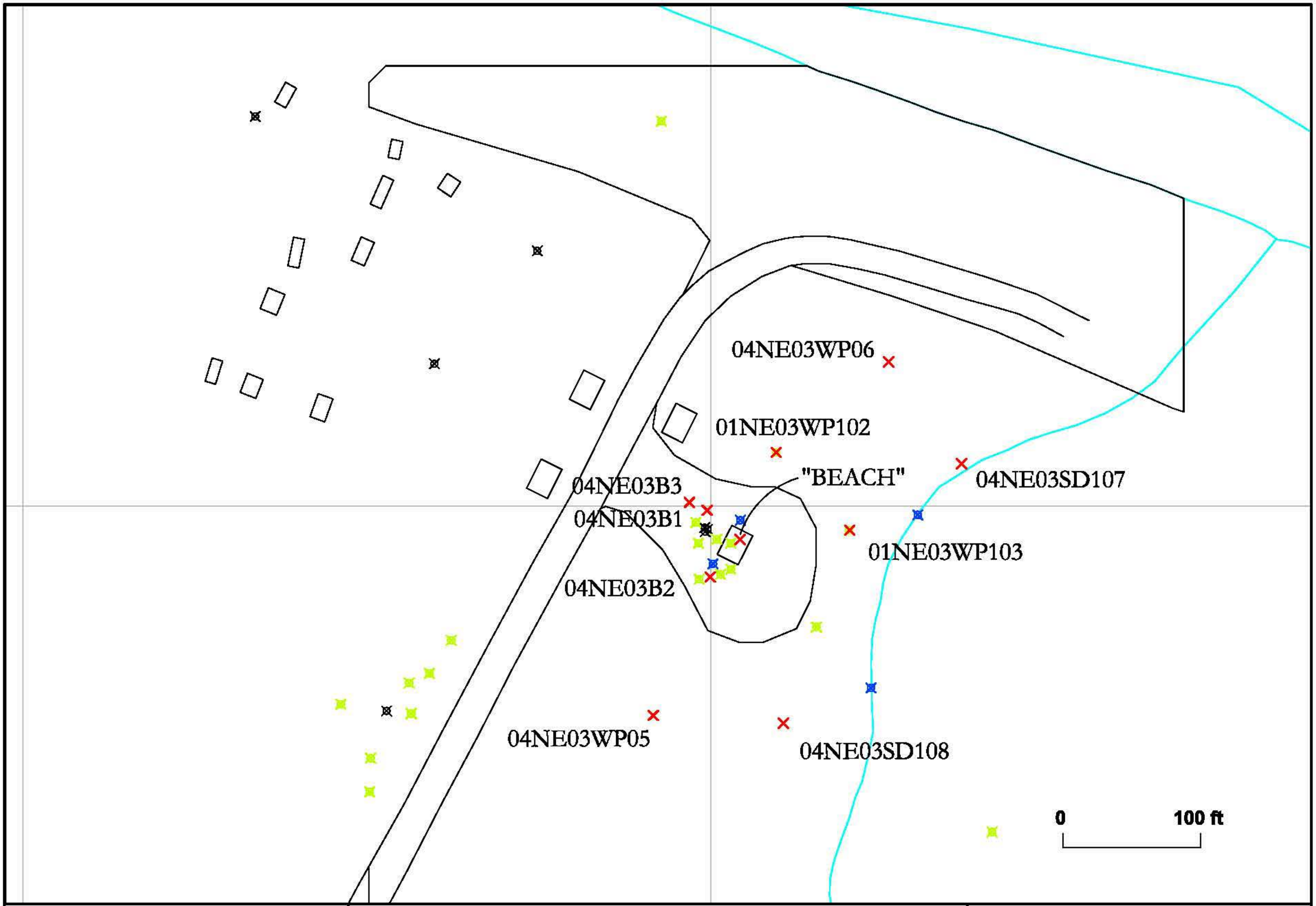
Shelley Williams, P.E., P.L.S.



SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Phase IV Remedial Investigation, NE Cape, St. Lawrence Island
August - September 2004

Site 1 - Burn Area



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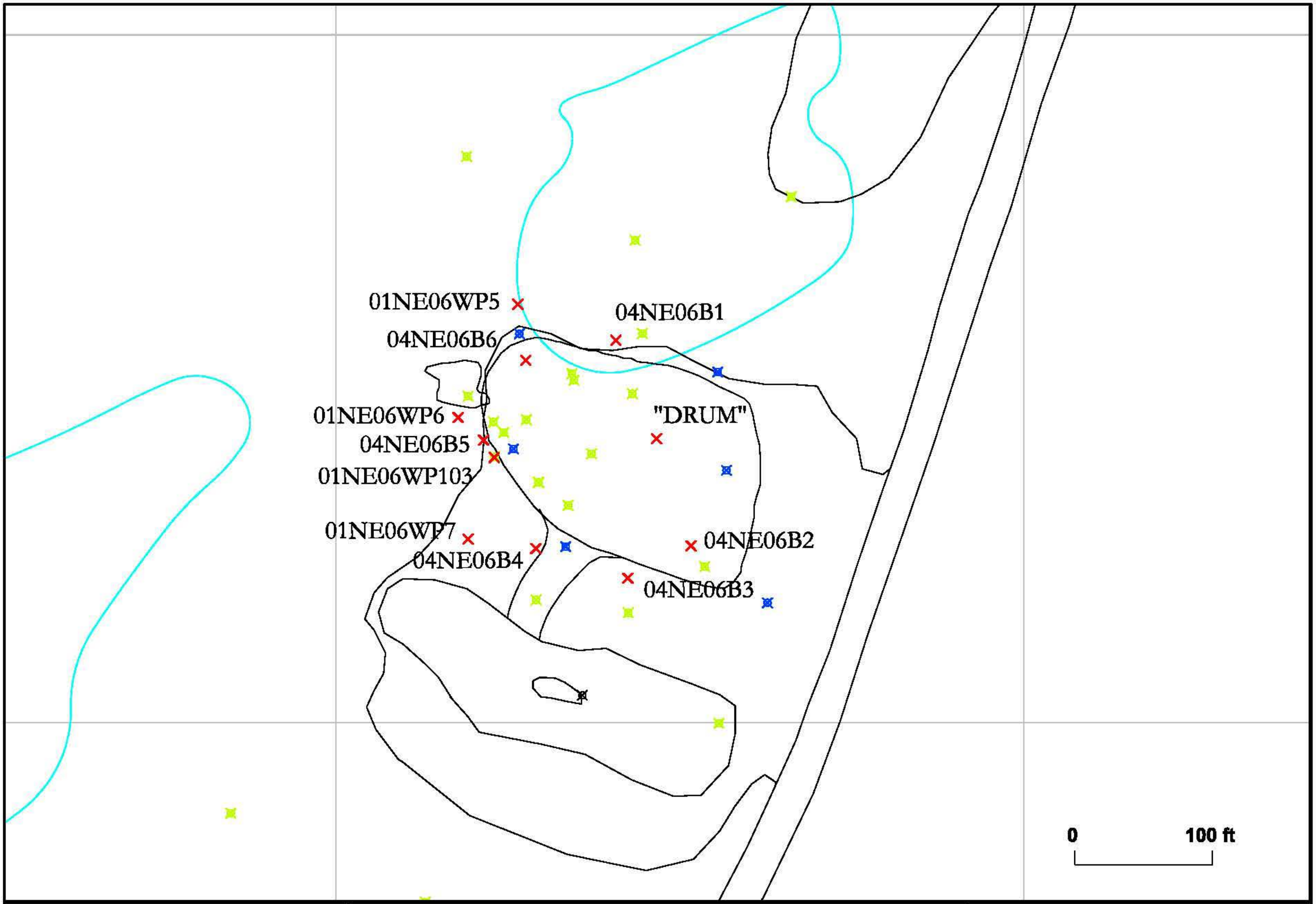
August - September 2004

Site 3 - Fuel Line Corridor and Pumphouse



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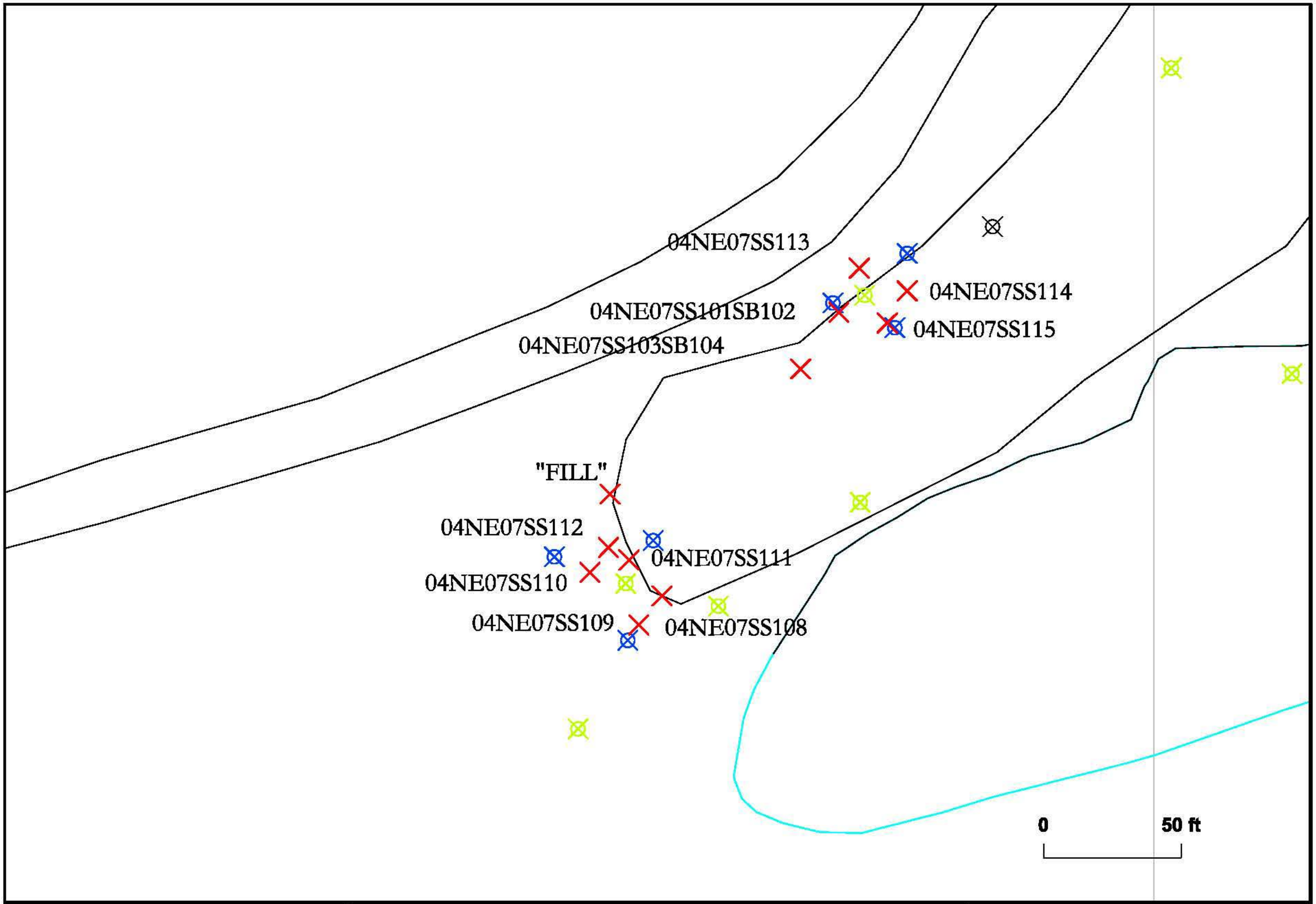
August - September 2004

Site 6 - Cargo Beach Road
Drum Field



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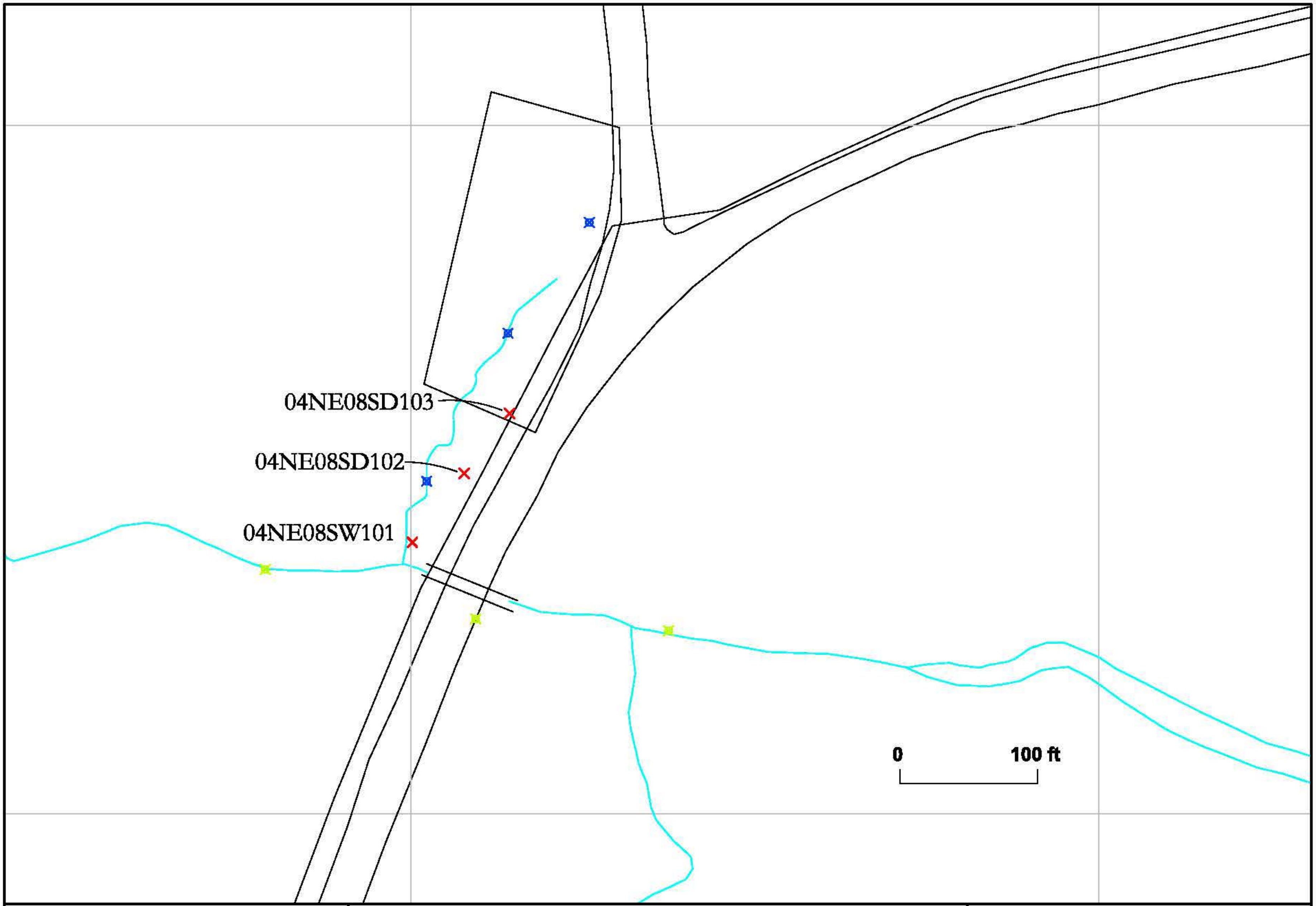
Phase IV Remedial Investigation, NE Cape, St. Lawrence Island
August - September 2004

Site 7 - Cargo Beach Road Landfill



SHANNON & WILSON, INC.
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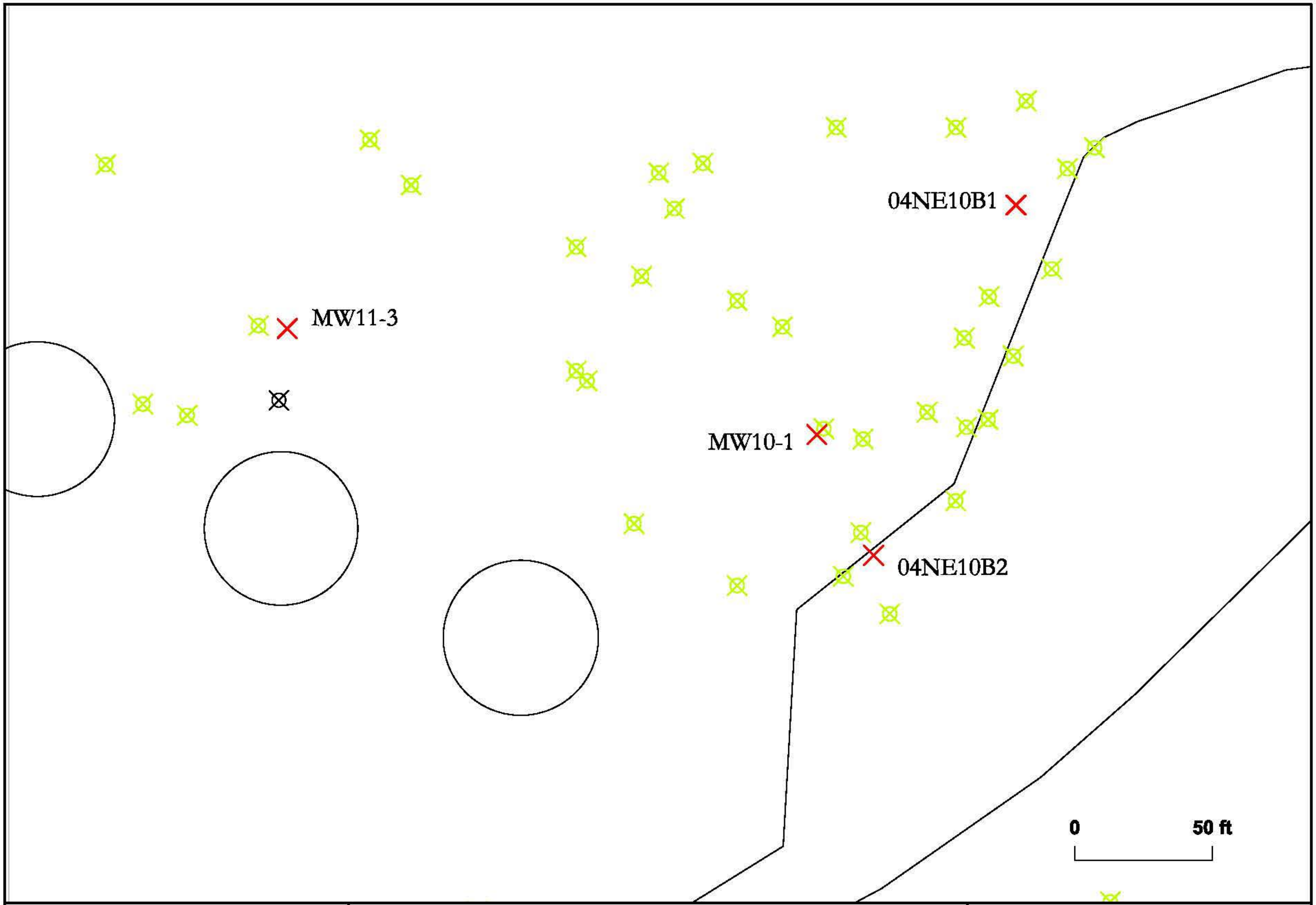
Phase IV Remedial Investigation, NE Cape, St. Lawrence Island
August - September 2004

Site 8 - POL Spill Site



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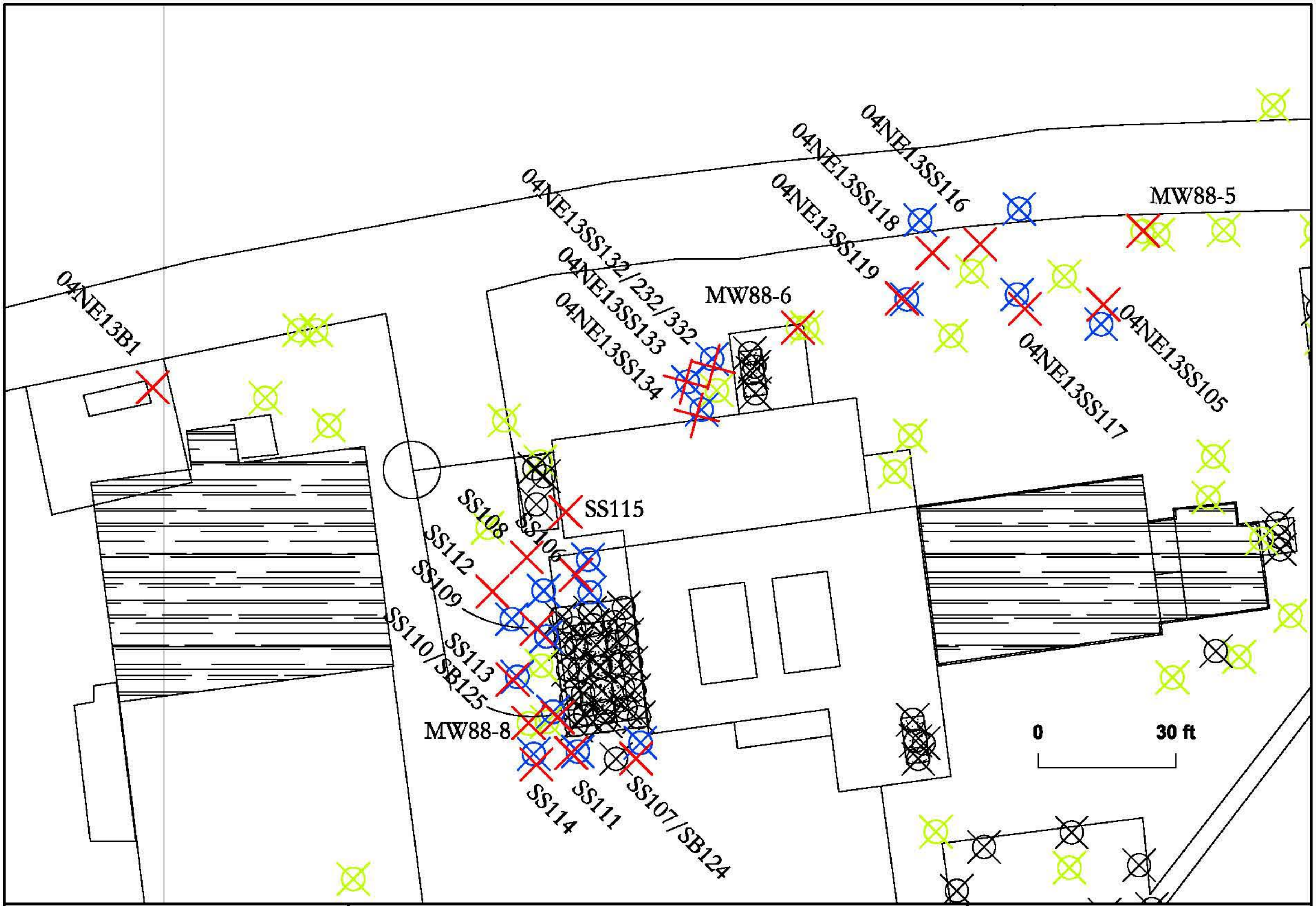
August - September 2004

Site 10 - Buried Drums
Site 11 - Fuel Storage Tanks



SHANNON & WILSON, INC.
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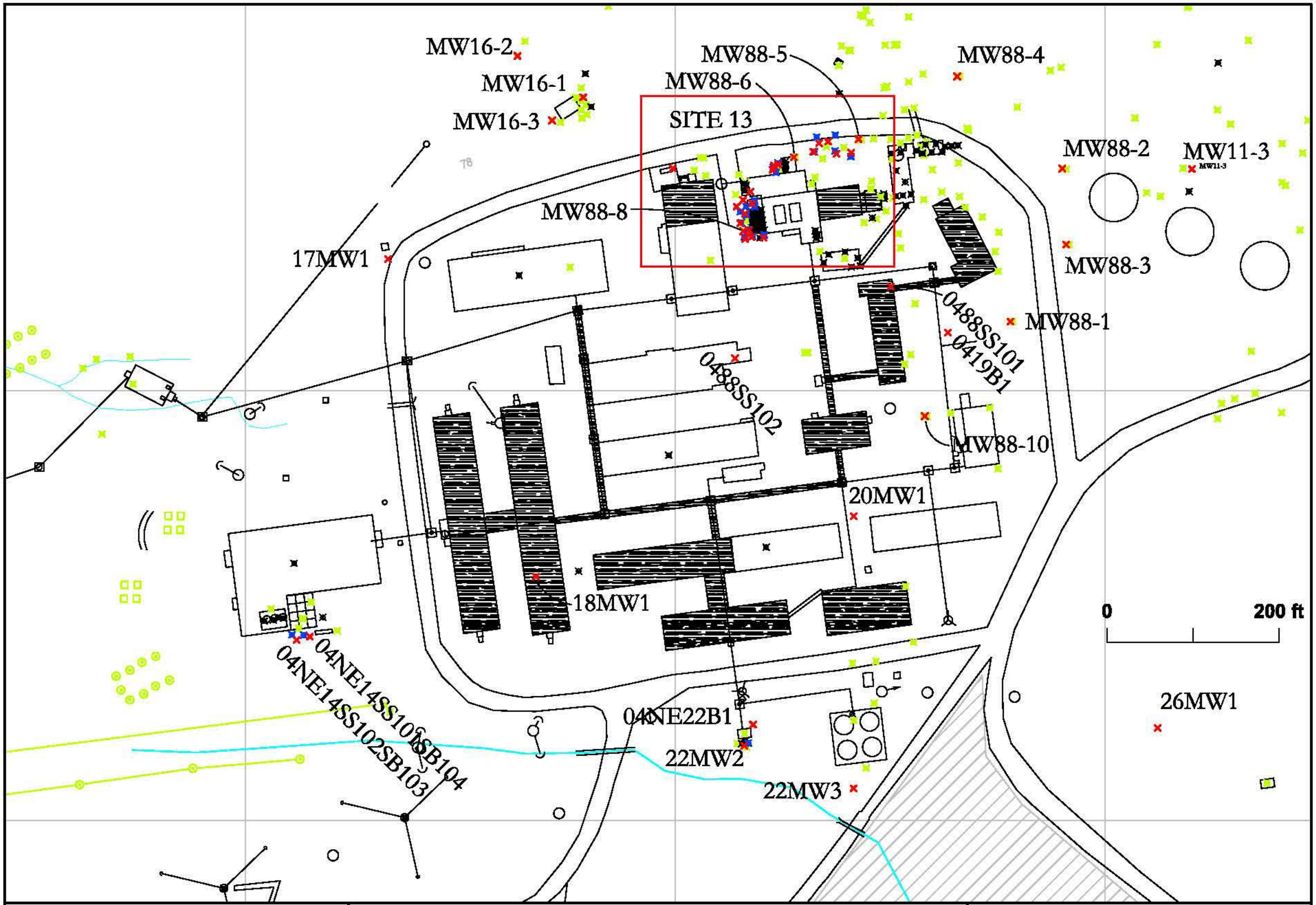
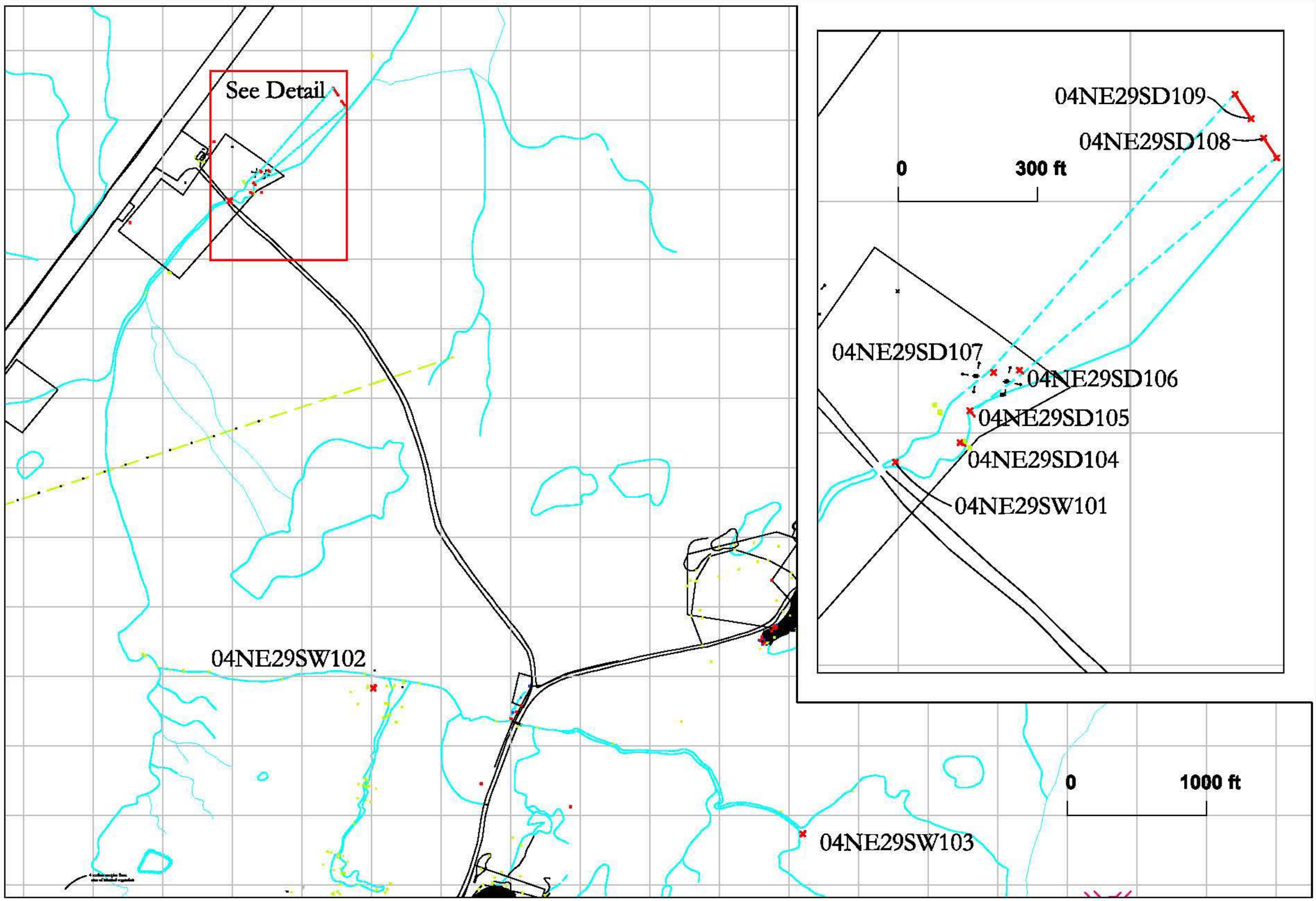
Phase IV Remedial Investigation, NE Cape, St. Lawrence Island
August - September 2004

Site 13 - Electric Power Building (Main Complex)



SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	**Phase IV Remedial Investigation, NE Cape, St. Lawrence Island** **August - September 2004**	**Sites 14, 16, 22, and 26** **Main Complex Area**



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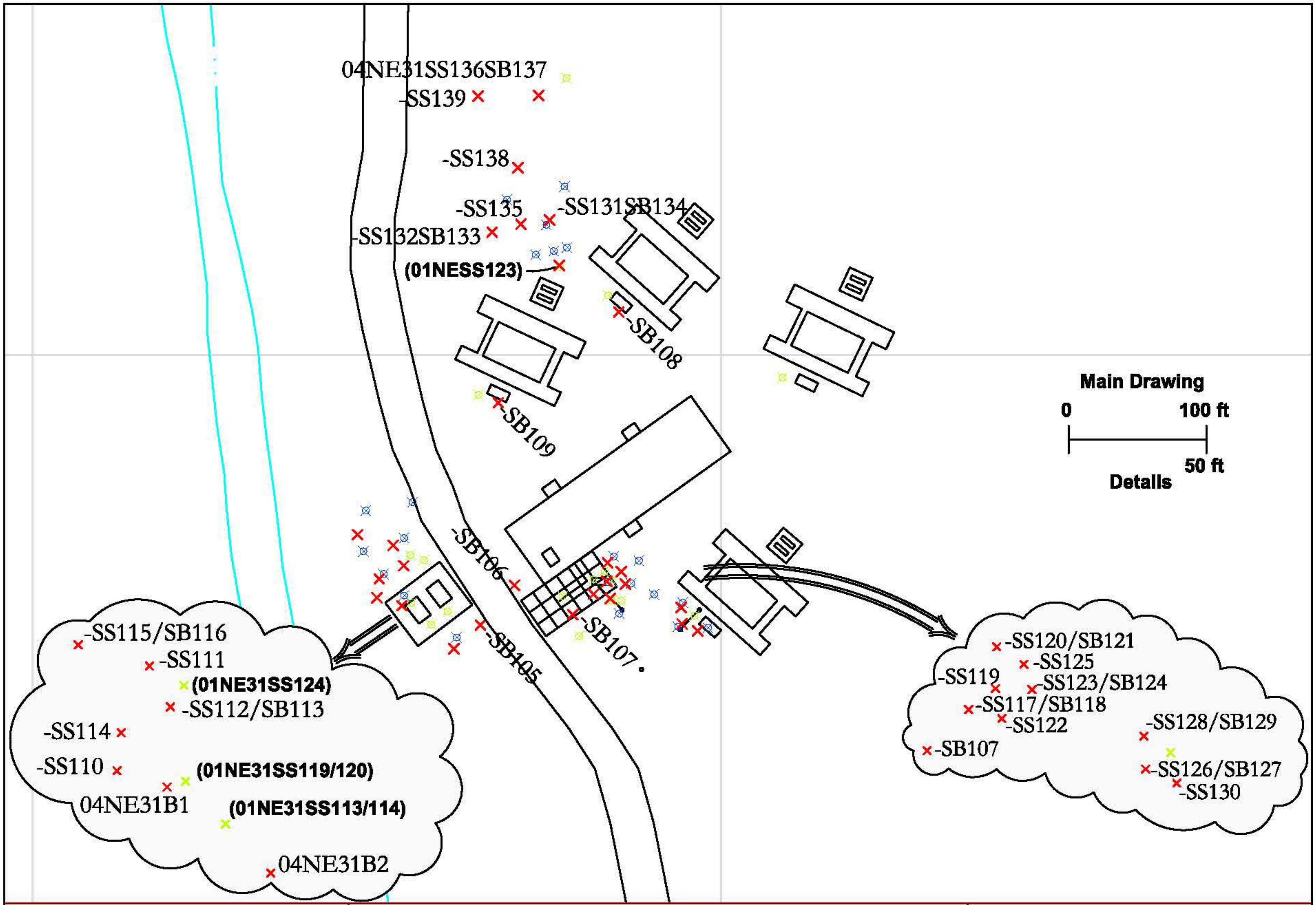
Phase IV Remedial Investigation, NE Cape, St. Lawrence Island
August - September 2004

Site 29 - Suqitughneq River & Estuary



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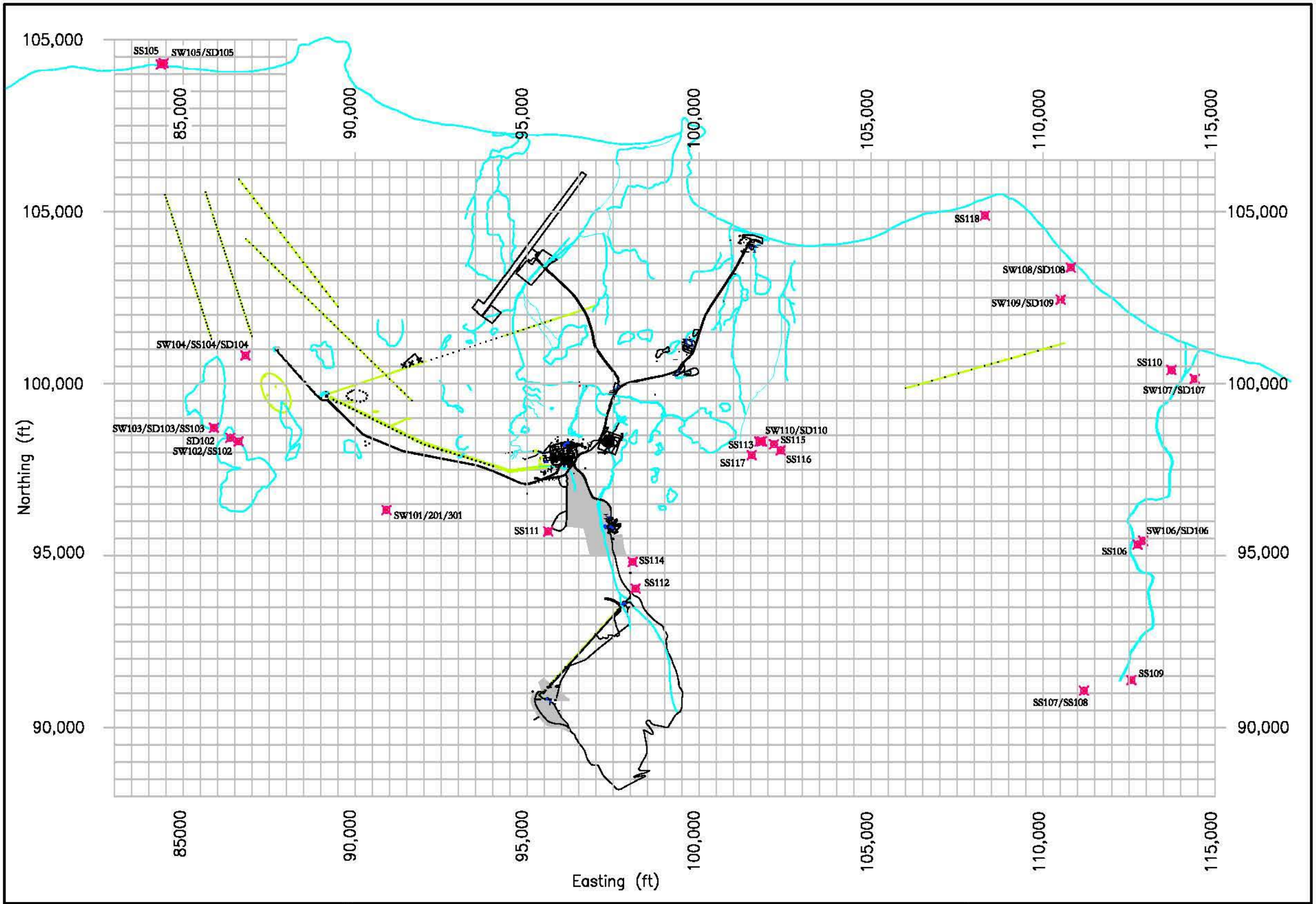
Phase IV Remedial Investigation, NE Cape, St. Lawrence Island
August - September 2004

Site 31 - White Alice Site



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Phase IV Remedial Investigation, NE Cape, St. Lawrence Island
August - September 2004

Background Sample Locations

Coordinate and Elevation Data
Phase IV Remedial Investigation
NE Cape, St. Lawrence Island, Alaska
August - September 2004

	Point No.	Northing	Easting	Elevation	Description	Source
CONTROL See Also Points 1208, 1209, 3201	1	100000.00	100000.00	75.97	BM-B	T03
	51	103975.62	101521.32	23.38	BEACH	2004
	52	101206.36	99733.09	51.16	DRUM	2004
	53	100283.05	99302.36	68.72	FILL	2004
	54	95878.60	97366.74	210.93	ALICE	2004
	55	103806.09	95498.62	19.33	ESTUARY	2004
	56	103549.54	95161.31	25.84	AIRPORT	2004
CONVENTIONAL SURVEY	401	103996.94	101497.29	16.7	04NE03B1	2004
	402	103948.40	101499.64	16.5	04NE03B2	2004
	403	104002.66	101484.45	15.9	04NE03B3	2004
	404	104038.97	101547.55	15.71	01NE03WP102	2004
	405	103982.50	101600.95	16.06	01NE03WP103	2004
	406	104030.70	101682.24	9.0	04NE03SD107	2004
	407	103842.22	101552.63	18.6	04NE03SD108	2004
	408	104104.69	101629.21	8.69	04NE03WP06	2004
	409	103847.91	101458.12	21.16	04NE03WP05	2004
	410	100691.65	99373.39	68.5	BSCHK-LOUNSBURY	2004
	411	101277.88	99703.46	47.1	04NE06B1	2004
	412	101128.32	99758.11	46.6	04NE06B2	2004
	413	101104.87	99712.14	46.1	04NE06B3	2004
	414	101126.38	99645.29	47.3	04NE06B4	2004
	415	101205.27	99607.24	46.0	04NE06B5	2004
	416	101263.20	99637.98	47.2	04NE06B6	2004
	417	101192.57	99614.98	48.33	01NE06WP103	2004
	418	101133.22	99596.11	49.87	01NE06WP7	2004
	419	101304.04	99632.32	48.35	01NE06WP5	2004
	420	101221.78	99588.78	50.57	01NE06WP6	2004
	421	100349.07	99385.54	67.3	04NE07SS101SB102	2004
	422	100328.53	99371.67	68.7	04NE07SS103SB104	2004
	423	100321.77	99353.30	68.9	04NE07SS105-nix	2004
	424	100345.83	99367.78	68.8	04NE07SS106-nix	2004
	425	100334.14	99346.01	69.5	04NE07SS107-nix	2004
	426	100246.07	99321.29	53.8	04NE07SS108	2004
	427	100235.49	99312.81	53.6	04NE07SS109	2004

	Point No.	Northing	Easting	Elevation	Description	Source
CONVENTIONAL SURVEY	428	100254.59	99295.08	60.1	04NE07SS110	2004
	429	100263.64	99301.80	62.6	04NE07SS112	2004
	430	100259.08	99309.27	60.0	04NE07SS111	2004
	431	100250.43	99307.92	56.8	01NE07SS125lath	2004
	432	99063.57	97928.08	70.0	BSCHK-BMH	2004
	433	98276.85	96204.79	69.1	04NE13SS115	2004
	434	98289.97	96177.93	68.9	04NE13SS116	2004
	435	98275.94	96187.66	69.5	04NE13SS117	2004
	436	98288.07	96167.51	68.9	04NE13SS118	2004
	437	98278.20	96160.85	69.3	04NE13SS119	2004
	438	98238.18	96093.50	72.3	04NE13SS120nix	2004
	439	98243.14	96087.10	72.4	04NE13SS121nix	2004
	440	98250.14	96090.17	72.0	04NE13SS122nix	2004
	441	98244.18	96093.88	72.2	04NE13SS123nix	2004
	442	98231.64	96087.58	72.6	04NE13SS105	2004
	443	98217.97	96089.82	72.9	04NE13SS106	2004
	444	98177.91	96102.90	73.1	04NE13SS107SB124	2004
	445	98221.79	96079.08	72.8	04NE13SS108	2004
	446	98206.26	96081.26	73.3	04NE13SS109	2004
	447	98186.92	96085.79	73.3	04NE13SS110SB125	2004
	448	98179.16	96088.75	73.1	04NE13SS111	2004
	449	98214.32	96071.58	73.1	04NE13SS112	2004
	450	98195.15	96076.01	73.5	04NE13SS113	2004
	451	98176.65	96081.17	73.8	04NE13SS114	2004
	452	98185.69	96079.46	73.39	MW88-8	2004
	453	98292.92	96213.46	67.83	MW88-5	2004
	454	98271.82	96138.17	68.83	MW88-6	2004
	455	98067.55	96317.35	82.5	04NE19B1	2004
	456	97970.52	96290.57	86.53	MW88-10	2004
	457	97854.27	96207.70	89.06	20MW1	2004
	458	97537.62	96207.60	99.31	22MW3	2004
	459	99063.59	97928.07	70.0	BSCHK-BMH	2004
	460	97587.19	96080.63	93.77	22MW2	2004
	461	97611.78	96090.69	94.2	04NE22B1	2004
	462	97783.55	95838.32	83.09	18MW1	2004
	463	99063.61	97928.15	70.1	BSCHK-BMH	2004
	464	98372.52	96436.66	67.3	BSCHK-GPS3201	2004
	465	96097.80	97375.50	195.4	04NE31SS131SB134	2004
	466	96089.09	97333.68	195.6	04NE31SS132SB133	2004
	467	96094.93	97354.60	195.9	04NE31SS135	2004

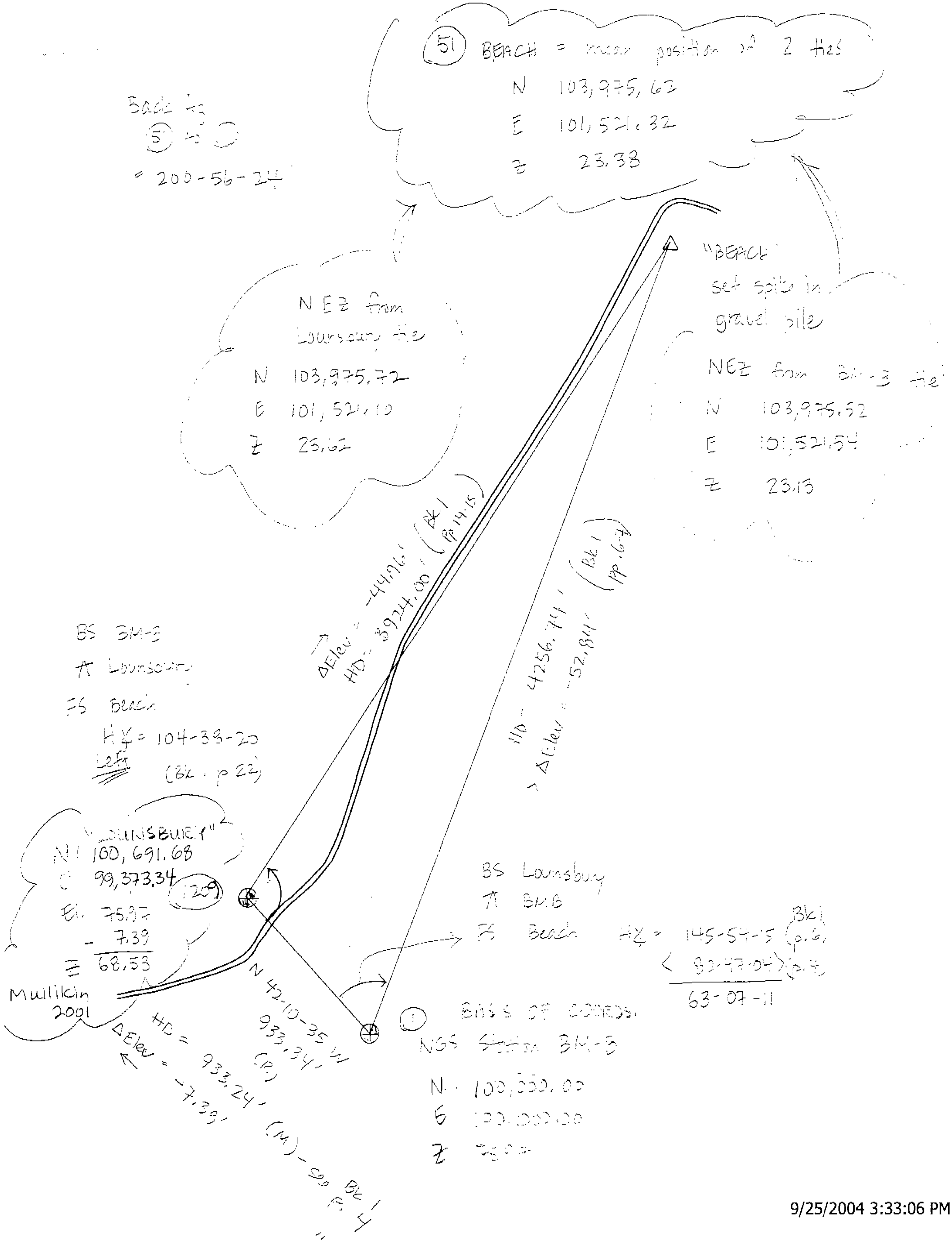
	Point No.	Northing	Easting	Elevation	Description	Source
	468	96135.91	97352.45	192.7	04NE31SS138	2004
	469	96187.97	97323.28	186.8	04NE31SS139	2004
	470	96031.06	97425.60	198.0	04NE31SB108	2004
	471	95965.20	97338.27	202.2	04NE31SB109	2004
	472	95832.58	97349.79	210.7	04NE31SB106	2004
	473	95811.14	97392.31	209.9	04NE31SB107	2004
	474	95803.59	97325.18	214.3	04NE31SB105	2004
	475	95786.42	97305.91	214.9	04NE31B2	2004
	476	95817.62	97268.27	212.0	04NE31B1	2004
	477	95823.56	97250.04	208.6	04NE31SS110	2004
	478	95861.56	97261.83	206.4	04NE31SS111	2004
	479	95846.73	97269.44	209.2	04NE31SS112SB113	2004
	480	95837.28	97251.62	207.9	04NE31SS114	2004
	481	95869.28	97236.01	203.4	04NE31SS115SB116	2004
	482	95826.18	97407.40	210.0	04NE31SS117SB118	2004
	483	95835.34	97417.02	210.0	04NE31SS119	2004
CONVENTIONAL SURVEY	484	95848.90	97417.60	210.2	04NE31SS120SB121	2004
	485	95822.89	97419.43	210.1	04NE31SS122	2004
	486	95833.44	97430.42	209.9	04NE31SS123SB124	2004
	487	95842.55	97427.45	209.7	04NE31SS125	2004
	488	95804.49	97471.66	213.5	04NE31SS126SB127	2004
	489	95816.44	97471.07	213.2	04NE31SS128SB129	2004
	490	95799.37	97482.96	213.4	04NE31SS130	2004
	491	97713.97	95575.16	77.5	04NE14SS101SB104	2004
	492	97710.46	95559.86	78.2	04NE14SS102SB103	2004
	493	98153.42	95666.35	71.20	17MW1	2004
	494	98258.81	95997.53	73.5	04NE13B1	2004
	495	98080.75	96390.05	81.91	MW88-1	2004
	496	98170.29	96455.04	77.32	MW88-3	2004
	497	98258.68	96450.28	70.88	MW88-2	2004
	498	98365.80	96328.02	68.24	MW88-4	2004
	499	98341.55	95893.12	75.11	MW16-1	2004
	500	98314.60	95857.04	75.28	MW16-3	2004
	501	98389.69	95816.65	74.87	MW16-2	2004
	502	98257.96	96601.12	72.33	MW11-3	2004
	503	98219.41	96793.59	71.42	MW10-1	2004
	504	98175.48	96814.28	77.8	04NE10B2	2004
	505	98302.86	96865.98	73.2	04NE10B1	2004
	506	97607.85	96561.46	107.37	26MW1	2004
	507	99932.97	96525.62	35.3	04NE29SW102lath	2004

	Point No.	Northing	Easting	Elevation	Description	Source
CONVENTIONAL SURVEY	508	96188.37	97367.40	188.3	04NE31SS136SB137	2004
	509	95691.39	97419.47	223.5	FND-SPIKE	2004
	510	96064.85	97382.50	197.4	staked_01ne31ss1	2004
	511	98258.17	96120.48	0	staked 98NEC13SS802	2004
	512	99227.83	97286.91	56.49	26MW-3	2004
	513	99697.07	97501.23	37.7	04NE08SW101	2004
	514	99790.54	97572.05	40.2	04NE08SD103	2004
	515	99747.17	97539.04	38.2	04NE08SD102	2004
	516	98885.69	99612.01	52.5	04NE29SW103lath	2004
	518	100355.28	99394.93	66.7	staked 01NE07SS127	2004
	519	103806.04	95498.56	19.3	BSCHK-ESTUARY	2004
	520	103748.37	95332.30	19.2	04NE01SS102	2004
	521	103437.84	95493.96	3.7	04NE29SW101lath	2004
	522	103472.84	95642.59	3.5	04NE29SD104lath	2004
	523	103481.02	95708.19	6.4	04NE01SS103	2004
	524	103536.04	95662.31	2.7	04NE01SS105lath	2004
	525	103628.66	95767.14	2.5	04NE29SD106lath	2004
	526	103635.87	95699.14	2.7	04NE29SD107lath	2004
	527	104230.85	96223.39	2.7	04NE29SD109lath	2004
	528	104094.00	96313.42	2.6	04NE29SD108lath	2004
	529	103806.03	95498.56	19.3	BSCHK-ESTUARY	2004
	530	103263.04	94761.67	25.8	04NE01SS104	2004
	531	103846.63	95366.09	17.3	04NE01SS101	2004
BY SWING TIES, OFFSETS	532	100365.11	99393.03	67.0	04NE07SS113	2004
	533	100356.87	99410.34	67.0	04NE07SS114	2004
	534	100345.19	99403.12	67.0	04NE07SS115	2004
	535	98263.21	96119.75	0	04NE13SS132/232/332	2004
	536	98260.08	96113.75	0	04NE13SS133	2004
	537	98252.68	96116.13	0	04NE13SS134	2004
	538	98121.38	96250.86	0	04NE88SS101	2004
	539	98038.01	96069.65	0	04NE88SS102	2004
	540	103479.80	95630.44	0	04NE29SD104	2004
	541	103548.25	95651.98	0	04N329SD105	2004
	542	103635.93	95758.89	0	04NE29SD106	2004
	543	103630.71	95703.09	0	04NE29SD107	2004
	544	104178.22	96258.02	0	04NE29SD109	2004
	545	104137.02	96285.12	0	04NE29SD108	2004
	546	103438.77	95493.59	0	04NE29SW101	2004
	547	99931.97	96525.56	0	04NE29SW102	2004
	548	98887.66	99612.36	0	04NE29SW103	2004

	Point No.	Northing	Easting	Elevation	Description	Source
DIFFERENTIAL GPS	601	98323.86	86614.37	20	04NEBGSW102/SS102	2004
	602	98426.25	86369.73	22	04NEBGSD102	2004
	603	98714.49	85897.28	21	04NEBGSW103/SD103/SS103	2004
	604	100817.88	86813.59	20	04NEBGSW104/SS104/SD104	2004
	605	96328.86	90914.14	82	04NEBGSW101/201/301	2004
	606	109316.13	84438.38	9	04NEBGSW105/SD105	2004
	607	109278.93	84350.06	9	04NEBGSS105	2004
	608	95431.09	112914.38	23	04NEBGSW106/SD106	2004
	609	95324.50	112745.71	29	04NEBGSS106	2004
	610	91074.30	111187.54	110	04NEBGSS107/SS108	2004
	611	91384.74	112567.04	56	04NEBGSS109	2004
	612	100142.88	114411.16	-6	04NEBGSW107/SD107	2004
	613	100393.08	113737.71	-6	04NEBGSS110	2004
	614	103376.88	110807.51	-3	04NEBGSW108/SD108	2004
	615	102443.85	110515.44	2	04NEBGSW109/SD109	2004
	616	99932.70	96523.05	31	04NE29SW102-GPS	2004
	617	95707.79	95613.63	277	04NEBGSS111	2004
	618	94044.28	98154.57	399	04NEBGSS112	2004
	619	98324.63	101822.54	48	04NEBGSW110/SD110	2004
	620	98316.51	101752.63	51	04NEBGSS113	2004
	621	94818.33	98065.30	318	04NEBGSS114	2004
	622	98239.27	102176.58	55	04NEBGSS115	2004
	623	98064.63	102376.08	64	04NEBGSS116	2004
	624	97923.86	101528.45	72	04NEBGSS117	2004
	625	104888.62	108308.63	-1	04NEBGSS118	2004
	626	103549.83	95160.89	17	AIRSTRIP-GPS	2004
CONTROL	1208	99063.60	97928.16	**69.96**	BM-H	M01
	1209	100691.68	99373.34	**68.58**	LOUNSBURY	M01
	3201	98372.51	96436.64	67.29	GPS 3201	M02
	M01 = Mullikin 2001					
	M02 = Mullikin 2002					
	T03 Terra Surveys 2003					
	2004 = This Survey					

Differentially-corrected GPS Data
Phase IV Remedial Investigation
NE Cape, St. Lawrence Island, Alaska
September 2004

	Datum:	WGS84		
	Lat - DD	Lon - DD	HAE - ft	MSL - ft
04nebgsw102/ss102	63.31170904	-169.02224161	44	20
04nebgsd102	63.31198816	-169.02372983	47	22
04nebgsw103/sd103/ss103	63.31277464	-169.02660468	46	21
04nebgsw104/ss104/sd104	63.31852951	-169.02104951	45	20
04nebgsw101/201/301	63.30626650	-168.99608843	107	82
04nebgsw105/sd105	63.34175743	-169.03557352	34	9
04nebgss105	63.34165652	-169.03610841	34	9
04nebgsw106/sd106	63.30380146	-168.86235906	48	23
04nebgss106	63.30351055	-168.86338509	54	29
04nebgss107/ss108	63.29189332	-168.87288310	135	110
04nebgss109	63.29273803	-168.86449930	82	56
04nebgsw107/sd107	63.31668039	-168.85322242	19	-6
04nebgss110	63.31736699	-168.85731574	19	-6
04nebgsw108/sd108	63.32553526	-168.87511644	22	-3
04nebgsw109/sd109	63.32298473	-168.87689863	27	2
04ne29sw102	63.31613037	-168.96200031	56	31
04nebgss111	63.30457657	-168.96751937	302	277
04nebgss112	63.30002991	-168.95207238	424	399
04nebgsw110/sd110	63.31173449	-168.92977608	73	48
04nebgss113	63.31171234	-168.93020113	76	51
04nebgss114	63.30214647	-168.95261589	343	318
04nebgss115	63.31150091	-168.92762359	80	55
04nebgss116	63.31102325	-168.92641088	89	64
04nebgss117	63.31063874	-168.93156445	97	72
04nebgss118	63.32967513	-168.89030974	24	-1



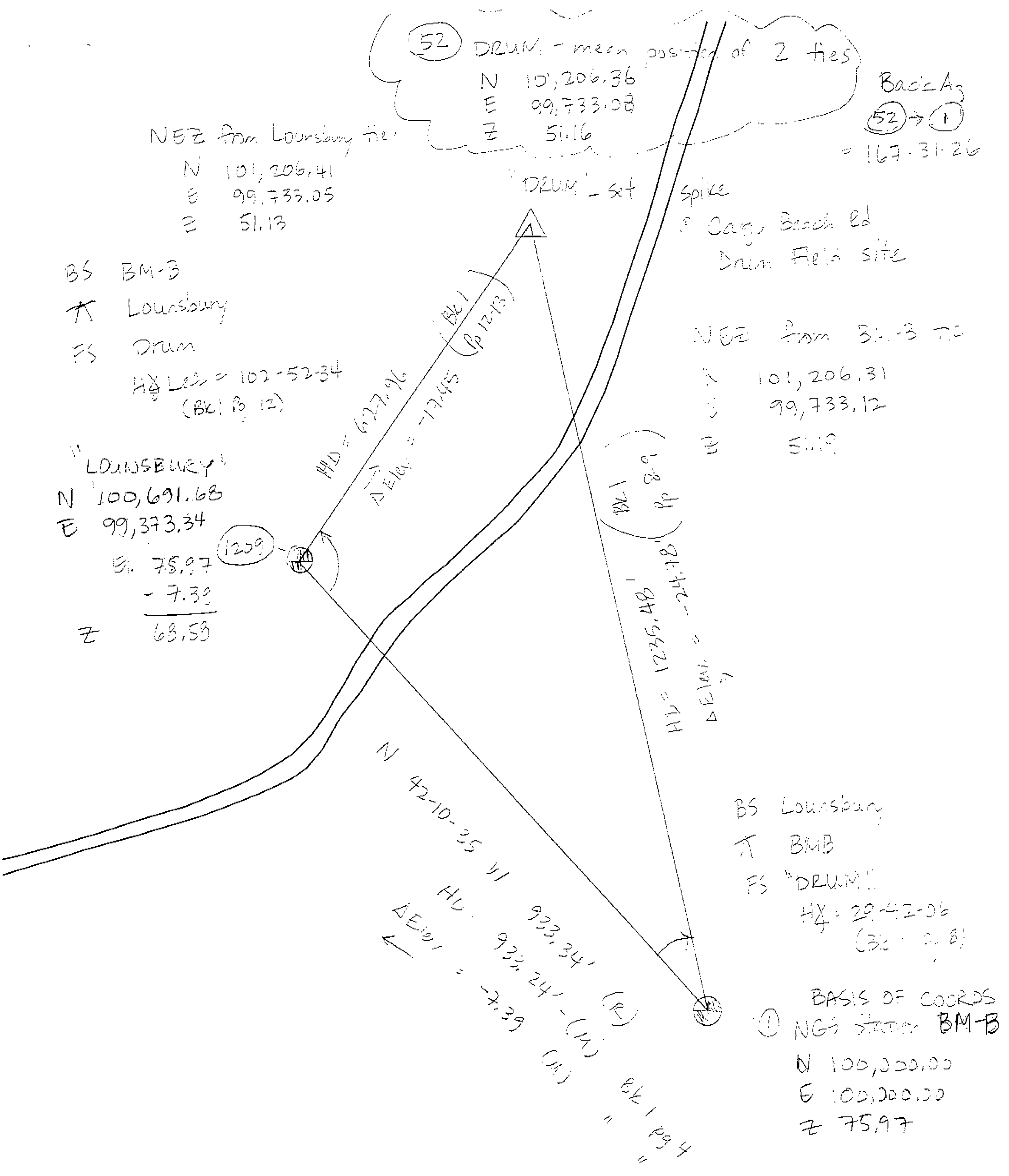
9/25/2004 3:33:06 PM

Site 3 Sideshots
from Station BEACH
Site 3 Beach.rw5 09/25/04 16:04:50

```
JOB:Name: NEC1             Date: 09-04-2004     Time: 12:18:20
M Setup:North Azimuth      Units: US Feet       Scale: 1.000000      Curvature: Off      Angle: Degrees
Occupy:Occ: 51             North: 103,975.6200  East: 101,521.3200   Elev: 23.38         BEACH
Backst:Occ: 51             BS pt: 1             BS azm: 200°56'24"   BS crl: 0°00'00"
HI/HR :H Inst: 4.93        H Rod: 0.45

Sd Shot:51-401             Ang R: 110°38'32"    Zen: 109°08'31"      S Dst: 34.005       04NE03B1
HI/HR :H Inst: 4.93        H Rod: 4.60
Sd Shot:51-402             Ang R: 17°36'18"     Zen: 101°45'19"      S Dst: 35.545       04NE03B2
HI/HR :H Inst: 4.93        H Rod: 0.45
Sd Shot:51-403             Ang R: 105°18'58"    Zen: 104°39'30"      S Dst: 47.265       04NE03B3

HI/HR :H Inst: 4.93        H Rod: 2.48
Sd Shot:51-404             Ang R: 181°33'05"    Zen: 98°23'39"       S Dst: 69.310       01NE03WP102
HI/HR :H Inst: 4.93        H Rod: 1.53
Sd Shot:51-405             Ang R: 244°07'09"    Zen: 97°38'14"       S Dst: 80.645       01NE03WP103
HI/HR :H Inst: 4.93        H Rod: 4.30

Sd Shot:51-406             Ang R: 230°09'57"    Zen: 95°02'57"       S Dst: 170.750      04NE03SD107
HI/HR :H Inst: 4.93        H Rod: 4.27
Sd Shot:51-407             Ang R: 325°51'02"    Zen: 92°16'52"       S Dst: 137.135      04NE03SD108
HI/HR :H Inst: 4.93        H Rod: 4.65
Sd Shot:51-408             Ang R: 198°57'10"    Zen: 95°05'07"       S Dst: 168.885      04NE03WP06

HI/HR :H Inst: 4.93        H Rod: 3.05
Sd Shot:51-409             Ang R: 5°23'22"      Zen: 91°38'54"       S Dst: 142.555      04NE03WP05
```

site 3 beach.cr5 09/25/04 16:03:50

Point	Northing	Easting	Elevation	Description
401	103,996.9411	101,497.2905	16.71	04NE03B1
402	103,948.4026	101,499.6354	16.47	04NE03B2
403	104,002.6625	101,484.4469	15.90	04NE03B3
404	104,038.9720	101,547.5501	15.71	01NE03WP102
405	103,982.5041	101,600.9526	16.06	01NE03WP103
406	104,030.6979	101,682.2428	8.98	04NE03SD107
407	103,842.2192	101,552.6321	18.58	04NE03SD108
408	104,104.6863	101,629.2085	8.69	04NE03WP06
409	103,847.9067	101,458.1185	21.16	04NE03WP05



(52) DRUM - mean position of 2 ties
N 101,206.36
E 99,733.08
Z 51.16

Back Az
(52) → (1)
= 167-31-26

NEZ from Lounsbury tie
N 101,206.41
E 99,733.05
Z 51.13

BS BM-B
⊼ Lounsbury
FS Drum
H∡ Left = 102-52-34
(Bk 1 Pg 12)

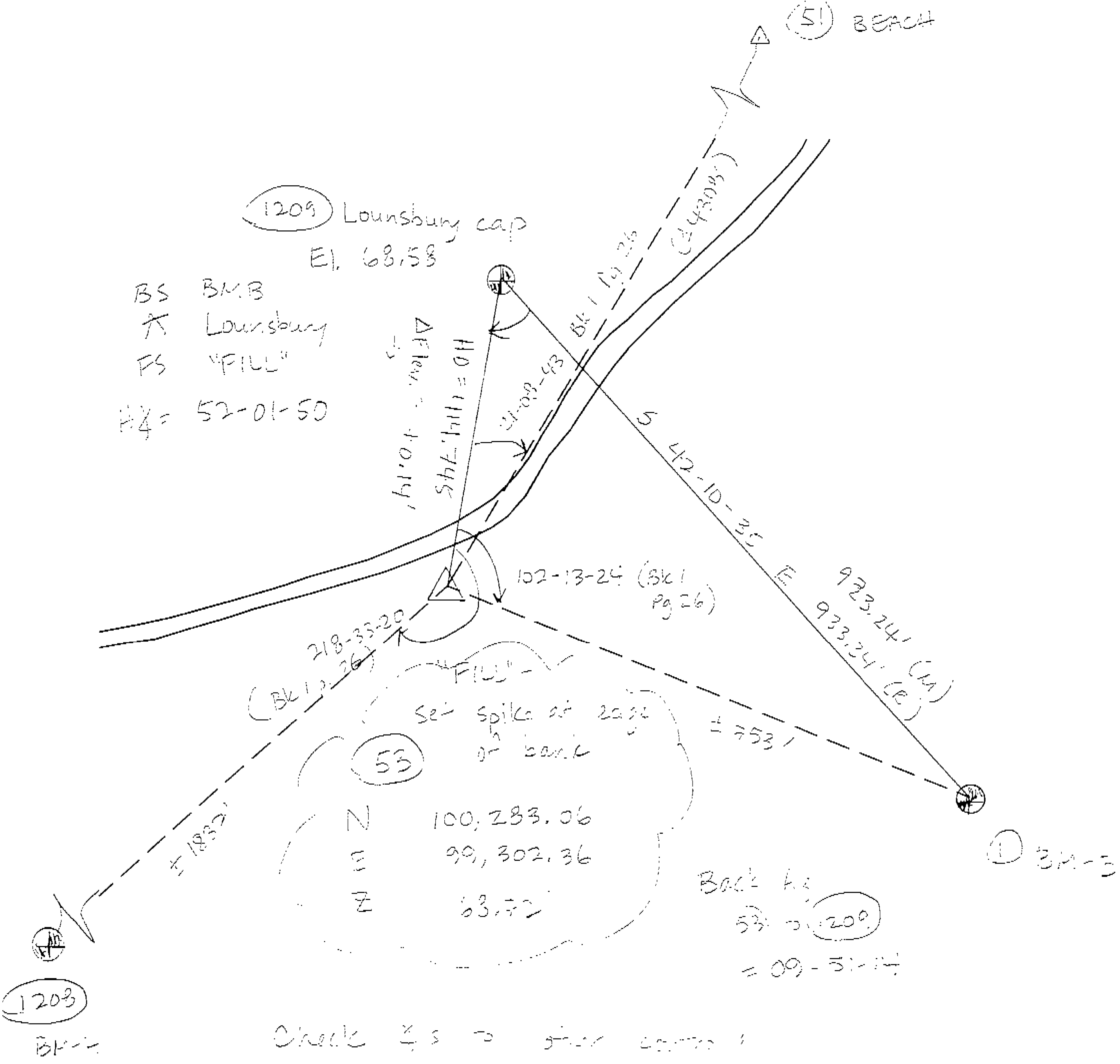
"LOUNSBURY"
N 100,691.68
E 99,373.34
El. 75.97
− 7.39
Z 68.58

NEZ from BM-B tie
N 101,206.31
E 99,733.12
Z 51.19

BS Lounsbury
⊼ BMB
FS "DRUM"
H∡ = 29-42-06
(Bk 1 Pg 8)

BASIS OF COORDS
(1) NGS Station BM-B
N 100,000.00
E 100,000.00
Z 75.97

9/25/2004 4:12:07 PM



Check ∠s to other corners!

BS Lounsbury

⊼ Fill

FS	Desc.	∠ shot	vs.	ideal ∠-staked out	Δ
(51)	BEACH	21-08-43		21-08-56	00-00-13 = .27'
①	BM-B	102-13-24		102-13-48	00-00-24 = .11'
(1203)	BM-4	218-33-20		218-33-39	00-00-19 = .16'

9/25/2004 4:34:00 PM

Sites 6&7 Sideshots
from Stations DRUM and FILL
Sites 6 and 7 Drums and Landfill.rw5 09/25/04 17:14:55

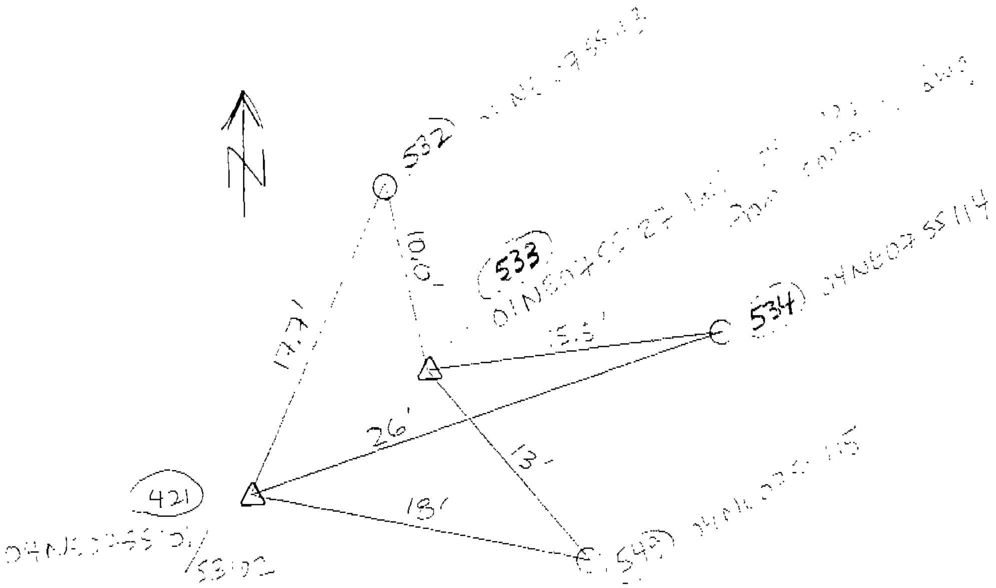
```
JOB:Name: NEC1            Date: 09-04-2004      Time: 12:18:20
M Setup:North Azimuth     Units: US Feet        Scale: 1.000000       Curvature: Off     Angle: Degrees
Occupy:Occ: 52            North: 101,206.3600   East: 99,733.0800     Elev: 51.16        DRUM
Backst:Occ: 52            BS pt: 1              BS azm: 167°31'26"    BS crl: 0°00'00"
HI/HR :H Inst: 5.00       H Rod: 4.48

Sd Shot:52-410            Ang R: 47°25'21"      Zen: 88°27'43"        S Dst: 628.160     LOUNSBURY
HI/HR :H Inst: 5.00       H Rod: 0.45
Sd Shot:52-411            Ang R: 169°58'45"     Zen: 96°20'25"        S Dst: 77.890      04NE06B1
Sd Shot:52-412            Ang R: 354°41'23"     Zen: 96°22'27"        S Dst: 82.465      04NE06B2
Sd Shot:52-413            Ang R: 24°08'09"      Zen: 95°16'51"        S Dst: 104.075     04NE06B3

Sd Shot:52-414            Ang R: 60°08'25"      Zen: 94°01'48"        S Dst: 119.050     04NE06B4
Sd Shot:52-415            Ang R: 101°58'42"     Zen: 94°24'06"        S Dst: 126.215     04NE06B5
Sd Shot:52-416            Ang R: 133°20'37"     Zen: 94°22'29"        S Dst: 111.115     04NE06B6
HI/HR :H Inst: 5.00       H Rod: 2.61
Sd Shot:52-417            Ang R: 95°48'58"      Zen: 92°30'46"        S Dst: 119.020     01NE06WP103

HI/HR :H Inst: 5.00       H Rod: 1.59
Sd Shot:52-418            Ang R: 74°22'32"      Zen: 91°44'00"        S Dst: 155.345     01NE06WP7
HI/HR :H Inst: 5.00       H Rod: 3.17
Sd Shot:52-419            Ang R: 146°35'13"     Zen: 91°53'33"        S Dst: 140.410     01NE06WP5
HI/HR :H Inst: 5.00       H Rod: 0.34

Sd Shot:52-420            Ang R: 108°34'25"     Zen: 92°04'20"        S Dst: 145.220     01NE06WP6
Occupy:Occ: 1,209         North: 100,691.6800   East: 99,373.3400     Elev: 68.58        LOUNSBURY
Backst:Occ: 1,209         BS pt: 1              BS azm: 137°49'25"    BS crl: 0°00'00"
HI/HR :H Inst: 4.60       H Rod: 4.63
Trav:1,209-53             Ang R: 52°01'50"      V Dst: 0.170          H Dst: 414.745     FILL

Occupy:Occ: 53            North: 100,283.0560   East: 99,302.3589     Elev: 68.72        FILL
Backst:Occ: 53            BS pt: 1,209          BS azm: 9°51'15"      BS crl: 0°00'00"
HI/HR :H Inst: 4.89       H Rod: 5.30
Sd Shot:53-421            Ang R: 41°42'24"      Zen: 90°31'24"        S Dst: 106.200     04NE07SS101SB102
Sd Shot:53-422            Ang R: 46°52'37"      Zen: 89°45'11"        S Dst: 82.895      04NE07SS103SB104

Sd Shot:53-423            Ang R: 42°54'32"      Zen: 89°27'49"        S Dst: 63.985      04NE07SS105-nix
Sd Shot:53-424            Ang R: 36°19'37"      Zen: 89°39'52"        S Dst: 90.665      04NE07SS106-nix
Sd Shot:53-425            Ang R: 30°39'39"      Zen: 88°59'32"        S Dst: 67.205      04NE07SS107-nix
Sd Shot:53-426            Ang R: 143°02'40"     Zen: 109°17'58"       S Dst: 44.025      04NE07SS108
Sd Shot:53-427            Ang R: 157°45'34"     Zen: 106°51'20"       S Dst: 50.880      04NE07SS109

Sd Shot:53-428            Ang R: 184°30'00"     Zen: 105°38'56"       S Dst: 30.515      04NE07SS110
Sd Shot:53-429            Ang R: 171°47'24"     Zen: 106°20'11"       S Dst: 20.240      04NE07SS112
Sd Shot:53-430            Ang R: 154°04'12"     Zen: 108°24'56"       S Dst: 26.295      04NE07SS111
Sd Shot:53-431            Ang R: 160°28'29"     Zen: 109°14'13"       S Dst: 35.050      01NE07SS125lath
Occupy:Occ: 1,209         North: 100,691.6800   East: 99,373.3400     Elev: 68.58        LOUNSBURY

Backst:Occ: 1,209         BS pt: 1              BS azm: 137°49'25"    BS crl: 0°00'00"
HI/HR :H Inst: 4.19       H Rod: 5.30
Sd Shot:1,209-518         Ang R: 38°30'18"      Zen: 90°07'30"        S Dst: 337.090     STAKED 01NE07SS127
```

~~Site 3 Sideshots~~
~~from Station BEACH~~
sites 6 and 7 drums and landfill.cr5 09/25/04 17:13:35

Point	Northing	Easting	Elevation	Description
53	100,283.0539	99,302.3601	68.72	FILL
410	100,691.6501	99,373.3935	68.54	LOUNSBURY-BSCHK
411	101,277.8824	99,703.4589	47.11	04NE06B1
412	101,128.3221	99,758.1148	46.55	04NE06B2
413	101,104.8652	99,712.1358	46.13	04NE06B3
414	101,126.3811	99,645.2946	47.34	04NE06B4
415	101,205.2667	99,607.2420	46.02	04NE06B5
416	101,263.2020	99,637.9816	47.23	04NE06B6
417	101,192.5696	99,614.9768	48.33	01NE06WP103
418	101,133.2228	99,596.1094	49.87	01NE06WP7
419	101,304.0389	99,632.3214	48.35	01NE06WP5
420	101,221.7753	99,588.7760	50.57	01NE06WP6
421	100,349.0739	99,385.5398	67.34	04NE07SS101SB102
422	100,328.5271	99,371.6684	68.67	04NE07SS103SB104
423	100,321.7704	99,353.2989	68.91	04NE07SS105-nix
424	100,345.8276	99,367.7767	68.84	04NE07SS106-nix
425	100,334.1377	99,346.0129	69.49	04NE07SS107-nix
426	100,246.0652	99,321.2894	53.76	04NE07SS108
427	100,235.4932	99,312.8052	53.56	04NE07SS109
428	100,254.5873	99,295.0754	60.08	04NE07SS110
429	100,263.6391	99,301.8028	62.62	04NE07SS112
430	100,259.0811	99,309.2686	60.00	04NE07SS111
431	100,250.4313	99,307.9195	56.76	01NE07SS125lath
518	100,355.2826	99,394.9252	66.73	STAKED 01NE07SS1

Point Listing made Sat Sep 25

Drawing Name: nec-field versio
Project Name: NE Cape
Project Path: D:\Land Projects
Username: Shelley

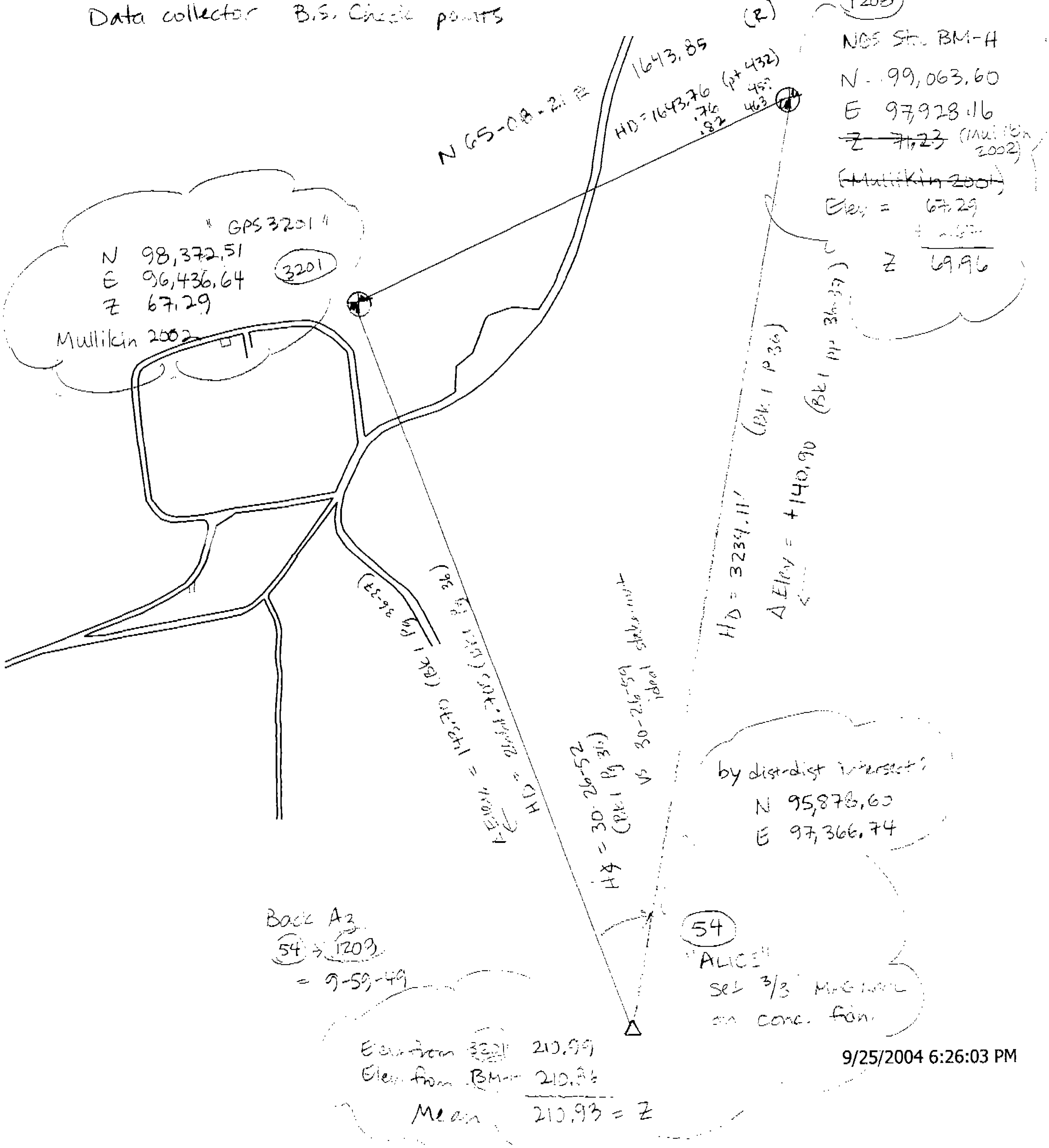


Number	Northing	Easting	Elevation	Full Desc
532 ~~547~~	100365.1088	99393.0347	67.00	04NE07SS113
533 ~~548~~	100356.8688	99410.3438	67.00	04NE07SS114
534 ~~549~~	100345.1868	99403.1151	67.00	04NE07SS115

Created these points in [illegible] by using
swing ties from pt (421) - 04NE07SS101
+ pt (513) - 01NE07SS127

```
                              RADIAL STAKEOUT OPTION
Occ. Pt.          3201      N        98372.5080                      SET 2" AL. CAP
                            E        96436.6413                               67.29
Back Pt.          1208      N        99063.6037                          fip1in2033
                            E        97928.1558                               71.23
 Stake Pt.  Angle Right     Distance        Coordinates            Desc/Elev
=================================================================================
432         359-59-59.61    1643.76'   N         99063.5724                    BMH
                                       E         97928.0808                   69.96
459         359-59-57.61    1643.76'   N         99063.5868                    BMH
                                       E         97928.0741                   69.96
463         00-00-00.98     1643.82'   N         99063.5842                    BMH
                                       E         97928.1323                   69.88
```

Data collector B.S. Check points



9/25/2004 6:26:03 PM

~~Sites 6&7 Sideshots~~
~~from Stations DRUM and FILL~~
Main Complex.rw5 09/25/04 19:30:08

```
JOB:Name: NEC1          Date: 09-04-2004     Time: 12:18:20
M Setup:North Azimuth   Units: US Feet       Scale: 1.000000      Curvature: Off    Angle: Degrees
Occupy:Occ: 3,201       North: 98,372.5080   East: 96,436.6413    Elev: 67.29       GPS3201
Backst:Occ: 3,201       BS pt: 1,208         BS azm: 65°08'21"    BS crl: 0°00'00"
HI/HR :H Inst: 4.42     H Rod: 3.00

Sd Shot:3,201-432       Ang R: 0°00'00"      Zen: 89°57'22"       S Dst: 1,643.765  BMH
HI/HR :H Inst: 4.42     H Rod: 0.45
Sd Shot:3,201-433       Ang R: 182°26'26"    Zen: 90°29'42"       S Dst: 250.815    04NE13SS115
Sd Shot:3,201-434       Ang R: 187°10'01"    Zen: 90°30'24"       S Dst: 271.565    04NE13SS116
Sd Shot:3,201-435       Ang R: 183°39'42"    Zen: 90°22'17"       S Dst: 267.055    04NE13SS117

Sd Shot:3,201-436       Ang R: 187°26'32"    Zen: 90°29'08"       S Dst: 282.080    04NE13SS118
Sd Shot:3,201-437       Ang R: 185°58'55"    Zen: 90°23'30"       S Dst: 291.480    04NE13SS119
HI/HR :H Inst: 4.42     H Rod: 0.20
Sd Shot:3,201-438       Ang R: 183°28'56"    Zen: 89°52'31"       S Dst: 368.495    04NE13SS120nix
HI/HR :H Inst: 4.42     H Rod: 0.45

Sd Shot:3,201-439       Ang R: 184°33'02"    Zen: 89°49'43"       S Dst: 372.715    04NE13SS121nix
HI/HR :H Inst: 4.42     H Rod: 0.20
Sd Shot:3,201-440       Ang R: 185°24'32"    Zen: 89°55'40"       S Dst: 367.450    04NE13SS122nix
HI/HR :H Inst: 4.42     H Rod: 0.45
Sd Shot:3,201-441       Ang R: 184°20'04"    Zen: 89°51'30"       S Dst: 365.995    04NE13SS123nix

HI/HR :H Inst: 4.42     H Rod: 0.20
Sd Shot:3,201-442       Ang R: 182°53'01"    Zen: 89°49'35"       S Dst: 376.415    04NE13SS105
HI/HR :H Inst: 4.42     H Rod: 3.60
Sd Shot:3,201-443       Ang R: 180°50'39"    Zen: 89°16'18"       S Dst: 379.725    04NE13SS106
HI/HR :H Inst: 4.42     H Rod: 1.40

Sd Shot:3,201-444       Ang R: 174°36'52"    Zen: 89°34'58"       S Dst: 386.340    04NE13SS107SB124
HI/HR :H Inst: 4.42     H Rod: 3.50
Sd Shot:3,201-445       Ang R: 182°00'15"    Zen: 89°19'17"       S Dst: 388.060    04NE13SS108
HI/HR :H Inst: 4.42     H Rod: 1.10
Sd Shot:3,201-446       Ang R: 179°47'26"    Zen: 89°36'49"       S Dst: 392.355    04NE13SS109

HI/HR :H Inst: 4.42     H Rod: 3.55
Sd Shot:3,201-447       Ang R: 176°59'00"    Zen: 89°15'37"       S Dst: 396.950    04NE13SS110SB125
HI/HR :H Inst: 4.42     H Rod: 3.60
Sd Shot:3,201-448       Ang R: 175°47'49"    Zen: 89°16'59"       S Dst: 398.040    04NE13SS111
HI/HR :H Inst: 4.42     H Rod: 0.80

Sd Shot:3,201-449       Ang R: 181°25'57"    Zen: 89°41'18"       S Dst: 397.870    04NE13SS112
HI/HR :H Inst: 4.42     H Rod: 0.50
Sd Shot:3,201-450       Ang R: 178°40'22"    Zen: 89°40'35"       S Dst: 401.895    04NE13SS113
HI/HR :H Inst: 4.42     H Rod: 3.60
Sd Shot:3,201-451       Ang R: 176°00'23"    Zen: 89°11'57"       S Dst: 405.900    04NE13SS114

HI/HR :H Inst: 4.42     H Rod: 5.30
Sd Shot:3,201-452       Ang R: 177°14'57"    Zen: 89°00'26"       S Dst: 403.145    MW88-8
Sd Shot:3,201-453       Ang R: 185°12'46"    Zen: 89°34'50"       S Dst: 237.035    MW88-5
Sd Shot:3,201-454       Ang R: 186°13'09"    Zen: 89°33'33"       S Dst: 315.005    MW88-6
Sd Shot:3,201-453       Ang R: 185°14'03"    Zen: 89°39'21"       S Dst: 236.950    MW88-5

Sd Shot:3,201-455       Ang R: 136°13'32"    Zen: 87°11'16"       S Dst: 327.855    04NE19B1
Sd Shot:3,201-456       Ang R: 134°49'49"    Zen: 87°18'23"       S Dst: 428.175    MW88-10
Sd Shot:3,201-457       Ang R: 138°41'42"    Zen: 87°42'36"       S Dst: 567.010    20MW1
HI/HR :H Inst: 4.42     H Rod: 11.30
Sd Shot:3,201-458       Ang R: 130°12'07"    Zen: 87°25'37"       S Dst: 866.610    22MW3

HI/HR :H Inst: 4.42     H Rod: 3.00
Sd Shot:3,201-459       Ang R: 359°59'58"    Zen: 89°57'23"       S Dst: 1,643.765  BMH
HI/HR :H Inst: 4.42     H Rod: 11.30
Sd Shot:3,201-460       Ang R: 139°14'49"    Zen: 87°47'03"       S Dst: 862.890    22MW2
Sd Shot:3,201-461       Ang R: 139°18'55"    Zen: 87°40'59"       S Dst: 836.380    04NE22B1

HI/HR :H Inst: 4.42     H Rod: 9.30
Sd Shot:3,201-462       Ang R: 160°18'46"    Zen: 88°35'20"       S Dst: 839.810    18MW1
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HI/HR :H Inst: 4.52   H Rod: 11.50
Sd Shot:3,201-491     Ang R: 167°27'56"   Zen: 89°05'40"   S Dst: 1,084.495   04NE14SS101SB104
Sd Shot:3,201-492     Ang R: 167°48'18"   Zen: 89°04'06"   S Dst: 1,098.805   04NE14SS102SB103
HI/HR :H Inst: 4.52   H Rod: 8.40
Sd Shot:3,201-493     Ang R: 188°59'02"   Zen: 89°26'35"   S Dst: 800.875     17MW1

HI/HR :H Inst: 4.52   H Rod: 5.40
Sd Shot:3,201-494     Ang R: 190°20'40"   Zen: 89°06'34"   S Dst: 453.650     04NE13B1
Sd Shot:3,201-495     Ang R: 123°55'59"   Zen: 86°59'49"   S Dst: 295.865     MW88-1
Sd Shot:3,201-496     Ang R: 109°39'43"   Zen: 86°55'25"   S Dst: 203.345     MW88-3
Sd Shot:3,201-497     Ang R: 108°01'48"   Zen: 87°46'11"   S Dst: 114.730     MW88-2

Sd Shot:3,201-498     Ang R: 201°19'46"   Zen: 89°02'11"   S Dst: 108.840     MW88-4
Sd Shot:3,201-499     Ang R: 201°36'05"   Zen: 89°05'03"   S Dst: 544.470     MW16-1
Sd Shot:3,201-500     Ang R: 199°09'20"   Zen: 89°07'40"   S Dst: 582.550     MW16-3
Sd Shot:3,201-501     Ang R: 206°26'55"   Zen: 89°13'08"   S Dst: 620.290     MW16-2
Sd Shot:3,201-502     Ang R: 59°42'55"    Zen: 88°18'32"   S Dst: 200.525     MW11-3

Sd Shot:3,201-503     Ang R: 48°04'30"    Zen: 89°15'41"   S Dst: 388.430     MW10-1
Sd Shot:3,201-504     Ang R: 52°24'50"    Zen: 88°27'43"   S Dst: 426.100     04NE10B2
Sd Shot:3,201-505     Ang R: 34°04'29"    Zen: 89°06'38"   S Dst: 435.000     04NE10B1
HI/HR :H Inst: 4.52   H Rod: 8.40
Sd Shot:3,201-506     Ang R: 105°35'23"   Zen: 86°45'09"   S Dst: 776.025     26MW1

HI/HR :H Inst: 4.52   H Rod: 5.40
Sd Shot:3,201-507     Ang R: 298°07'27"   Zen: 91°08'27"   S Dst: 1,563.305   04NE29SW102lath
```
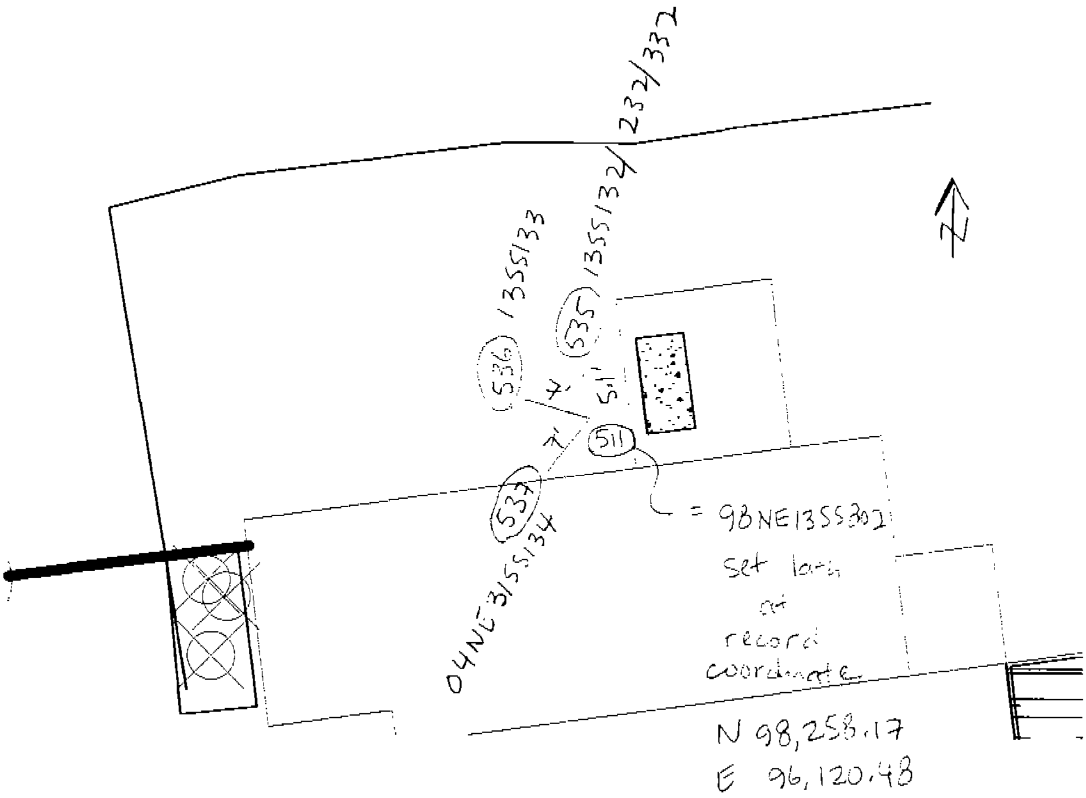

~~Sites 6&7 Sideshots~~
~~from Stations DRUM and FILL~~
main complex.cr5 09/25/04 19:29:41

Point	Northing	Easting	Elevation	Description
432	99,063.5724	97,928.0808	69.96	BMH
433	98,276.8513	96,204.7938	69.09	04NE13SS115
434	98,289.9741	96,177.9331	68.85	04NE13SS116
435	98,275.9400	96,187.6634	69.52	04NE13SS117
436	98,288.0702	96,167.5063	68.86	04NE13SS118
437	98,278.1964	96,160.8480	69.26	04NE13SS119
438	98,238.1811	96,093.5025	72.31	04NE13SS120nix
439	98,243.1378	96,087.1008	72.37	04NE13SS121nix
440	98,250.1413	96,090.1652	71.97	04NE13SS122nix
441	98,244.1764	96,093.8841	72.16	04NE13SS123nix
442	98,231.6399	96,087.5810	72.65	04NE13SS105
443	98,217.9715	96,089.8182	72.93	04NE13SS106
444	98,177.9062	96,102.9037	73.12	04NE13SS107SB124
445	98,221.7855	96,079.0771	72.80	04NE13SS108
446	98,206.2594	96,081.2586	73.25	04NE13SS109
447	98,186.9165	96,085.7869	73.28	04NE13SS110SB125
448	98,179.1614	96,088.7503	73.09	04NE13SS111
449	98,214.3166	96,071.5779	73.07	04NE13SS112
450	98,195.1470	96,076.0064	73.47	04NE13SS113
451	98,176.6454	96,081.1691	73.78	04NE13SS114
452	98,185.6878	96,079.4644	73.39	MW88-8
453	98,292.9203	96,213.4618	67.83	MW88-5
454	98,271.8201	96,138.1715	68.83	MW88-6
455	98,067.5508	96,317.3464	82.49	04NE19B1
456	97,970.5217	96,290.5730	86.53	MW88-10
457	97,854.2675	96,207.7007	89.06	20MW1
458	97,537.6198	96,207.5977	99.31	22MW3
459	99,063.5868	97,928.0741	69.96	BMH
460	97,587.1894	96,080.6345	93.77	22MW2
461	97,611.7815	96,090.6885	94.22	04NE22B1
462	97,783.5539	95,838.3219	83.09	18MW1
491	97,713.9652	95,575.1559	77.45	04NE14SS101SB104
492	97,710.4633	95,559.8574	78.18	04NE14SS102SB103
493	98,153.4212	95,666.3549	71.19	17MW1
494	98,258.8112	95,997.5267	73.46	04NE13B1
495	98,080.7454	96,390.0536	81.91	MW88-1
496	98,170.2914	96,455.0405	77.32	MW88-3
497	98,258.6787	96,450.2768	70.87	MW88-2
498	98,365.8049	96,328.0233	68.24	MW88-4
499	98,341.5548	95,893.1215	75.11	MW16-1
500	98,314.6026	95,857.0442	75.28	MW16-3
501	98,389.6936	95,816.6471	74.87	MW16-2
502	98,257.9592	96,601.1218	72.33	MW11-3
503	98,219.4136	96,793.5935	71.42	MW10-1
504	98,175.4780	96,814.2782	77.85	04NE10B2
505	98,302.8640	96,865.9770	73.16	04NE10B1
506	97,607.8501	96,561.4630	107.37	26MW1
507	99,932.9686	96,525.6150	35.28	04NE29SW102lath

Re-sampled locations - Site 13
positions determined by swing ties



Point Listing made Sat Oct 09 12:06:04 2004 **Page 1 of 1**

Drawing Name: **nec-field version**
Project Name: **NE Cape**
Project Path: **D:\Land Projects 2004\NE Cape**
Username: **Shelley**

Number	Northing	Easting	Elevation	Raw Desc	Full Desc
511	98258.1700	96120.4800	0.00	98NEC13S	98NEC13SS802
535	98263.2138	96119.7470	0.00	04NE13SS	04NE13SS132/232/332
536	98260.0814	96113.7489	0.00	04NE13SS	04NE13SS133
537	98252.6846	96116.1296	0.00	04NE13SS	04NE13SS134

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Point Listing made Sun Sep 26 11:57:33 2004

Drawing Name:  nec-field version
Project Name:  NE Cape
Project Path:  D:\Land Projects 2004\NE Cape\
Username:      Shelley
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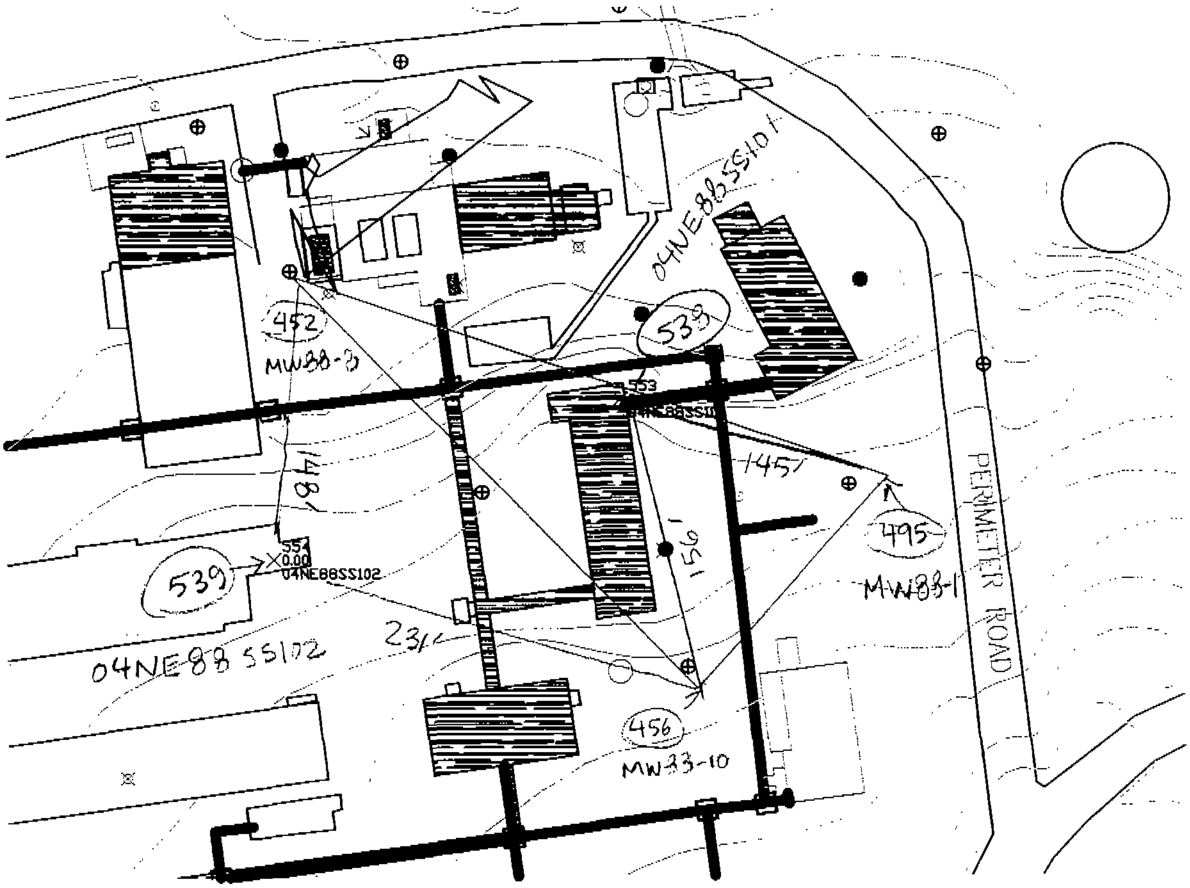
Number	Northing	Easting	Elevation	Full Desc
452	98185.6878	96079.4644	73.39	MW88-8
456	97970.5217	96290.5730	86.53	MW88-10
495	98080.7454	96390.0536	81.91	MW88-1
538	98121.3834	96250.8647	0.00	04NE88SS101
539	98038.0134	96069.6525	0.00	04NE88SS102



Positions of Bulk Soil Samples taken from Main Complex Area 538 & 539 determined by swing ties from 1988 Monitor Wells

9/25/2004 9:15:19 PM

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JOB:Name: NEC1          Date: 09-04-2004      Time: 12:18:20
M Setup:North Azimuth   Units: US Feet        Scale: 1.000000     Curvature: On        Angle: Degrees
Store:Point: 54         North: 95,878.6000    East: 97,366.7400   Elev: 210.93         ALICE
Occupy:Occ: 54          North: 95,878.6000    East: 97,366.7400   Elev: 210.93         ALICE
Backst:Occ: 54          BS pt: 1,208          BS azm: 9°59'49"    BS crl: 0°00'00"

HI/HR :H Inst: 4.95     H Rod: 3.04
Sd Shot:54-463          Ang R: 359°59'59"     Zen: 92°31'52"      S Dst: 3,237.245     BMH
HI/HR :H Inst: 4.95     H Rod: 4.70
Sd Shot:54-464          Ang R: 329°33'02"     Zen: 93°05'54"      S Dst: 2,665.590     GPS3201
HI/HR :H Inst: 4.95     H Rod: 3.50

Sd Shot:54-465          Ang R: 352°17'33"     Zen: 94°25'14"      S Dst: 220.030       04NE31SS131SB134
HI/HR :H Inst: 4.95     H Rod: 3.55
Sd Shot:54-466          Ang R: 341°04'38"     Zen: 94°29'06"      S Dst: 213.725       04NE31SS132SB133
HI/HR :H Inst: 4.95     H Rod: 3.80
Sd Shot:54-467          Ang R: 346°47'27"     Zen: 94°16'14"      S Dst: 217.275       04NE31SS135

HI/HR :H Inst: 4.95     H Rod: 3.45
Sd Shot:54-468          Ang R: 346°49'31"     Zen: 94°22'13"      S Dst: 258.460       04NE31SS138
HI/HR :H Inst: 4.95     H Rod: 3.55
Sd Shot:54-469          Ang R: 342°00'24"     Zen: 94°40'44"      S Dst: 313.455       04NE31SS139
HI/HR :H Inst: 4.95     H Rod: 3.95

Sd Shot:54-470          Ang R: 11°06'46"      Zen: 94°52'06"      S Dst: 164.020       04NE31SB108
HI/HR :H Inst: 4.95     H Rod: 4.00
Sd Shot:54-471          Ang R: 331°48'22"     Zen: 96°03'57"      S Dst: 91.675        04NE31SB109
HI/HR :H Inst: 4.95     H Rod: 4.10
Sd Shot:54-472          Ang R: 190°13'31"     Zen: 91°12'57"      S Dst: 49.055        04NE31SB106

HI/HR :H Inst: 4.95     H Rod: 3.80
Sd Shot:54-473          Ang R: 149°14'49"     Zen: 91°45'23"      S Dst: 72.175        04NE31SB107
HI/HR :H Inst: 4.95     H Rod: 4.10
Sd Shot:54-474          Ang R: 198°59'19"     Zen: 88°19'31"      S Dst: 85.790        04NE31SB105
HI/HR :H Inst: 4.95     H Rod: 3.80

Sd Shot:54-475          Ang R: 203°25'32"     Zen: 88°30'56"      S Dst: 110.480       04NE31B2
HI/HR :H Inst: 4.95     H Rod: 4.00
Sd Shot:54-476          Ang R: 228°14'00"     Zen: 89°57'29"      S Dst: 115.825       04NE31B1
HI/HR :H Inst: 4.95     H Rod: 4.05
Sd Shot:54-477          Ang R: 234°45'09"     Zen: 91°26'09"      S Dst: 129.070       04NE31SS110

HI/HR :H Inst: 4.95     H Rod: 4.20
Sd Shot:54-478          Ang R: 250°46'41"     Zen: 92°51'49"      S Dst: 106.420       04NE31SS111
HI/HR :H Inst: 4.95     H Rod: 4.00
Sd Shot:54-479          Ang R: 241°52'02"     Zen: 91°30'42"      S Dst: 102.420       04NE31SS112SB113
HI/HR :H Inst: 4.95     H Rod: 4.30

Sd Shot:54-480          Ang R: 240°15'32"     Zen: 91°42'36"      S Dst: 122.365       04NE31SS114
HI/HR :H Inst: 4.95     H Rod: 4.00
Sd Shot:54-481          Ang R: 255°55'33"     Zen: 93°42'28"      S Dst: 131.340       04NE31SS115SB116
Sd Shot:54-482          Ang R: 132°12'18"     Zen: 91°35'20"      S Dst: 66.370        04NE31SS117SB118
HI/HR :H Inst: 4.95     H Rod: 4.10

Sd Shot:54-483          Ang R: 120°42'53"     Zen: 91°31'43"      S Dst: 66.355        04NE31SS119
HI/HR :H Inst: 4.95     H Rod: 3.90
Sd Shot:54-484          Ang R: 110°17'05"     Zen: 91°42'59"      S Dst: 58.920        04NE31SS120SB121
HI/HR :H Inst: 4.95     H Rod: 4.10
Sd Shot:54-485          Ang R: 126°35'53"     Zen: 91°16'44"      S Dst: 76.700        04NE31SS122

Sd Shot:54-486          Ang R: 115°20'43"     Zen: 91°22'49"      S Dst: 78.085        04NE31SS123SB124
Sd Shot:54-487          Ang R: 110°42'27"     Zen: 91°40'28"      S Dst: 70.635        04NE31SS125
HI/HR :H Inst: 4.95     H Rod: 4.35
Sd Shot:54-488          Ang R: 115°14'22"     Zen: 89°08'00"      S Dst: 128.465       04NE31SS126SB127
HI/HR :H Inst: 4.95     H Rod: 3.90

Sd Shot:54-489          Ang R: 110°47'23"     Zen: 89°26'13"      S Dst: 121.450       04NE31SS128SB129
HI/HR :H Inst: 4.95     H Rod: 4.70
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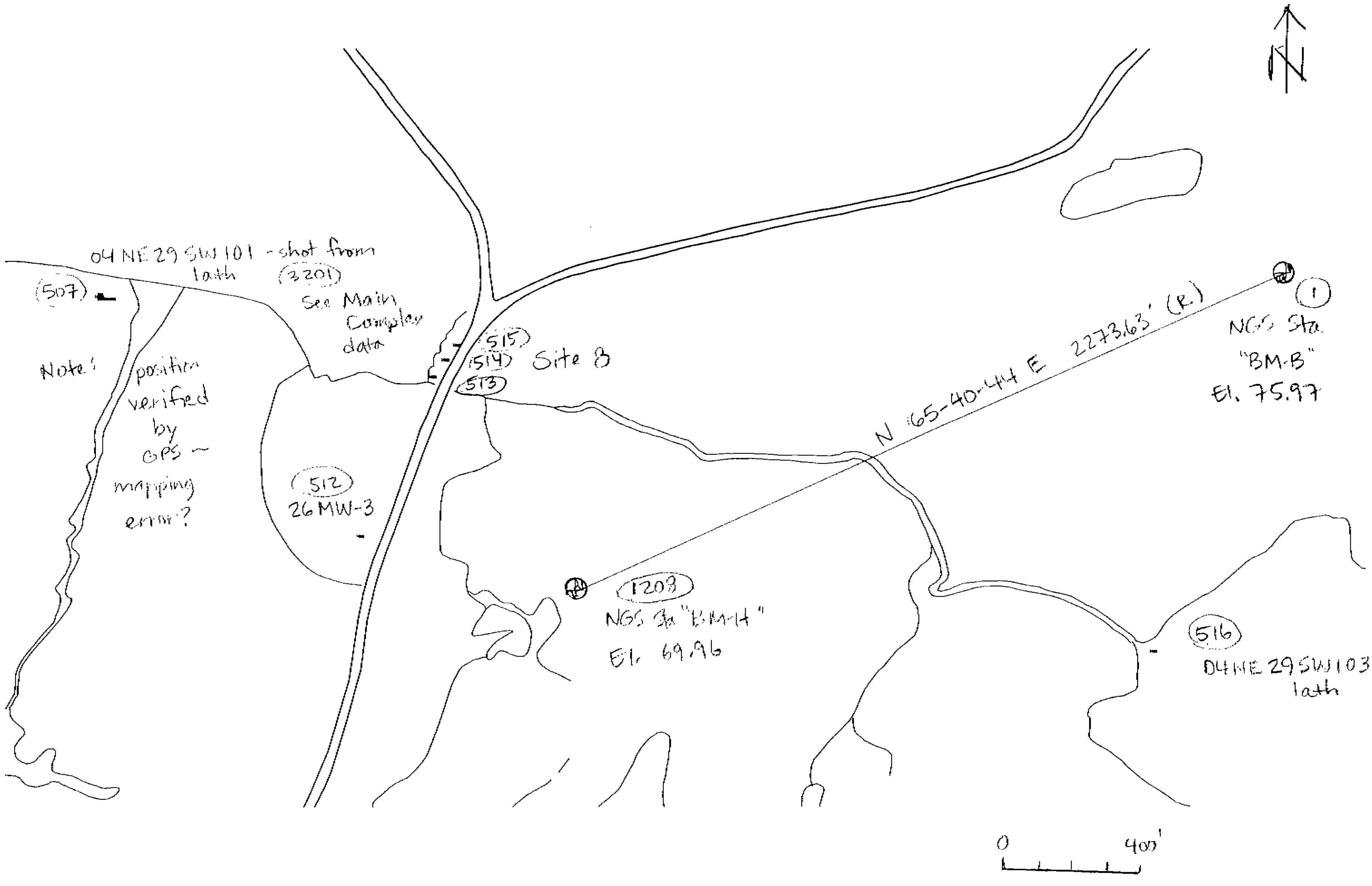
Sd Shot:54-490	Ang R: 114°17'02"	Zen: 89°06'08"	S Dst: 140.675	04NE31SS130
HI/HR :H Inst: 4.87	H Rod: 3.50			
Sd Shot:54-508	Ang R: 350°07'31"	Zen: 94°25'59"	S Dst: 310.700	04NE31SS136SB137
HI/HR :H Inst: 4.87	H Rod: 4.00			
Sd Shot:54-509	Ang R: 154°16'18"	Zen: 86°33'42"	S Dst: 194.845	FND-SPIKE
Sd Shot:54-510	Ang R: 354°50'18"	Zen: 94°24'10"	S Dst: 187.465	staked_01ne31ss123

NE Cape 2004

site 31 white alice.cr5 09/26/04 10:11:37

Point	Northing	Easting	Elevation	Description
54	95,878.6000	97,366.7400	210.93	ALICE
463	99,063.6066	97,928.1515	70.09	BMH
464	98,372.5222	96,436.6565	67.25	GPS3201
465	96,097.8005	97,375.5036	195.42	04NE31SS131SB134
466	96,089.0904	97,333.6808	195.62	04NE31SS132SB133
467	96,094.9315	97,354.5989	195.90	04NE31SS135
468	96,135.9125	97,352.4541	192.74	04NE31SS138
469	96,187.9731	97,323.2803	186.76	04NE31SS139
470	96,031.0611	97,425.5996	198.01	04NE31SB108
471	95,965.2026	97,338.2716	202.19	04NE31SB109
472	95,832.5792	97,349.7874	210.74	04NE31SB106
473	95,811.1410	97,392.3061	209.87	04NE31SB107
474	95,803.5880	97,325.1849	214.29	04NE31SB105
475	95,786.4209	97,305.9071	214.94	04NE31B2
476	95,817.6174	97,268.2690	211.97	04NE31B1
477	95,823.5589	97,250.0391	208.60	04NE31SS110
478	95,861.5609	97,261.8275	206.36	04NE31SS111
479	95,846.7307	97,269.4420	209.18	04NE31SS112SB113
480	95,837.2809	97,251.6201	207.93	04NE31SS114
481	95,869.2811	97,236.0066	203.39	04NE31SS115SB116
482	95,826.1762	97,407.4012	210.04	04NE31SS117SB118
483	95,835.3352	97,417.0193	210.01	04NE31SS119
484	95,848.9028	97,417.5980	210.22	04NE31SS120SB121
485	95,822.8902	97,419.4314	210.07	04NE31SS122
486	95,833.4441	97,430.4164	209.90	04NE31SS123SB124
487	95,842.5485	97,427.4469	209.72	04NE31SS125
488	95,804.4905	97,471.6555	213.47	04NE31SS126SB127
489	95,816.4397	97,471.0701	213.17	04NE31SS128SB129
490	95,799.3746	97,482.9636	213.38	04NE31SS130
508	96,188.3701	97,367.4008	188.29	04NE31SS136SB137
509	95,691.3909	97,419.4728	223.49	FND-SPIKE
510	96,064.8467	97,382.4951	197.41	staked_01ne31ss1



9/26/2004 10:17:04 AM

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JOB:Name: NEC1          Date: 09-04-2004     Time: 12:18:20
M Setup:North Azimuth   Units: US Feet       Scale: 1.000000      Curvature: On       Angle: Degrees
Occupy:Occ: 1,208       North: 99,063.6037   East: 97,928.1558    Elev: 69.96         FIP BM H
Backst:Occ: 1,208       BS pt: 1             BS azm: 65°40'44"    BS crl: 0°00'00"
HI/HR :H Inst: 3.14     H Rod: 3.92

Sd Shot:1,208-512       Ang R: 218°41'10"    Zen: 91°05'58"       S Dst: 662.060      26MW-3
HI/HR :H Inst: 3.14     H Rod: 11.50
Sd Shot:1,208-513       Ang R: 260°20'35"    Zen: 91°47'37"       S Dst: 764.270      04NE08SW101
HI/HR :H Inst: 3.14     H Rod: 4.35
Sd Shot:1,208-514       Ang R: 268°13'19"    Zen: 92°01'23"       S Dst: 809.980      04NE08SD103

HI/HR :H Inst: 3.14     H Rod: 6.00
Sd Shot:1,208-515       Ang R: 264°40'13"    Zen: 92°06'09"       S Dst: 787.085      04NE08SD102
HI/HR :H Inst: 3.14     H Rod: 5.40
Sd Shot:1,208-516       Ang R: 30°21'09"     Zen: 90°30'56"       S Dst: 1,693.295    04NE29SW103lath
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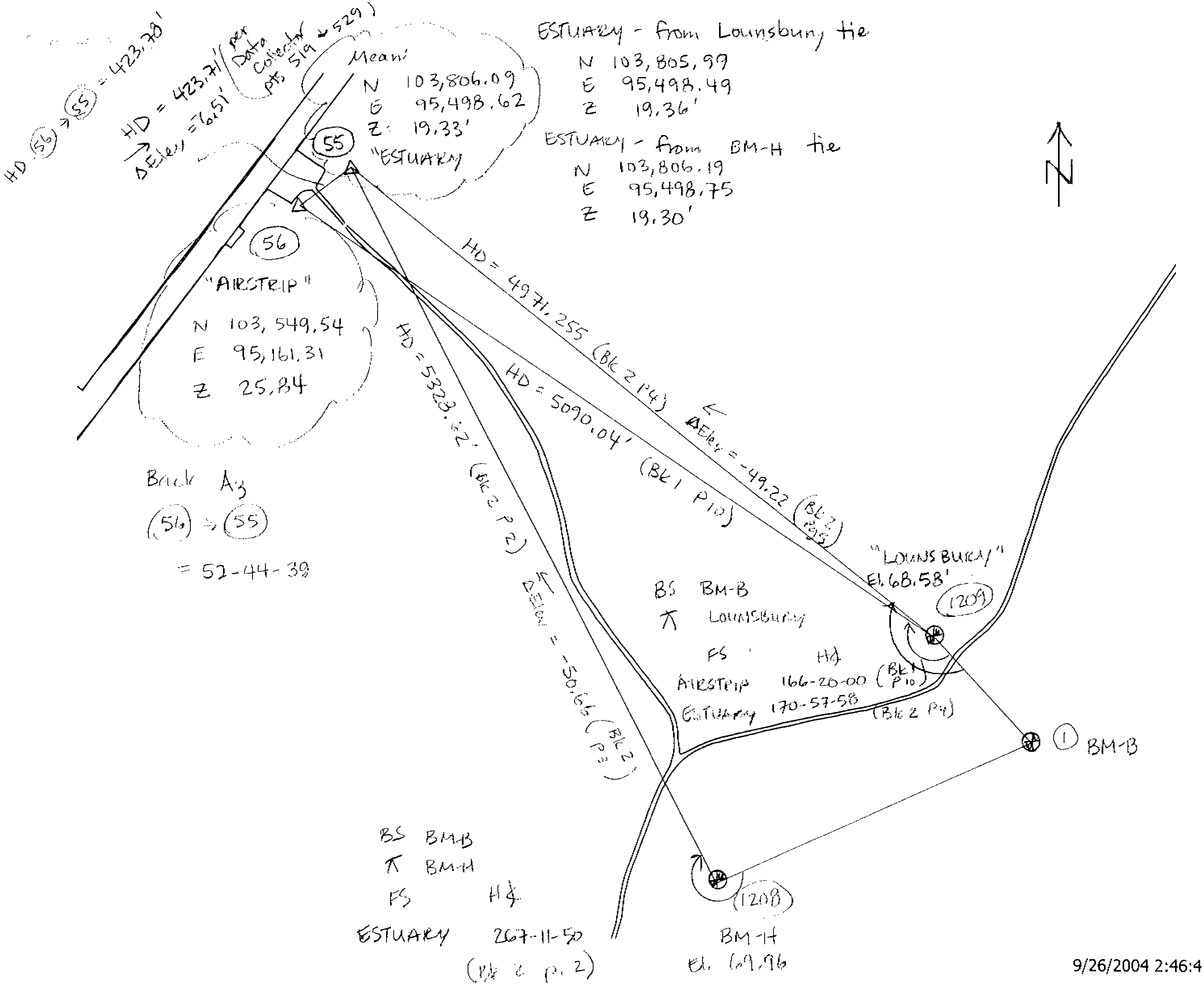
NE Cape 2004

the y.cr5 09/26/04 10:54:08

Point	Northing	Easting	Elevation	Description
512	99,227.8294	97,286.9129	56.49	26MW-3
513	99,697.0660	97,501.2330	37.69	04NE08SW101
514	99,790.5408	97,572.0461	40.17	04NE08SD103
515	99,747.1653	97,539.0362	38.24	04NE08SD102
516	98,885.6907	99,612.0105	52.52	04NE29SW103lath



Mean:
N 103,806.09
E 95,498.62
Z: 19.33'
"ESTUARY"

ESTUARY - from Lounsbury tie
N 103,805.99
E 95,498.49
Z 19.36'

ESTUARY - from BM-H tie
N 103,806.19
E 95,498.75
Z 19.30'

"AIRSTRIP"
N 103, 549.54
E 95,161.31
Z 25.84

Back Az
(56) → (55)
= 52-44-39

BS BM-B
⊼ LOUNSBURY
FS Ha
AIRSTRIP 166-20-00 (BK 1 P10)
ESTUARY 170-57-58 (BK 2 P4)

BS BMB
⊼ BMH
FS Ha
ESTUARY 267-11-50
(BK 2 P. 2)

9/26/2004 2:46:41 PM

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JOB:Name: NEC1          Date: 09-04-2004      Time: 12:18:20
M Setup:North Azimuth   Units: US Feet        Scale: 1.000000      Curvature: On        Angle: Degrees
Occupy:Occ: 56          North: 103,549.5400   East: 95,161.3100    Elev: 25.84          AIRSTRIP
Backst:Occ: 56          BS pt: 55             BS azm: 52°44'39"    BS crl: 0°00'00"
HI/HR :H Inst: 4.77     H Rod: 4.86

Sd Shot:56-519          Ang R: 0°00'02"       Zen: 90°52'06"       S Dst: 423.760       ESTUARY
HI/HR :H Inst: 4.77     H Rod: 6.00
Sd Shot:56-520          Ang R: 347°57'05"     Zen: 91°11'18"       S Dst: 262.295       04NE01SS102
HI/HR :H Inst: 4.77     H Rod: 8.00
Sd Shot:56-521          Ang R: 55°49'01"      Zen: 93°04'49"       S Dst: 351.410       04NE29SW101

HI/HR :H Inst: 4.77     H Rod: 5.40
Sd Shot:56-522          Ang R: 46°18'40"      Zen: 92°33'11"       S Dst: 487.835       04NE29SD104lath
Sd Shot:56-523          Ang R: 44°23'50"      Zen: 91°57'31"       S Dst: 551.480       04NE01SS103
Sd Shot:56-524          Ang R: 38°47'57"      Zen: 92°34'15"       S Dst: 501.690       04NE01SS105lath
Sd Shot:56-525          Ang R: 29°48'56"      Zen: 92°07'32"       S Dst: 611.395       04NE29SD106lath

Sd Shot:56-526          Ang R: 28°08'12"      Zen: 92°21'47"       S Dst: 545.175       04NE29SD107lath
Sd Shot:56-527          Ang R: 4°34'34"       Zen: 91°01'31"       S Dst: 1,262.025     04NE29SD109lath
Sd Shot:56-528          Ang R: 11°57'42"      Zen: 91°01'00"       S Dst: 1,274.485     04NE29SD108lath
HI/HR :H Inst: 4.77     H Rod: 4.86
Sd Shot:56-529          Ang R: 0°00'06"       Zen: 90°52'04"       S Dst: 423.755       ESTUARY

HI/HR :H Inst: 4.77     H Rod: 5.30
Sd Shot:56-530          Ang R: 181°37'10"     Zen: 89°56'57"       S Dst: 491.730       04NE01SS104
HI/HR :H Inst: 4.77     H Rod: 8.00
Sd Shot:56-531          Ang R: 341°50'00"     Zen: 90°50'44"       S Dst: 360.865       04NE01SS101
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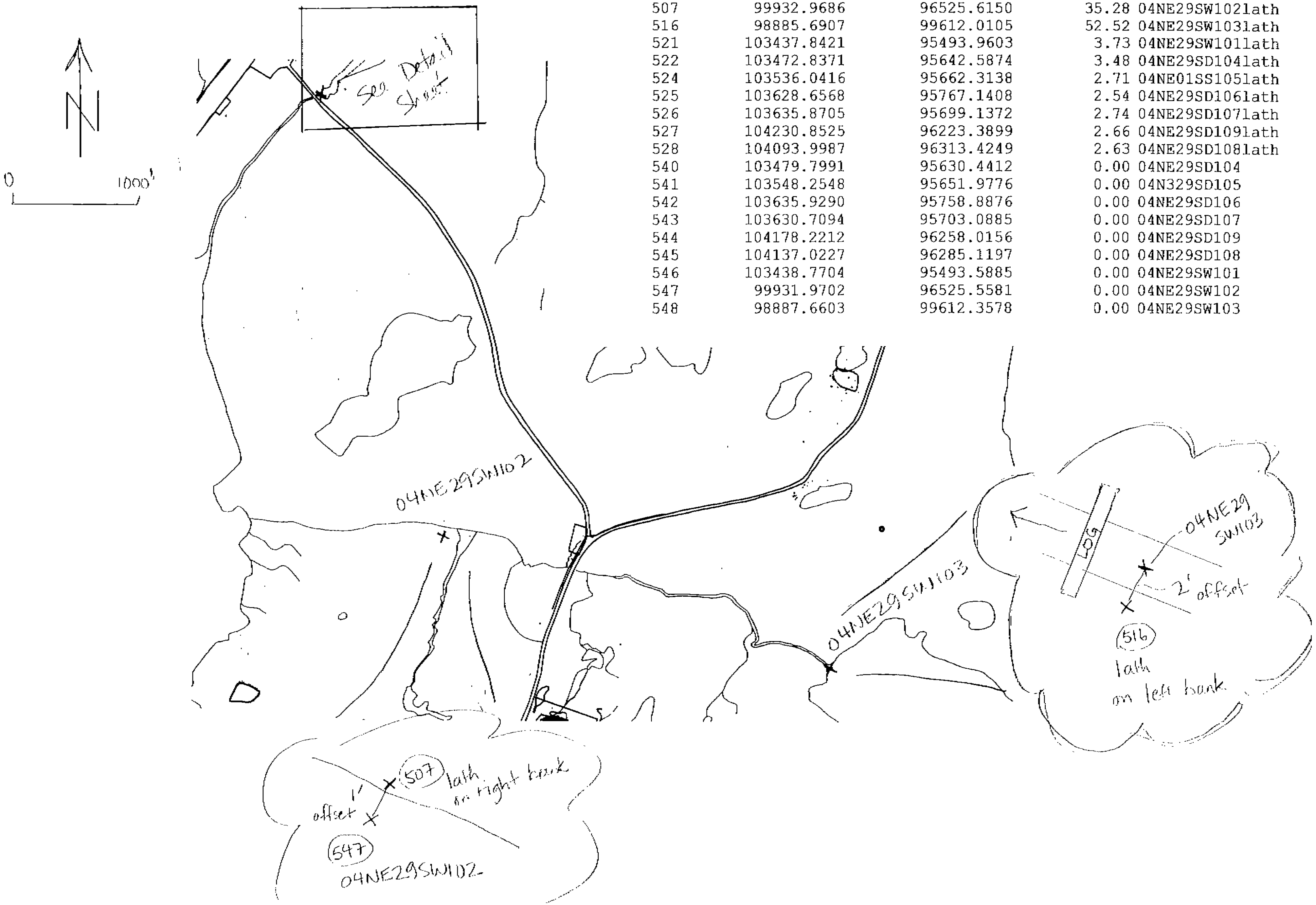
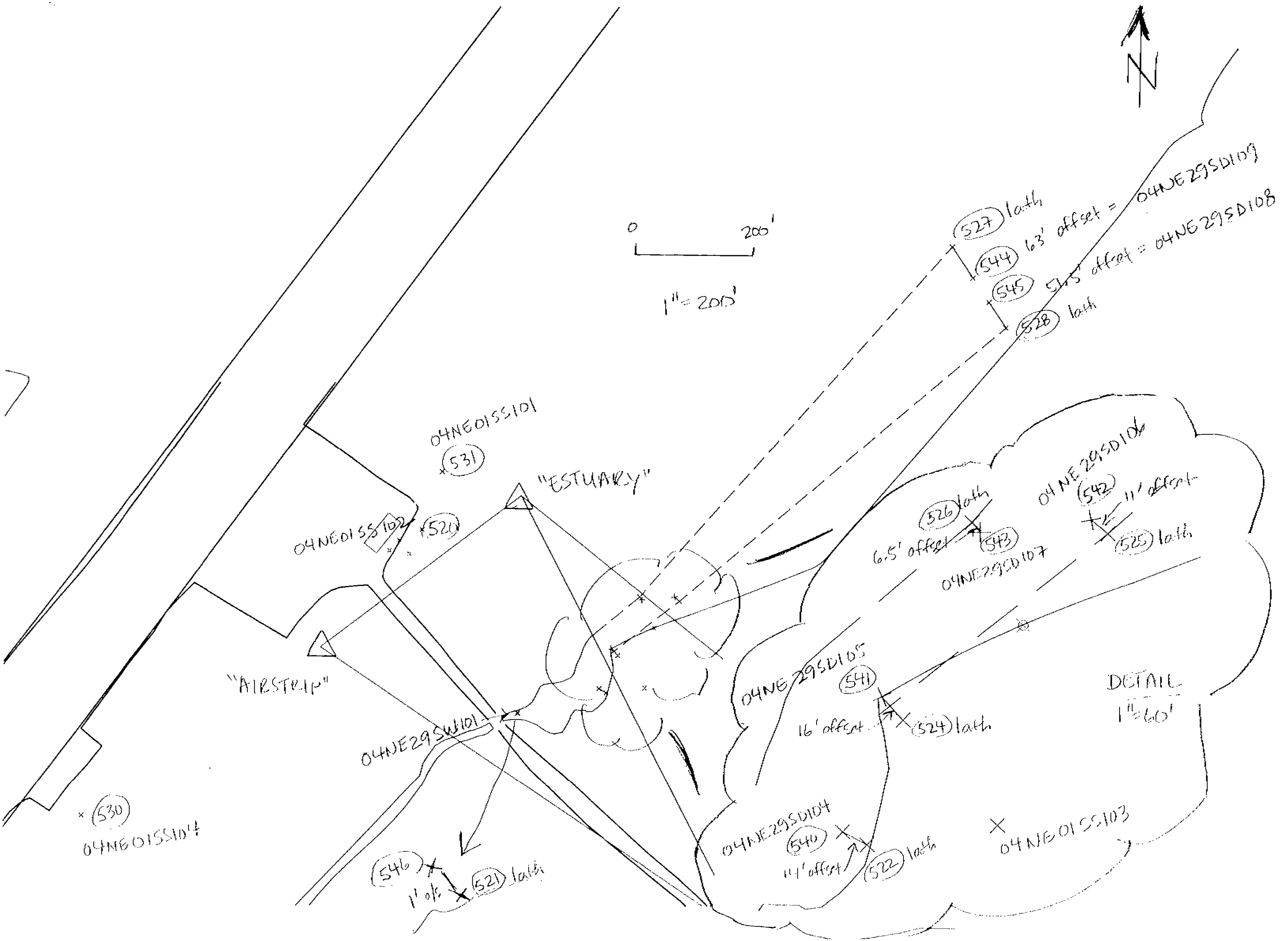
airport.cr5 09/26/04 16:07:20

Point	Northing	Easting	Elevation	Description
519	103,806.0411	95,498.5615	19.33	ESTUARY
520	103,748.3654	95,332.3000	19.17	04NE01SS102
521	103,437.8421	95,493.9603	3.73	04NE29SW101
522	103,472.8371	95,642.5874	3.48	04NE29SD104lath
523	103,481.0210	95,708.1926	6.37	04NE01SS103
524	103,536.0416	95,662.3138	2.71	04NE01SS105lath
525	103,628.6568	95,767.1408	2.54	04NE29SD106lath
526	103,635.8705	95,699.1372	2.74	04NE29SD107lath
527	104,230.8525	96,223.3899	2.66	04NE29SD109lath
528	104,093.9987	96,313.4249	2.63	04NE29SD108lath
529	103,806.0315	95,498.5626	19.34	ESTUARY
530	103,263.0389	94,761.6660	25.75	04NE01SS104
531	103,846.6293	95,366.0860	17.29	04NE01SS101

Drawing Name: nec-field version
Project Name: NE Cape
Project Path: D:\Land Projects 2004\NE Cape\
Username: Shelley

Number	Northing	Easting	Elevation	Full Desc
507	99932.9686	96525.6150	35.28	04NE29SW102lath
516	98885.6907	99612.0105	52.52	04NE29SW103lath
521	103437.8421	95493.9603	3.73	04NE29SW101lath
522	103472.8371	95642.5874	3.48	04NE29SD104lath
524	103536.0416	95662.3138	2.71	04NE01SS105lath
525	103628.6568	95767.1408	2.54	04NE29SD106lath
526	103635.8705	95699.1372	2.74	04NE29SD107lath
527	104230.8525	96223.3899	2.66	04NE29SD109lath
528	104093.9987	96313.4249	2.63	04NE29SD108lath
540	103479.7991	95630.4412	0.00	04NE29SD104
541	103548.2548	95651.9776	0.00	04N329SD105
542	103635.9290	95758.8876	0.00	04NE29SD106
543	103630.7094	95703.0885	0.00	04NE29SD107
544	104178.2212	96258.0156	0.00	04NE29SD109
545	104137.0227	96285.1197	0.00	04NE29SD108
546	103438.7704	95493.5885	0.00	04NE29SW101
547	99931.9702	96525.5581	0.00	04NE29SW102
548	98887.6603	99612.3578	0.00	04NE29SW103




N
0
200'
1" = 200'
527 lath
544 63' offset = 04NE29SD109
545 51.5' offset = 04NE29SD108
528 lath
04NE01SS101
531
"ESTUARY"
04NE01SS102
520
"AIRSTRIP"
04NE29SW101
546
1' o/s
521 lath
530
04NE01SS104
526 lath
6.5' offset
543
04NE29SD107
04NE29SD106
542
11' offset
525 lath
04NE29SD105
541
16' offset
524 lath
DETAIL
1" = 60'
04NE29SD104
540
11' offset
522 lath
04NE01SS103

a product of [illegible]
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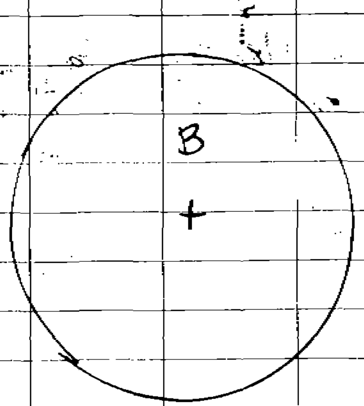
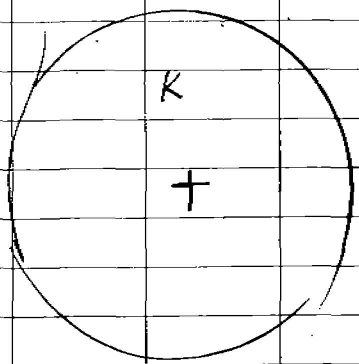


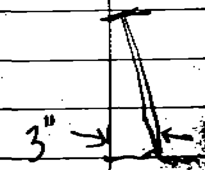
BM B

Found 3⅝"
brass cap on
1½" IP
projecting 8"
above ground

BM K:

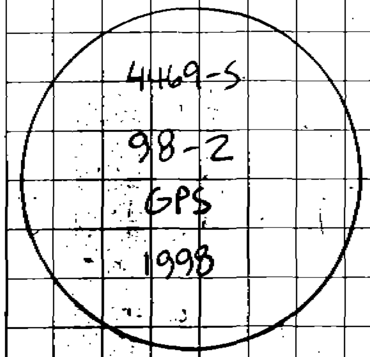


Found 3½-3¾"
Brass Cap mo
on 1½" I
projecting 16
above gnd.
leaning ~~E~~ W



9-3-04

BM H: Fnd 1½ ~~IP~~ w/ tack in center, projecting 0.8' above ground - pt is located on prominent "∧" ± Ū of road, south side of "Y"



Found alum cap
mon @ airstrip

BS ~~BM K~~ ~~P~~ "RANDOM"

① ⊼ BM B HR 3.825'
1.165 m

FS
1) 82-47-11 ~~547~~ 4.57
2) 165-34-04 1.395 m
M) 82-47-02

Horizon ∡ = 82-47-04
1) 277-13-00
2) 554-25-45
M) 277-12-53

HD = 933.24 ft 284.452 m
(R) 933.24 ft ~~2.024~~ m

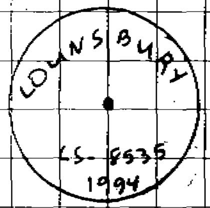
VD = -6.655 ft 284452 m
-6.640 ft -2.024 m

9-3-04

Sunny: 55° 30' Hg (-2.9 ppm)

CONTROL

Fnd Lounsbury mon. @ Old Landfill
2" ac on 5/8" rbr 0.2' above grd
good condition



VS 933.34(L)

ΔElev BM B → Lounsbury
= 3.825
-6.645
~~-4.57~~
~~-8.29~~
-7.39

Elev. Lounsbury
= 75.97
~~-8.29~~ -7.39
~~67.68~~ 68.58

VS 69.75 (Mullik

BS 'RANDOM' (same as on p4)

① ⊼ BM B HR = 3.825 ft
1.165 m

FS

(51) 1) 145-54-18 4.67'
2) 291-48-26 1.423 m
m) 145-54-13

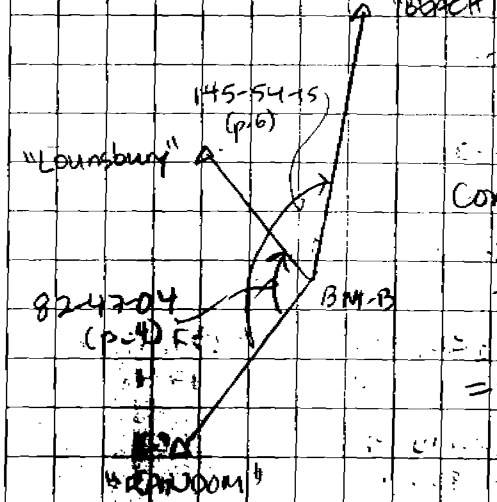
Horiz m ∡ = 145-54-15
1) 214-05-40
2) 428-11-24
m) 214-05-42

HD =	4256.740 ft 4256.740	1297.457 m 1297.457 m
VD =	-52.105 ft -51.880 ft m = 51.99	-15.882 m -15.813 m

9-3-04

CONTROL

"BEACH"
set spike in gravel pile @ old fuel pump house site near beach



Computed Horiz ∡
BS LOUNSBURY
⊼ BM-B
FS BEACH
= 63-07-11

ΔElev BM B → ~~Spike~~ BEACH

3.825
- 51.99
- 4.67
- 52.835

Elev. BMB = 75.97
- 52.84
23.13
per p. 15 23.62
Mean 23.38

(1209) BS Lounsbury cap

(1) ⊼ BM-B HR= 3.825 ft
1.165 m

FS
(52) 1) 29-42-06 HR= 4.61 ft
1.406 m
2) 59-24-09
m) 29-42-05
Horizon ∡ = 29-42-06
1) 330-17-52
2) 660-35-46
m) 330-17-52

HD = 1235.480 ft 376.577 m
1235.485 376.577 m

VD = -24.050 ft -7.330 m
-23.955 -7.302 m

9-3-04

CONTROL

"DRUM"
Set spike in Old Drum Storage Area

ΔElev. BM-B → DRUM
= 3.825
-24,00
- 4.61
-24.785

7597 BMB
-24.785
51,185

See also p13

Elev. "DRUM" = 51.16 (51.13)
(51.18)

① BS BM B

(209) ⊼ Lounsbury Cap HI = 4.57'
1.393m

FS

(56)
1) 166-20-00
2) 332-39-59
M) 166-20-00

Horizon ∡ = 166-20-00
1) 193-40-08
2) 387-20-00
M) 193-40-00

HD = 5090.045' 1551.449m
5090.040' 1551.448m

VD = -42.880' -13.067m
-42.520' -12.960m

9-3-04

CONTROL

Find AC @ Airstrip

4469-5
98-2
GPS
1998

He ≈ 4.5 (Did not record)

elev. of Airstrip derived from measurements
to Estuary - Bk 2 - pp 3→7
= 25.84

① BS BM B

(1209) ⊼ Lounsbury Cap

FS

HR = 4.61 ft
1.406 m

1) 257-07-34
2) 514-14-52
M) 257-07-26

∡ = 257-07-26

Horizon
1) 102-52-36
2) 205-45-08
M) 102-52-34

∡left = 102-52-34

HD = 627.955' 191.401 m
627.960' 191.402 m

VD = -17.440' -5.316 m
-17.380' -5.298 m

9-3-04

CONTROL

Spike in Old Drum Storage Area

ΔElev Lounsbury → DRUM

= 4.57
- 17.41
- 4.61
-17.45

Elev Louns. = 68.58
- 17.45
51.13

see also p. 9
or p 19

(1) BS BM B

(51) $\overline{\Lambda}$ Beach. Spike (Old Fuel Pump House Site)

HI = 4,93' 1.505 m

(1209) FS

1) 12-14-51

2) 24-29 42 HR = 4,48'

M) 12-14-51 1,365 m

Horiz

1) 347-45-~~14~~ 11

2) 695-30-15 ∡ = 12-14-51

M) 347-45-08

HD = 3924.000 ft 1196.036 m

3923.995 ft 1196.036 m

VD = +44.340 ft +13.515 m

+44,685 ft +13.620 m

9-04-04

Overcast

55°

CONTROL

Lounsbury cap

Δ Elev BEACH → Lounsbury

4.93
+44.51
- 4.48
44.96

Elev. Louns. 68.58
-44.96
Elev BEACH 23.62

See also p. 7

① BS BMB

(51) ⊼ Beach Spike HI = 4.93'

FS	~~BS~~ HZ	HD	VD	HR		
401 ~~52~~	110-38-32	32.125	-11.150	0.45		
402	17-36-18	SD 35.545	Z 101-45-19	4.60		
403	~~105~~-18-58	47.265	109-39-30	0.45	-0.08 = 2.48	
404	181-33-05	69.310	98-23-39	2.01 + .55	= 2.56	to gnd [2.20]
405	244-07-09	80.645	97-38-14	1.06 + .55	= 1.61 -.08 = 1.53	[2.97]
406	230-09-57	170.750	95-02-57		4.30	
407	325-51-02	137.135	92-16-52		4.27	
~~408~~ 409	5-23-22	142.555	91-38-54	1.58 + .55	3.13 -.08 = 3.05	[2.4
~~409~~ 408	198-57-10	168.885	95-05-07	4.18 + .55 =	4.73 -.08 = 4.65	[.3

Numbers in brackets
are dist. (in ft) from
bottom of threads to
ground surface

9-04-04 Site 3 - Beach Fuel

04NE03B1
B2
B3

01NE03WP102
103

Bottom thread to
Cap off for sampling: top pipe = 0.08'
HE meas'd to bottom of pipe thread

04NE03SD107
108

04NE03WP05
~~04~~ 06

① BS BM-B

(52) ⊼ ~~Drum~~ Spike @ Cargo Beach Drum Field

HI = 5.00' 1.524m

(1209) FS Lounsbury Cap

1) 47-25-27 HR = 4.48'
2) 94-50-42 1.365m
m) 47-25-21
Horizon ∡ = 47-25-20
1) 312-34-43
2) 625-09-24
m 312-34-42

HD = 627.935 191.395m
627.930 191.394m

VD = +16.855 +5.137m
+16.895 +5.150m

9-04-04

CONTROL

ΔElev DRUM to Lounsbury

5.00
+16.88
-4.48
17.40

Elev. Louns = 68.58
- 17.40
51.18

see also p. 13 & p. 9.

BS BM-B

(52) ⊼ Spike c Cargo & Beach Drum Field

FS	H∢	SD	Z∢	HR	
410	47-25-21	628.16	88-27-43	4.48	
411	169-58-45	77.89	96-20-25	0.45	
412	354-41-23	82.465	96-22-27	0.45	
413	24-08-09	104.075	95-16-51	0.45	
414	60-08-25	119.05	94-01-48	0.45	
415	101-58-42	126.215	94-24-06	0.45	
416	133-20-37	111.115	94-22-29	0.45	
					[Ht above Gnd.]
417	95-48-58	119.02	92-30-46	2.14+.55=	2.69 [2.37] -.08=2.61
418	74-22-32	155.345	91-44-00	1.12+.55=	1.67 1.59 [3.10]
~~419~~ 420	108-34-25	145.220	92-04-20		0.42-.08 2.34 [4.14] ~~3.25~~
~~420~~ 419	146-35-13	140.410	91-53-33	2.70+.55	~~2.70~~ [[illegible].95] 3.25 -.08 3.17

* [ ] number in brackets is dist. to ground from measured point

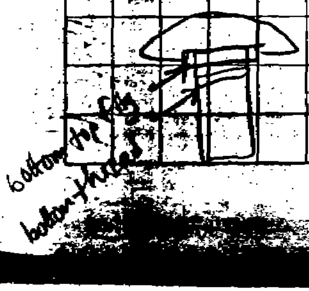
9-4-04 Site 6 - Drum Field

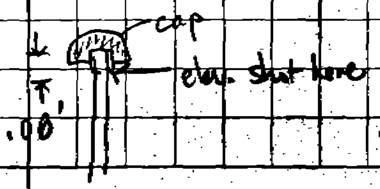
~~04NE06B1~~ Lounsbury Cap

04NE06B1
B2
B3
B4
B5 ← Note: Desc in Topcon is B4 (forgot to update)
B6

01NE06WP103
01NE06WP[illegible]7
6
5

He is to bottom of pipe thread, if visible, or bottom of top fitting otherwise





(51) BS Spike C ~~[illegible]~~ Beach ~~Dum Field~~

(1209) ⊼ Lounsbury

① FS BM-B

1) 104-38-$\overset{16}{31}$

2) 209-16-$\overset{40}{45}$

M) 104-38-$\overset{20}{23}$ ∡ = 104-38-20

Horizon 1) 255-21-51

2) 510-43-25

M) 255-21-43

Closing Angle for

BMB - Lounsbury - Beach

9-04-04

CONTROL

①	BS	BM B	
(1209)	⊼	Lounsbury Cap	HI = 4.60'
			1.403 m
	FS		
	1) 52-01-50		HE = 4.63'
(53)	2) 104-03-39		1.412 m
	m) 52-01-50		
Horizm		∡ = 52-01-50	
	1) 307-58-09		
	2) ~~307-58~~ 615-56-20		
	m) 307-58-10		
	HD = 414.745'		126.415 m
	414.745'		126.415 m
	VD = +0.195'		+0.059 m
	+0.140'		+0.042 m

9-04-04

CONTROL

set spike @ edge of bank, E side road

Elev. "FILL" = Elev. Louns. 68.58

+4.60

+ 0.17

- 4.63

68.72

(1209)	BS	Lounsbury cap	
(53)	⊼	spike in fill	
	FS		H∢
Beach spike	(51)		21-08-43
BM-B	①		102-13-24
BM-C			176-56-01
BM-H	(1208)		218-33-20

9-04-04

CONTROL

(1209) BS Lounsbury

(53) ⊼ Spike in Fill

HI= 4.89'
1.492m

	FS	H∡	SD	Z∡	HE
421	41-42-24 →		106.20	90-31-24	5.3
422		46-52-37	82.895	89-45-11	5.3
~~423~~		42-54-32	63.985	89-27-49	5.3
~~424~~		36-19-37	90.665	89-39-52	5.3
~~425~~		30-39-39	67.205	88-59-32	5.3
426		143-02-40	44.025	109-17-58	5.3
427		157-45-34	50.880	106-51-20	5.3
428		184-30-00	30.515	105-38-56	5.3
429		171-47-24	20.240	106-20-11	5.3
430		154-04-12	26.295	108-24-56	5.3
431		160-28-29	35.05	109-14-13	5.3

9-04-04 Site 7 - Landfill

04NE07SS101 / SB102

103 104

105

106

107

108

109

110

112

111

desc is "15"

SAMPLES CANCELLED.

Will tie new sample locations to lath set at 01NE07SS127

01NE07SS125 (old stake)

~~106~~ 1208 BS BM H

~~12~~ 3201 ⊼ GPS 3201 2002 HI=4.415' 1.345m

FS	H∠ ~~ES~~	SD	Z∠	HR	ΔElev.
432	0-00-00	1643.765	89-57-22	3.00	2.67
433	182-26-26	250.815	90-29-42	0.45	
434	187-10-01	271.565	90-30-24	0.45	
435	183-39-42	267.055	90-22-17	0.45	
436	187-26-32	282.08	90-29-08	0.45	
437	185-58-55	291.48	90-23-30	0.45	
~~438~~	183-28-56	368.495	89-52-31	0.20	
~~439~~	184-33-02	372.715	89-49-43	0.45	
~~440~~	185-24-32	367.450	89-55-40	0.20	
~~441~~	184-20-04	365.995	89-51-30	0.45	
~~447~~					
442	182-53-01	376.415	89-45-35	0.20	
443	180-50-39	379.725	89-16-18	~~0.45~~ 3.60	
444	174-36-52	386.34	89-34-58	1.40	
445	182-00-15	388.06	89-19-17	3.5	
446	179-47-26	392.355	89-39-49	1.1	
447	176-59-00	396.950	89-15-37	3.55	

9-5-09 overcast 55°

Site 13 - Elec. Power Bldg

HR = 3.00' 0.915 m

Fnd 2" ac on 5/8 rbr 0.45' above gnd in good condition mkd

4469-S GPS 3201 2002

BS CHK : BMH Elev = 69.89

04NE13SS115

116

117

118

119

04NE13SS 120 — SAMPLES CANCELLED

121

122

123

Will tie new sample location to MW88-6 + lath set at 98NE01355802

04NE 13SS 105

106

107 / SB 124

108

109

110 / SB 125

(1208) BS BM H

(3201) ⊼ GPS ~~3007~~ 3201 2002

FS	H∡	SD	Z∡	HR	
448	175-47-49	398.04	89-16-59	3.60	
~~450~~ 449	181-25-57	397.87	89-41-18	0.80	
450	178-40-22	401.895	89-40-35	0.50	
451	176-00-23	405.900	89-11-57	3.60	
NEW BATTERY					
~~452~~	~~177-16-38~~	~~402.875~~	~~89-11-19~~	29 ~~3.30+0.52~~ =	81 ~~3.82~~
453	185-~~12-46~~ 14-03	~~237.035~~ 236.950	89-~~34-50~~ 39-21	5.30	
454	186-13-09	315.005	89-33-33	5.30	
452	177-14-57	403.145	89-00-26	5.30	
455	136-13-32	327.856	87-11-16	5.30	
456	134-49-49	428.175	87-18-23	5.30	
457	138-41-42	567.01	87-42-36	5.30	
458	130-12-07	866.61	87-25-37	11.30	
459	359-59-58	1643.765	89-57-23	3.00	2.67
460	139-14-49	862.890	87-47-03	11.30	
461	139-18-55	836.380	87-40-59	11.30	
462	160-18-46	839.810	88-35-20	9.30	
~~463~~					

9-5-04

Site 13 (cont.)

04NE 13SS 111

112

113

114

~~MW 88-8 - N pt of 0.55' ø (O.D.) casing~~

88-5 - ~~center of casing~~ W pt of top casing

88-6 W pt. of ~~o~~ casing

88-8 N pt of casing

04NE19 B1

88-10 [illegible] pt casing - broken

20 MW1 N pt

2[illegible] MW3

[illegible] 1K BS - Elev ≠ 69.861

[illegible] MW2 N pt

2[illegible] B1

1[illegible] MW1 N pt.

~~CHECKS (BM~~ H)

(1208)

~~(106)~~ BS BM H

(12) ⊼ GPS 3201 2002 HI = 4.52'

1.385m

FS	H∡	SD	Z∡	HR
~~465~~ 491	167-27-56	1084.495	89-05-40	11.5
492	167-48-18	1098.805	89-04-06	11.5
493	188-59-02	800.875	89-26-35	8.4
494	190-20-40	453.65	89-06-34	5.4
495	123-55-59	295.865	86-59-49	5.4
496	109-39-43	203.345	86-55-25	5.4
497	108-01-48	~~108.~~ 114.73	87-46-11	5.4
498	201-19-46	108.84	89-~~30~~ 02-11	5.4
499	201-36-05	544.47	89-05-03	5.4
500	199-02-20	582.55	89-07-40	5.4
501	206-26-55	620.29	89-13-08	5.4
502	59-42-55	200.525	88-18-32	5.4
503	48-04-30	388.43	89-15-41	5.4
504	52-24-50	426.10	88-27-43	5.4
505	34-04-29	435.00	89-06-38	5.4
506	105-35-23	776.025	86-45-09	8.4
507	298-07-27	1563.305	91-08-27	5.4

9-8-04 PM
overcast, 55°
light wind

Main Complex Area

~~04 NE~~ ~~1455101 SB104~~

04NE 1455101 SB 104
102 103
17MW1
13 B1

MW88-1 N pt of casing
MW88-3 N
MW88-2 N
MW88-4 N
MW16-1 N
MW16-3 N
MW16-2 N
MW11-3 N
MW10-1 N

04 NE 10B2
04 NE 10B1
26MW-1
04NE 29SW102 – stake on rt bank looking downstream
sample was 1' closer, 1' lower in elev.

~~(12)~~ (3201)	BS	GPS 3201 2002 ~~BRAD~~	HR = 4.70'
(54)	⊼	TBM ALICE	HI = 4.95' 1.509 m
~~(106)~~ (1208)	FS	BM-H	HR = 3.04'

1) 30-26-50
2) 60-53-44
m) 30-26-52 ∡ = 30-26-52

Horiz m
1) 329-33-07
2) 659.06-16
m 329-33-08

HD = 2661.~~70~~ 695' 2661.715
to GPS 3201 811.286 m 811.292 m

VD = -144.15' -143.755
-43.937 m -43.817 m

HD to ~~BS~~ BM-H = 3234.110' 3234.105'
985.759 m 985.757 m

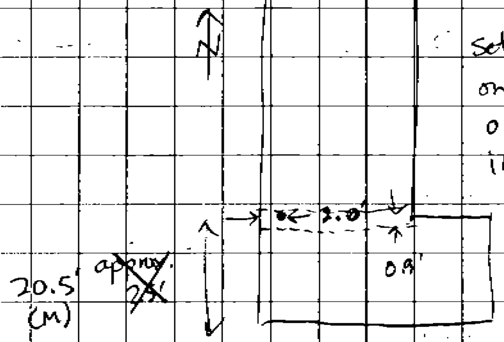
VD to ~~BS~~ = -142.72 -142.905
-43.501 m -43.553

9-6-04 - AM
overcast, 55°
30+ mph wind

Site 31
White Alice

12
.03
30

Pt on concrete fdn @ White Alice Site



Set 3/8"ϕ MAG NAIL
on N side of
0.9'-wide wall base
in concrete
top is 0.1'
above concrete

Elev BM-H = ~~70.04~~ 69.96
HR 3.04
Ht target ~~VD~~ ~~73.08~~ 73.00
VD to ALICE + 142.81
215.~~89~~ 81

3201 2002 = ~~12.22~~ 67.29
+ 4.70
71.~~92~~ 99
143.95
215.~~87~~ 94

Mean = 215.88 ✓
HI = 4.95
Elev. ALICE = 210.93 ✓

(1208)

~~(1)~~ BS ~~GPS~~ BM-H

~~(68)~~ (54) π TBM "ALICE" HI = 4.95

FS	H∡	SD	Z∡	HR	
463	359-59-59	3237.245	92-31-52	3.04	fixed
464	329-3302	2665.59	93-05-54	3.04 ~~s/s~~	4.70
465	352-17-33	220.03	94-25-14	3,50	
466	341-04-38	213.725	94-29-06	3.55	
467	346-47-27	217.275	94-16-14	3.80	
468	346-49-31	258.46	94-22-13	3.45	
469	342-00-24	313.455	94-40-44	3.55	
470	11-06-46	164.02	94-52-06	3.95	
471	331-48-22	91.675	96-03-57	4.00	
472	190-13-31	49.055	91-12-57	4.10	
473	149-14-49	72.175	91-45-23	3.80	
474	198-59-19	85.790	88-19-31	4.10	
~~475~~	~~126-35-53~~	~~76.70~~	~~91-16-44~~	~~4.10~~	

9-6-04

Site 31 White Alice

= (cont.)

BM-H

GPS-320 2002

04NE31SS131 SB134

SS132 SB133

SS135

SS138

SS139

04NE31SB108

SB109

SB106

SB107

SB105

~~(106)~~ BS ~~na~~ BM-H

	π	TBM	"ALICE"	HI=4.95
FS	H∡	SD	Z∡	HR
475	203-25-32	110.48	88-30-56	3.80
476	228-14-00	115.825	89-57-29	4.00
		129.07		4
477	234-45-09	~~234.~~	91-26-09	4.05
478	250-46-41	106.42	92-51-49	4.20
479	241-52-02	102.42	91-30-42	4.00
480	240-15-32	122.365	91-42-36	4.30
481	255-55-33	131.34	93-42-28	4.00
482	132-12-18	66.37	91-35-20	4.00
483	120-42-53	66.355	91-31-43	4.10
484	110-17-05	58.92	91-42-59	3.90
485	126-35-53	76.70	91-16-44	4.10
486	115-20-43	78.085	91-22-49	4.10
487	110-42-27	70.635	91-40-28	4.10
488	115-14-22	128.465	89-08-00	4.35
489	110-47-23	121.450	89-26-13	3.90
490	114-17-02	140.675	89-06-08	4.70

Site 31 White Alice (cont.)

04NE31 B2
B1

04NE31 SS110

04NE31 SS111
SS112 SB113
SS114
SS115 SB116

SS117 SB118
SS119
SS120 SB121
SS122
SS123 SB124
SS125 - ~~got entered as~~ SS115 fixed
SS126 SB127
SS128 SB129
SS130

(1208)

~~(106)~~ BS BM H. HR = 3.04'

(54) ⊼ ALICE HI - 4.87' 1.485m

FS	H∡	SD	Z∡	HR
508	350-07-31	310.70	94-25-59	3.5
509	154-16-18	194.845	86-33-42	4.00
510	354-50-18	187.465	94-24-10	4.00

(1208) BS BM H

(3201) ⊼ GPS 3201 2007

511

9-7-04

Site 31 - White Alice (cont.)

04NE3155136SB137

Terra? Spike - uphill end of driveway

set stake @ 01NE3155123 (Pt 120$\overset{3}{9}$)

Set stake at location of 98NEC1355B02

① BS BMB

~~106~~ 120B ⊼ BM-H HI = 3.14' 0.960m

FS	H∡	SD	Z∡	HR
512	218-41-10	662.06	91-05-58	3.92
513	260-20-35	764.27	91-47-37	11.5
514	268-13-19	809.98	92-01-23	4.35
515	264-40-13	787.085	92-06-09	6.00
516	30-21-09	1693.295	90-30-56	5.40

9-7-04

Site 8

~~04NE~~ 26MW-3 - N ~~pt~~ top casing

04NE ~~29~~ 08 SW101 ! entered 29 not 08 !

04NE 08 SD103

04NE 08 SD102 → ~~Should be~~ fixed 103

04NE 29 SW 101 ← need to verify - stake = 2' offset -

"River" is ± 2.5' wide, 2' deep - bears S80E/N80W

Stake is just upstream of a 12" log bridge

END OF BOOK

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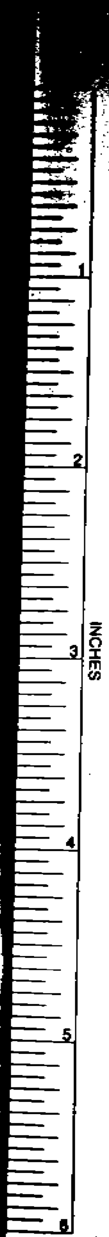


Name ______________________

Address ______________________

Phone ______________________

Project ______________________

CONTENTS

PAGE	REFERENCE	DATE
2→5	Control	9-7-04
6→7	Site 1 + Estuary Portion Site 29	9-7-04

① BS BM-B

~~(106)~~ 1208 $\overline{\wedge}$ BM-H HI = 3.14'

FS "ESTUARY" ~~HB~~ = 4.20' + .66
-4.86'
1.482m

1) 267-11-54
2) 534-23-36
M) 267-11-48

∡ = 267-11-50

Horz
1) 92-48-11
2) 185-36-17
M 92-48-09

HD = 5328.615' 1624.165m
5328.620' 1624.66m

VD = -49.200' -14.996m
-48.675' -14.836m

9-7-08

CONTROL

set spike btwn runway + Susti River,
downstream of bridge
on small knoll near field of
weathered 2x6's

Δ Elev. BM-H to ESTUARY

= 3.14
- 48.94
- 4.86
- 50.66

Elev. BM-H = 69.96
- 50.66
Elev. @ Estuary 19.30
p. 5 19.36
Mean 19.33

① BS BM-~~B~~B

(1209) ⊼ Lounsbury HI = 4.19 1.278m

(55) FS "ESTUARY" HR=4.86

1) 170-58-00
2) 341-56-01
M) 170-58-01

Horizon ∡ = 170-57-58

1) 189-02-03
2) 378-04-10
M) 189-02-05

HD = 4971.255' 1515.242m
4971.255' 1515.242m

VD = -48.650' -14.829m
-48.455' -14.769m

SIDESHOT

517 "IDEAL"
518 STAKED

9-7-04

CONTROL

ΔElev. Louns. → Estuary

4.19
-48.55
- 4.86
-49.22

Elev. @ Louns. 68.58
-49.22
19.36
see also p3

01NE07551277 N 100,355.29
E 99,394.93

(55) BS Estuary HI=4.86

(56) ⊼ Airstrip HI=4.77'

FS	H∢	SD	Z∢	HR
519	00-00-02	423.76	90-52-04	4.86 ~~5.0~~
520	347-57-05	262.295	91-11-18	6.0
521	55-49-01	351.41	93-04-49	9.0
522	46-18-40	487.835	92-33-41	5.4
523	44-23-50	551.480	91-57-31	5.4
524	38-47-57	501.69	92-34-15	5.4
525	29-48-56	611.395	92-07-32	5.4
526	28-08-12	545.175	92-21-47	5.4
527	4-34-34	1262.025	91-01-31	5.4
528	~~4~~ 11-57-42	1274.485	91-01-00	5.4
~~529~~	~~0-00-06~~	~~423.76~~	~~90-52-04~~	HI=4.77 ~~4.86~~
530	181-37-10	491.73	89-56-57	5.3
529	60-00-06	423.755	90-52-04	4.86
531	341-50-00	360.865	90-50-44	~~9.00~~ 8.00

9-7-04

Site 29 - Sugi River Estuary

of Site 1 - Burn Area

Elev. Airport - Elev. Estuary + 6.51

= 19.33 (see p. 3) + 6.51

= 25.84

~~04NE01SS102~~ ESTUARY Δelev. = -6.51

04NE01SS102

04NE29SW101 OFFSET = ~~X (none)~~ 1'

04NE29SD104 OFFSET = 14' Sample @ (540)

01SS103 (NO OFFSET)

29SD105 OFFSET = 16' (541)

29SD106 OFFSET = 11' (542)

29SD107 OFFSET = 6.5' (543)

29SD109 OFFSET = 63' (544)

29SD108 OFFSET = 51.5' (545)

9-8-04

ESTUARY

04NE01SS104

ESTUARY Δelev = -6.51

04NE01SS101 ~~entered~~ fixed HR = 9.0

END OF BOOK

APPENDIX H

Field Sampling Forms

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER, BEN HEPNER
RANDY HESSONG

DRILL CONTRACTOR ~~DENALI~~ DRILLING
DISCOVERY

DRILLER JOE WININGER, FRANK, COLE

TYPE DRILL MOBILE 31

SIZE & TYPE OF CASING AUGER

JOB DACA85-03-D-003 T.O.6
NE CAPE 2004 PHASE III RI

BORING NO. 03 B1

ELEV.

LOCATION NORTH OF FORMER PUMPHOUSE

DATE 8-18-04

WEATHER 60°F CDY

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	SAMPLE TIME ~~DRILL~~ ACTION PID RDG.	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
03B1S1 S.S.	0 ft 2	9-6-4 ←(1.5')	4"	1814 0.0		MOIST DK BROWN GRAVELLY SILT. ODER OF ORGANICS (SEWAGE?) 3-1" ± PC. ROCK ONLY PS SAMPLE, NO ANALYTICAL.
03B1S2	2 4 3.5?	1-1-1 1.5'	9"	1825 0.0 ppm		Moist, 2" sandy SILT, trace organics, brown 2x MeOH
03B1S3	4 6 ↑5.5'?	9-22-39 1.5'	18	1840 0.7 ppm	5' ICE	6" MOIST BROWN SILT AND ORGANICS - MAY BE SLOUGH ~2" FROZEN ICE RICH SILT (ANALYTICAL) 10" SOLID ICE

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING

REMARKS

FROZEN @ ~3FT

HAMMER WT.

STROKE

HAMMER LIFT

SAMPLER

ROD DIA.

NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 6 ft

NO. SAMPLES: ATTEMPTED 3

RECOVERED 2

TIME DISTRIBUTION THIS HOLE

ON HOLE 1750

DONE DRILLING 1850

DRILLING 1808

OFF HOLE 1900

BORING NO. 03B1 SHEET 1 OF 1

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. DACA 85-03-D-003 T.O.6

LOGGED BY JULIE KEENER

DRILL CONTRACTOR ~~DENALI~~ BENITEAVNER, DRILLING DISCOVERY

DRILLER JOE WININGER COLE, FRANK

TYPE DRILL MOBILE 53

SIZE & TYPE OF CASING AIR ROTARY

JOB NE CAPE ST. LAWRENCE ISL 2004

BORING NO. 03 B2

ELEV.

LOCATION SOUTHWEST SIDE OF PUMPHOUSE

DATE 8-18-04

WEATHER 70°F

SAMPLE DATA SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	TIME ~~DRILL ACTION~~ PID RDG	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
03B2S1 SS	0 18"	2-1-2	2"	15:10 0.0ppm	6" bgs	WET. LOOSE BROWN MED SAND, PLUS 1" ANG. ROCK. SL. W HC ODOR NO ANAL. SAMPLE, ONLY FS.
03B2S2 SS.	2 Ft 3.5? 4 Ft	1-1-1	8"	15:23 0.4 PPm	~~5'~~ RER 8/19 PF	Wet, stiff Brown to Dk grey Thawed to frozen ice-rich SILT 1" Peat on top (DARK BROWN)
03B2S3 SS	4 Ft 5.5 6 Ft	5-9-11	18"	15:40 0.0 PPm		1/4 to 1/3" lenses of ice & grey SILT, wet TRIPLICATE B2S3R-1555 COLLECT DUPLICATE B2S3D-1545
03B2S4 S	6 Ft 8 Ft	18-19-13	18"	1558 0.0 ppm		<1/4" SEAMS OF ICE IN GREY SILT FROZEN, WET
	7.5					

DEPTH FROM	TO	FIELD LOG OF BORING
		Ice encountered at 5' (Lenses) RER 8/19

REMARKS SURFACE IS DRY-MOIST MED-COARSE SAND, TR. CGR.

HAMMER WT. 300 STROKE

HAMMER LIFT STROKE

SAMPLER

ROD DIA.

NO. OF TURNS

WATER LEVEL	TIME	DATE
6" bgs	15:05	8/18/04

FOOTAGE DRILLED 8

NO. SAMPLES: ATTEMPTED 4

RECOVERED 3

TIME DISTRIBUTION THIS HOLE

ON HOLE 1410

DONE DRILLING 1605

DRILLING 1500

OFF HOLE 1630

BORING NO. 03 B2 **SHEET** 1 **OF** 1

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER
DRILL CONTRACTOR ~~DENALI~~ DISCOVERY DRILLING
DRILLER DEWIMNGER COLE, FRANK TYPE DRILL MOBILE 31
SIZE & TYPE OF CASING AUGER

JOB DACA85-03-D-003 T.O.6 NE CAPE 2004 PHASE II RI
BORING NO. 03 B3 ELEV.
LOCATION ~13 FT NW OF 03 B1
DATE 8-18-03 WEATHER

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH	FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
03B3S1 SS		1 ft 3 2.5?	1-1-2	16"	1925 9.6		2x MeOH 2" layers of silt & organics
03B3S2		3 5 4.5?	1-1-4	8"	1935 6.5	4.8' Ice	5" SILT + PEAT, WITH 2-1.5" ROCKS 3" ICE
03B3S3		5 7 6.5?	4-13-21	18"	1945 3.0		3" SANDY ORGANICS + ICE 15" ICE FS SAMPLE ONLY IN TOP 3"

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING

REMARKS
DECON. BIT, & USING CLEAN AUGER 03B3 AT LOC. WHERE WE NOTED W. HC ODOR

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED
NO. SAMPLES: ATTEMPTED
RECOVERED

TIME DISTRIBUTION THIS HOLE
ON HOLE 1905 DONE DRILLING 1950
DRILLING 1910 OFF HOLE 2000

BORING NO. 03B3 **SHEET** 1 **OF** 1

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY Randy Hessong / JKOENER

DRILL CONTRACTOR Discovery Drilling

DRILLER Wininger & Sons TYPE DRILL Custom Air/rotary
Jo, Cole, Frank

SIZE & TYPE OF CASING No casing - 8" Auger

JOB DACA85-03-D-003 T.O. 6

BORING NO. 06B1

ELEV. site surface all w/in 2-4'

LOCATION NE portion Site 6 (Drum Field)

DATE 8/21/04

WEATHER Near 60F, high Smoke/Haze mild E. wind.

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	Time ~~DRILL ACTION~~ PID (ppm)	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
~~06B1S1~~ NOT SAMPLED	5	19, 15-12	6"	1530	GW @ ~5ft	BROKEN ROCK → NOT SAMPLED
06B1S1	6.5 7.5	4-7-15	12"	1540 0.3		WET SILTY COARSE GRAVEL (SUBANG) LT. BROWN ROCK IN CATCHER
06B1S2	10 11.5	7-13-15	9"	1555 0.3		WET SILTY F-M SAND

DEPTH FROM	TO	FIELD LOG OF BORING
0	0.1	Lichen, stunted woody plants
0	~3	COLLECT FS SAMPLE FROM AH CUTTINGS → 0.3 PPM AUGER (GRINDING) TO 3FT, BEYOND
		SAMPLE 06B1S1 FROM 6.5 TO 7.5 FT SUBMITTED AS 04NE06SB111 AT 1540
		SAMPLE 06B1S2 FROM 10 TO 11.5 FT. AT 1555 SUBMITTED AS 04NE06SB112.
		BOTH TO SGS FOR DRO/RRO (AK102/103), GRO/BTEX (AK101/SW8260), PAH SIM, PCBs (SW8082), RCRA METALS (SW 6020/7470/7041)

REMARKS

Air hammer 1st 3' to break rocks, then auger to 3.5 drive spoon

HAMMER WT. 300 lb STROKE

HAMMER LIFT SAMPLER 1.5' - 2" ID SS

ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 11.5

NO. SAMPLES: ATTEMPTED 3

RECOVERED 2

TIME DISTRIBUTION THIS HOLE

ON HOLE 1430 DONE DRILLING 1600

DRILLING 1450 OFF HOLE ~1630

BORING NO. 06B1 SHEET 1 OF 1

8/21/04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER

DRILL CONTRACTOR DISCOVERY DRILLING

DRILLER JOE WNINGER COLE, FRANK

TYPE DRILL MOBILE 31 AIR ROTARY

SIZE & TYPE OF CASING

JOB NECAPE 2004 PHASE IV RI DACA85-03-D-003 T.O.6

BORING NO. 06B2

ELEV.

LOCATION CARGO BEACH DRUM FIELD

DATE 8-19-04

WEATHER 65°F, CDY

SAMPLE DATA						
SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
~~06B2S1~~ SS	5 6.5	10-10- 7	~2"	1550	~5 FT	WET FRACTURED GRANITE AND COARSE SAND (NO SHEEN OR ODOR) ROCK IN SHOE, NO FS OR ANAL. COLLECTED
S.S. ~~06B2S2~~ ~~06B2S1~~	6.5 8	5-7- 7	3" ROCK	1555		3" LONG FRACTURED GRANITE ROCK IN CATCHER NO FS OR ANALYTICAL COLLECTED
06B2S1 SS	10 11.5	6-16- 12	3" ROCK ~2"	1615		2" WET LT GREY SL SILTY FINE SAND 3" ROCK IN SHOE (4OZ, 4OZ + MeOH)
06B2S2 SS	~~12.5~~ 13 ~~13.5~~ 14.5	6-6- 10	3" ROCK + ~4"	1625 0.4 PPM		~4" WET LT GREY F TO M. SAND, TR. SILT (ENOUGH FOR 3 JARS AND FS SAMPLE) 3" ROCK IN SHOE
06B2S3 SS	14.5 16	12-9- 6	6"	1750 0.2 PPM		6" LT GREY SL. SILTY VF-M SAND, F-C GRAVELLY GRAVEL IS ANGULAR GRANITE (FS + ANALYTICAL SAMPLE)

DEPTH FROM	TO	FIELD LOG OF BORING
TIME	1510	COLLECT FS SAMPLE (06B2 FS1)
		FROM AIR ROTARY CUTTINGS FROM
		TOP OF ~~PIPE~~ CASING. HNU PID = 0.0
		NEAR SURFACE (~2') BOULDER (SLOW
		DRILL ACTION) AT ~2.5 FT TO ~4.5 FT
		TWO S.S. SAMPLES → NO RECOVERY. USE A.R.
		FROM 8 TO 10 FT. TRY 2 S.S. SAMPLES.
		POOR RECOVERY
	to 1730	TRY TO USE AIR HAMMER ~~DOWN TO~~ HEAVING SAND -
		~~AH~~ A.H. STUCK, GOT UNSTUCK. AH TO
	1745	14.5 FT.
		DRIVE LAST SAMPLE DOES NOT APPEAR
		TO BE HEAVE.

REMARKS 5 FT INTERVALS TO 20 FT. SAMPLE FOR GRO/BTEX, DRO/RRO, PAH, PCBS, METALS; 4OZ MeOH, 8OZ, 4OZ

HAMMER WT.

STROKE

HAMMER LIFT

SAMPLER

ROD DIA.

NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED

NO. SAMPLES: ATTEMPTED 5

RECOVERED 3

TIME DISTRIBUTION THIS HOLE

ON HOLE 1440

DONE DRILLING 1800

DRILLING 1500

OFF HOLE 1845

BORING NO. 06B2 SHEET 1 OF 1

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY Julie Koenor
DRILL CONTRACTOR Discovery
DRILLER Joe Wininger TYPE DRILL
Cole, Frank
SIZE & TYPE OF CASING Auger / Airhammer

JOB DACA85-03-D-003 T.O.6
NE Cape 2004
BORING NO. 06B3 ELEV.
LOCATION Site 6 - Cargo Beach Drum Field
DATE 8-20-04 WEATHER 105°F Ptly Cdy.

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
06B3S1	3	18-21-	12"	1205	Damp @ shoe ?	Moist Brown Gravelly (subang F-C) Sandy (F) Silt.
SS	4.5	20		1.2		Rock in shoe (4oz+MeOH, 8oz, FS)
06B3S2	5	11-15-	14"	1225	~4.5'	Wet silty sandy (M-C) Gravel (F-C) Lt. Grey
SS	6.5	15		0.6		
06B3S3	10	18-15-	8"	1300		Wet Sl. Silty Med Sand, Trace F Sand
SS	11.5	14		0.0		Lt Grey 3" Rock in shoe
06B3S4	15	12-32-	8"	1500		Wet Lt. Grey M-C Sand (Angular) Tr Ang Coarse Gravel Sl. Silty
SS	16.5	18		0.7		
06B3S5	20	6-6-	Full	1530		Wet Lt. Grey Sl. Silty, M-C Ang Sand
	21.5	12	(18")	0.4		

FIELD LOG OF BORING

DEPTH FROM	TO	FIELD LOG OF BORING
	Time	Rocks/Boulders @ ~0.5 ft.
	1107	FS Sample: cutting @ 0.5 ft Brown moist
		Silt (=0.8 ppm @ 1150) No odor.
		Airhammer 0.5 to 3 ft.
		Auger JW would not advance through rock.
		Airhammer to ~2.5 ft. Auger in rocks
		Submitted to SGS for GRO/BTEX (AK101/
		SW8260), DRO/RRO (AK102/103), PAH SIM, PCBs
		(SW8082), RCRA Metals (SW6020/7470/7641)
	1205	06B3S1 as 04NE06SB103
	1225	06B3S2 as 04NE06SB104

REMARKS

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE
4.5	1220	8/20/04

FOOTAGE DRILLED 21.5

NO. SAMPLES: ATTEMPTED 5
RECOVERED 5

TIME DISTRIBUTION THIS HOLE Offsite 1300-1450

ON HOLE 1050 DONE DRILLING 1528
DRILLING 1100 OFF HOLE 1555

BORING NO. 06B3 SHEET 1 OF 1
8/20/04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER
DRILL CONTRACTOR DISCOVERY DRILLING
DRILLER JOE, COLE, FRANK WINNEKER TYPE DRILL
SIZE & TYPE OF CASING AIR HAMMER, AUGER

JOB DACA85-03-D-003 T.O.6 NE CAPE 2004
BORING NO. 06B4 ELEV.
LOCATION SITE 6 - CARGO BEACH DRUM FIELD
DATE 8-20-04 WEATHER 70°F, PARTLY CLDY. HAZY ?

SAMPLE DATA

SAMPLE NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH / NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
06B4S1 SS	3.5 5	2-12-18	9"	1655 1.2	WATER @ ~5.5'	(WOOD) NOT SAMPLED 3" MOIST BROWN SILT, TR-ORG (SLOUGH ?) 3" ROCK IN CATCHER 3" ~~GRAVELLY (BR ROCK~~ SILTY GRAVEL BROKEN ROCK (2-4OZ)
06B4S2	5 6.5	2-16-21	8"	1705 0.6		6" MOIST BROWN SILTY ~~SL~~ GRAVELLY (F, ANG) SAND (M) * LIKELY SLOUGH * BROKEN ROCK STUCK IN CATCHER 2 4-OZ JARS TRACE ORG (SM. F. WOOD)
06B4S3	10 11.5	7-10-11	9"	1745 0.0	GRINDING	WET LT. BROWN SL SILTY GRAVELLY (F-C) SAND (F-M), GRAVEL IS ANGULAR

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
		~0.5 FT ORG/MOSS, SILT
		COBBLES @ 0.5 FT.
		AUGER TO 3.5, 5 FT INTERVALS, AIR
	TIME 1725	HAMMER 6.5 TO ~8FT
		AUGER TO 10
		SUBMITTED TO SGS FOR GRO/BTEX (AK101/SW 8260), DRO/RRO (AK102/103), PAH SIM, PCBs (SW 8082), RCRA METALS (SW 6020, 7470, 7041).
	1655	06B4S1 AS 04NE06SB105
	1745	06B4S3 AS 04NE06SB106

REMARKS
JOE SAID HE IS FLOATING BIT PLUG IN AUGER

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE
5.5	1700	8-20-04

FOOTAGE DRILLED 11.5

NO. SAMPLES: ATTEMPTED 3
RECOVERED 3

TIME DISTRIBUTION THIS HOLE

ON HOLE 1600 DONE DRILLING 1755
DRILLING 1625 OFF HOLE 1900

BORING NO. 06B4 SHEET 1 OF 1

8/20/04

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 321-16821-3

LOGGED BY JULIE KEENER
DRILL CONTRACTOR DISCOVERY DRILLING
DRILLER JOE, COLE, FRANK WINWEER TYPE DRILL
SIZE & TYPE OF CASING AIR HAMMER, AUGER

JOB DACA85-03-D-003 T.O.6 NECAPE 2004
BORING NO. 06B5 ELEV.
LOCATION SITE 6 CARGO BEACH DRUM FIELD
DATE 8-21-04 WEATHER 60°F

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
06B5S1 SS	3 4.5	4-9-4	12"	1100 0.6		6" SLOUGH SILTY GRAVEL LOOSE ~~&~~ DRY. DAMP 6" SILTY GRAVEL MOIST
06B5S2 SS	5 6.5	3-3-6	12"	1115 0.4		Lt. brown to redish brown gravelly, sandy SILT; moist, trace gravel 06B5S2D-1120 06B5S2R-1125
06B5S3 SS	10 11.5	7-35-24	12"	1130 0.7	8 ▽	9" WET Lt. BROWN SILTY GRAVEL (C) 3" BROKEN ROCK

DEPTH FROM	TO	FIELD LOG OF BORING
0	3	(AIR HAMMER)
3	11.5	AUGER
		TO SGS FOR GRO/BTEX (AK101/SW8260), DRO/RRO (AK102/103), PAH SIM, PCBS (SW8082), RCRA METALS (SW6020/7470/7041)
TIME	1115	06B5S2 AS 04NE06SB107 AND DUPLICATE:
	1120	06B5S2D AS 04NE06SB~~108~~. 207.
	1130	06B5S3 AS 04NE06SB108
		TO NCA (QA LAB) FOR SAME ANALYSES:
	1125	06B5S2R AS 04NE06SB307 (QA REPLICATE OF 04NE06SB107).

REMARKS

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE
8		

FOOTAGE DRILLED 11.5
NO. SAMPLES: ATTEMPTED 3
RECOVERED 3

TIME DISTRIBUTION THIS HOLE
ON HOLE 1020 DONE DRILLING 1135
DRILLING 1035 OFF HOLE 1200

BORING NO. 06B5 SHEET 1 OF 1
8/21/04

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER/R. HESSONG
DRILL CONTRACTOR DISCOVERY DRILLING
DRILLER JOE WININGER
COLE, FRANK
TYPE DRILL
SIZE & TYPE OF CASING AIR HAMMER, Auger

JOB DACA85-03-D-003 T.O.6
NE CAPE 2004
BORING NO. 06B6
ELEV.
LOCATION SITE 6 - CARGO BEACH DRUM FIELD
DATE 8-21-04
WEATHER 60°F CLOUDY

SAMPLE DATA

SAMPLE NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH / NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
~~06B6S1~~	4	3/7/7	∅	1210		(EMPTY)
	5.5					~~ROCK~~
~~06B6S2~~	5	3/8/5	2"	1245		SILT + VEGETATION (SLOUGH)
	6.5					POOR RECOVERY → MOVE BORING ~2 FT OVER
~~06B6S4~~	2	3-4-5	12"	1315		5" ORG SURFACE VEGETATION
06B6S1	3.5	→ Sam 0.8 ft	0.4 ppm			7" MOIST STIFF BROWN-GREY SL. GRAVELLY SILT
NOT	5	3-5-6	10	1330		ROOTS/SURF. ORGANICS SILT MOIST BROWN UNKNOWN DEPTH
SAMPLED					water 4.5'	Spin auger to clear front.
06B6S2	6.5	4-5-	12	1350		MOIST STIFF BROWN/GREY/RUSTY ORANGE SL. GRAVELLY (F) SILT
	8	7	0.2 ppm			LENSES OF DK GREY F. SAND
06B6S3	10	4-6-6	12	1400	moist,	(WET SILT ON OUTSIDE OF SAMPLE CORE) STIFF GREY-BROWN MOTTLED SL. GRAV. (F) SILT
	11.5		0.2 ppm			PERCHED WATER?

FIELD LOG OF BORING

DEPTH FROM	TO	FIELD LOG OF BORING
0	4	AIR HAMMER
4	6.5	AUGER → NO RECOVERY, MOVE 2 FT OVER

SAMPLE 06B6S1 FROM ~0.8 FT (DRIVEN AT 2 to 3.5 FT) SUBMITTED AS 04NE06SB109 AT 1315.

SAMPLE 06B6S2 FROM 6.5 TO 8 FT. SUBMITTED AS 04NE06SB110 AT 1350

BOTH TO SGS FOR GRO/BTEX (AK101/SW8260), DRO/RRO (AK102/103), PAH SIM, PCBs (SW8082), RCRA METALS (SW 6020/7470/7041).

REMARKS

HAMMER WT. ______ STROKE ______
HAMMER LIFT ______ SAMPLER ______
ROD DIA. ______ NO. OF TURNS ______

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 11.5
NO. SAMPLES: ATTEMPTED 6
RECOVERED 3

TIME DISTRIBUTION THIS HOLE
ON HOLE 1205
DONE DRILLING 1410
DRILLING 1220
OFF HOLE 1425

BORING NO. 06B6 SHEET 1 OF 1
8/21/04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER
DRILL CONTRACTOR DISCOVERY DRILLING
DRILLER JOE WIMMER COLE, FRANK TYPE DRILL
SIZE & TYPE OF CASING AUGER

JOB DACA 85-03-D-003 T.O. 6
BORING NO. 10 B1 ELEV.
LOCATION SITE 10 - BURIED DRUMS
DATE 8-23-04 WEATHER 60°F LT-BREEZE Smoky/HAZY

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	DRILL ACTION	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
10B1S1	0 1.5	8-9-8	12"	1445 0.4		MOIST SL. SILTY GRAVELLY (F-C) SAND BROWN, TRACE ORG (ROOTS), MED DENSE USED HC (MOTOR OIL?) ODOR *
10B1S2	5 6.5	7-12-10	14"	1455 0.2		MOIST SL SILTY GRAVELLY F SAND (F-C) TR. ORG. ~~TR ORG~~ (ROOTS) DARK ~~GREY~~ BROWN — ORANGE/BROWN
10B1S3	10 11.5	18-22-27	16"	1515 0		MOIST DENSE BROWN TO DK. BROWN SILTY GRAVELLY (F-C, ANG) SAND (F-C) (CRUMBLY ROCK) *
10B1S4	15 16.5	20-40-50	8"	1535 0	WATER ~~WET~~ @ 16.5	MOIST GREY/BROWN SILTY GRAVELLY (F-C) ANG SAND (F-C) BROWN WET SILT ON OUTSIDE OF SAMPLE BROKEN ROCK IN CATCHER

FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
		SUBMIT TO SGS FOR GRO/BTEX (AK 101/SW8260) AND DRO/RRO (AK 102/103): 10B1S2 AS 04NE10SB104, 10B1S3 AS 04NE10SB105, AND 10B1S4 AS 04NE10SB106. SAMPLE 04NE10SB104 ALSO ANALYZED FOR PAH SIM AND TOC (SGS SOP.)

REMARKS

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 16.5
NO. SAMPLES: ATTEMPTED 4
RECOVERED 4

TIME DISTRIBUTION THIS HOLE
ON HOLE 1435 DONE DRILLING 1535
DRILLING 1440 OFF HOLE 1600

BORING NO. 10 B1 **SHEET** 1 **OF** 1
8/23/04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY J. KEENER
DRILL CONTRACTOR DISCOVERY DRILLING
DRILLER JOE NININGER TYPE DRILL
SIZE & TYPE OF CASING AUGER

JOB DACA 85-03-D-003 T.06 NE CAPE 2004
BORING NO. 10B2 ELEV.
LOCATION SITE 10 - BURIED DRUMS
DATE 8/23/04 WEATHER 65° HAZY SMOKY

SAMPLE DATA

SAMPLE NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH / NO. SAVED	TIME ~~DRILL ACTION~~ / PID	CONTACTS/ GROUNDWATER
10B2S1	0	8-8-8	6"	1300	
S.S. PB1	1.5 ~~2.5~~		2"	0.4	
NO SAMPLE	4	10-10-9	8	1315	SLOW, GRINDING
SS	5		0"	~~1.3~~	
10B2S1	5	11-11-36	10"	1320	
	6.5		10"	1.3	
10B2S2	10	12-20-42	10"	1340	H2O, ~~FROZEN~~ @ 11'?
	11		5	0.7	
10B2S3	11	45 (6")	6"	1355	
	11.5			0.4	
10B2S4	15	7-23-23	12"	1410	
	16.5			0.3	

FIELD CLASSIFICATION

2' ORGANICS / GRASS / SILT
BROKEN ROCK
SILTY (BROWN, MOIST) → PB1
ROCK IN CATCHER / SHOE
3" BROKEN ROCKS
MOIST BROWN SILTY MED SAND W/SCATTERED ORGANICS (ROOTS)
SLOUGH
BROWN GRAVELLY (C) SANDY SILT (F-M) STIFF
TR-ORG (ROOTS)
TOP ½ MOISTER
5" BROWN MOIST GRAVELLY (C) STIFF SILT. TR-ORG.
3" BROKEN ROCK
2" LT GREY DRY CRUSHED ROCK, BROWN SILT
WET LT. BROWN SANDY (F-M) SILT
LOOSE / RUNNY
WET DENSE BROWN SILTY GRAVELLY (F-C) SAND (F-C)
3" ROCK

FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
	10B2PB1	SILT FROM AROUND BROKEN ROCK - ~0.5 ft. BGS - RANDY - PID = 0 ppm @ BORING
	11	RESISTANCE (BOULDER)

SUBMIT TO SGS FOR GRO/BTEX (AK101/SW8260) AND DRO/RRO (AK 102/103):
10B2S1 AS 04NE10SB101,
10B2S2 AS 04NE10SB102, AND
10B2S4 AS 04NE10SB103.
SAMPLE 04NE10SB103 ALSO ANALYZED FOR PAH SIM AND TOC (SGS SOP)

REMARKS

"GROUNDWATER" AT 11 FT BGS MAYBE WATER PUSHED UP IN SPOON.

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 16.5

NO. SAMPLES: ATTEMPTED 6
RECOVERED 4

TIME DISTRIBUTION THIS HOLE

ON HOLE 1245 DONE DRILLING 1410
DRILLING 1255 OFF HOLE 1425

BORING NO. 10B2 SHEET 1 OF 1
8/23/04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY Randy Hessong
DRILL CONTRACTOR Discovery Drilling
DRILLER Wininger & Sons Jo, Cole, Frank
TYPE DRILL Homebuilt Cool/Tuber rotary
SIZE & TYPE OF CASING 4" threaded

JOB NE Cape DACA85-03-D-003 TO6
BORING NO. 13B1
ELEV.
LOCATION Main Operations Complex, next to perimeter road
DATE 8/26/04
WEATHER clear, cool breeze from E. 50°F

SAMPLE DATA						FIELD CLASSIFICATION
SAMPLE NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH / NO. SAVED	DRILL ACTION	Time CONTACTS/ ~~GROUNDWATER~~ Headspace	
13B1 S1	5 6.5	8/8/11	12"	rocks	13:10 110ppm	Brown, sl. silty, sandy Gravel, moist Strong petroleum odor - in cobbles + diesel adequate volume for Nat. Atten., not Grainsize *
13[redacted] B1S2	10 11.5	5/21/21	6"	rocks	13:20 50ppm in rocks	Dk. brown, sl. silty, sandy GRAVEL in cobbles W/ diesel odor Minimal material - 1/2 8oz jar + AK101/ar
13[redacted] B1S3	15	7/9/11	8"	water ∇	1340 178ppm 1345-P	DK gray, sandy, gravelly SILT in Cobbles. Moist to wet At GW interface 13B1S3D=Dup. 13B1S3R=REPLICATE *
13[redacted] B1[redacted] B1S3	16.5	9/20/8	6"		1350 -P	Combined 2 split spoons - aluminum pan to homogenize Non-volatiles *
13[redacted] B1S[redacted]4	18 19.5	7/10/7	12"		~~10~~ 1413 55ppm in rocks	Gray, sandy, silty Gravel in cobbles, wet strong diesel odor - Also Grainsize sample - Apply w/ above *
13[redacted] B1S[redacted]5	25 26.5	7/12/7	12"		15:10 6.6ppm	Brown Gravelly SAND in Cobbles, wet 4" lense medium SAND, 6" fractured rock. *
13B1 S6	32 33.5	6/7/8	8"		15:40 0.2ppm	Olive/Brown medium sand in fractured cobbles. partial 8oz, AK101 jars

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
0	4	sl. silty, sandy GRAVEL in Cobbles
4	~~6~~ 11.5 MH	strong diesel (weathered) odor
~~15~~ MK		5 ppm out of casing
15	18	DK. gray sandy silt in gravel + cobbles
		- GW interface - strong diesl odor
		Silt plugs conductor casing - add tap H2O to blow out [illegible]
23'	25	Drill action/cuttings
		suggest bedrock
25		Soil again
		Sand lense ≈4" at 25'
30		Clean, water washed material.
		(Sand in cobbles)
40		Gray, tight silty clay/Clay silt

REMARKS

Drilling through sticky contaminated material into cleaner, high water material - high potential for cross contamination

HAMMER WT. 300 lb
STROKE
HAMMER LIFT
SAMPLER
ROD DIA.
NO. OF TURNS

Chips added @ 16.5 while backfilling

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED
NO. SAMPLES: ATTEMPTED
RECOVERED

TIME DISTRIBUTION THIS HOLE

ON HOLE 12:45
DONE DRILLING 17:30
DRILLING
OFF HOLE

BORING NO. 13B1 SHEET 1 OF 1
8/26/04

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 321-16821-3

LOGGED BY Randy Hessong
DRILL CONTRACTOR Discovery Drilling
DRILLER
TYPE DRILL
SIZE & TYPE OF CASING

JOB NE Cape DACA85-03-D-003-TO 6
BORING NO. 13B1
ELEV.
LOCATION 13B1, Main operations Complex
DATE 8/26/04
WEATHER Clear, cool E wind to 10 50F

SAMPLE DATA						
SAMPLE NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH / NO. SAVED	DRILL ACTION	TIME ~~CONTACTS/ GROUNDWATER~~ PID	FIELD CLASSIFICATION
38 39.5	13B1 ~~S7~~	15/27/14	Ø	Hard	16:45 —	No recovery - go down more
40 41.5	13B1 S~~8~~7	6/8/24	6"	Hard	17:10 0.2ppm	Olive gray green, gravelly, clayey silt in cobbles ~~(Till)~~ ML-CL * 3/4 of 9oz, + Akla Jar End Boring - ~~Aquitard~~ layer
					see	previous page

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING

REMARKS

HAMMER WT.
STROKE
HAMMER LIFT
SAMPLER
ROD DIA.
NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED
NO. SAMPLES: ATTEMPTED
RECOVERED

TIME DISTRIBUTION THIS HOLE
ON HOLE
DONE DRILLING
DRILLING
OFF HOLE

BORING NO. 13B1 SHEET 2 OF 2

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY Ben Heavner
DRILL CONTRACTOR Discovery Drilling
Wininger & sons
DRILLER Jo Cole, Frank TYPE DRILL Air/rotary
SIZE & TYPE OF CASING 4" steel

JOB NE Cape, DACA85-03-D-003, T.O. 6
BORING NO. 04NE~~2MW2~~ 17MW1 3X ELEV.
LOCATION USACE NE Cape, SW side of main complex
DATE 8/29/04 31 WEATHER Cool, cloudy.

SAMPLE DATA HNU 101

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	DRILL ACTION	Time CONTACTS/ GROUNDWATER Headspace	FIELD CLASSIFICATION	
S1	6' 7.5'	7/9/8	18" dr 6"		1354 0,0	Redish Brown, moist gravelly SAND 1x 8oz, 1x 4oz MeOH, 1x 4oz NAP, 1x NAP	*
S2	10 11.5'	5/8/10	18" dr 4"		14:09 10' ▼ 0.2	Gray silty sandy GRAVEL, wet. 1x 8oz, 1x 4oz MeOH	*
S3	16' 17.5'	8/8/9	18" dr 6"		14:27 0.3	Brown, sandy GRAVEL, wet 1x 4oz meoH, ½ 8oz	
S4	20' 21.5'	14/9/13	18" dr 6"		14:50 0.5	Brown sandy GRAVEL, wet 1x 4oz meoH, 3/4 8oz	*

DEPTH FROM	TO	FIELD LOG OF BORING
0	[illegible]	Loosly packed rocks / fill
[illegible]	2.5	brown, peat/soil Easy Drill action
2.5		Typical harder material
10	20	Sandy Gravel saturated layer
20		Hit something hard, drove spoon
		possible frozen?

REMARKS

HAMMER WT. 300 lbs STROKE
HAMMER LIFT SAMPLER 18"x2" ID SS
ROD DIA. 2" NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED
NO. SAMPLES: ATTEMPTED
RECOVERED

TIME DISTRIBUTION THIS HOLE
ON HOLE 13:20 DONE DRILLING 15:00
DRILLING ~~15:00~~ OFF HOLE

BORING NO. 17MW1 **SHEET** 1 **OF** 1

SHANNON & WILSON, INC.
Geotechnical Consultants

FIELD LOG OF BORING

JOB NO. 321-16821-3

LOGGED BY J. KEENER
DRILL CONTRACTOR DISCOVERY DRILLING
DRILLER JOE WIMMER COLE, FRANK TYPE DRILL MOBILE
SIZE & TYPE OF CASING AIR HAMMER STEEL CASING

JOB DACA 85-03-D-003 T.O. 6
BORING NO. 18MW1 ELEV.
LOCATION SITE 18 (EAST OF EMERG. POWER BLDG.) MAIN OPERATIONS COMPLEX.
DATE 8-24-04 WEATHER 50°F FOG

SAMPLE DATA						
SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
18MW1S1 SS	5 6.5	17-19-23	9" 0	1145 0		MOIST LT BROWN-~~ORANGE~~ SILTY GRAVELLY (F) SAND (F-M) / CRUSHED ROCK.
~~18MW1S2~~ NOT SAMPLED	10 11.5	11-28-19	4 0	1215 1.2ppm	FS 18MW1 10'	1" MOIST SILTY GRAVEL (F-C) (CRUSHED ROCK) MANGLED CATCHER
18MW1S2 SS.	15 16.5	13-33-27	12"	1245 0.3ppm	ROCK	MOIST LT-BROWN SILTY ~~SAND (F)~~ GRAVELLY (F-C) (CRUSHED ROCKS) SAND (F-M)
~~18MW1S3~~ NOT SAMPLED	20 21.5	4-8-18	10" 0	1310 0.6ppm	~19' GW	WET SL SILTY GRAVEL ~~(F-C)~~ (C-F) BROKEN ROCK FS = MW1-20' ROCK IN CATCHER
18MW1S3 SS	25 26.5	11-35-REFUSAL	8" 10"	1512 0.3		2" WET SILT SLOUGH SANDY (F-M) 6" WET DENSE SILTY BROWN GRAVELLY (F-C) SAND ROCK IN CATCHER (2x 8OZ FORMS/MSD)

DEPTH FROM	TO	FIELD LOG OF BORING
		AIR HAMMER INSIDE CASING NO AUGER
		SLOW PROGRESS SINCE ROCKY
		WET SILT/SAND CUTTINGS @ ~20FT.
		→ WENT THROUGH FILL MATERIAL TO NATIVE
		ROD STUCK AT 25FT. OFFSITE 1400-1500
		WATER COMING UP CASING AT ~27FT.
		INSTALL MW: 18MW1 (SEE MW CONSTR. DETAILS)
		SUBMIT TO SGS FOR GRO/BTEX (AK101/SW 8260), DRO/RRO (AK102/103), TOC (SGS SOP), Cr, Pb, Zn, Hg (SW6020/7470/7041):
		18MW1S1 AS 04NE18SB101,
		18MW1S2 AS 04NE18SB102, AND
		18MW1S3 AS 04NE18SB103 (MS/MSD).

REMARKS LOCATION IN APPARENT FILL AREA (RECENTLY DOZED)

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE
~19 FT	1300	8/24/04

FOOTAGE DRILLED 26.5
NO. SAMPLES: ATTEMPTED 5
RECOVERED 3

TIME DISTRIBUTION THIS HOLE
ON HOLE 1100 DONE DRILLING
DRILLING 1110 OFF HOLE

BORING NO. 18MW1 SHEET 1 OF 1
8-24-04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY J. Keener / R. Hessong

JOB NE Cape DACA85-03-D-003 T.O6

DRILL CONTRACTOR Discovery Drilling

BORING NO. 19B1 ELEV.

DRILLER Wininger + Sons Jo, Gie, Frank TYPE DRILL Custom Air/Auger

LOCATION MAIN OPS. COMPOUND

SIZE & TYPE OF CASING TUBEX, AIR HAMMER

DATE 8-25-04 WEATHER 65° HIGH FOG / HAZE

SAMPLE DATA

SAMPLE NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH / NO. SAVED	DRILL ACTION	CONTACTS/ GROUNDWATER
19B1S1	5	12-11-	10"	1615	
SS	6.5	24	7"	0.2 ppm	
19B1S2	~~10~~ 12	10-12-	12"	1710	
SS	~~11.5~~ 13.5	14		16.5	
19B1S3	~~15~~ 17.5	17-14	12"	1740	GW@~17
	~~16.5~~ 19	-9		LOW BATTERY 24 1650	ft
19B1~~S4~~	~~20~~ 21	21	6"	1810	@
21'	21.5	8-17-14	0	12.8	1900
~~19B1~~ NOT sampled	21.5	4-6-	6"	1820	@
	23	19	0	~~24.8~~ ~~1900~~	
No Anal.	28	17/48/26	6"	9:48	
Headspace	29.5		0	21 ppm	

8/26 RTH

FIELD CLASSIFICATION

3" COARSE GRAVEL
4" STIFF GREY SL. GRAVELLY (F) SANDY (C), SILT MOIST
3" GREY/BROWN GRAVELLY (F) SILTY SAND (M-C) MOIST
MOIST + DRY SILTY GRAVELLY (F-C) SAND (F-C), BROWN
MOD. HC ODOR (4oz + MeOH 4oz, 8oz)
WET SILTY SANDY ~~(F)~~ GRAVEL (F-C)
STRONG HC ODOR [GM]
SL. HC SHEEN ON WATER
CRUSHED ROCK
PS ONLY
"
Crushed Rock - less weathering than previous
Headspace only - wet rock
Stop drilling - last 3 feet all look like chipped rock - call it bedrock?
No analytical

FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
SURF SILT	SAND ROCK?	5 MINUTES TO AIR HAMMER 0-5 ft.
		SLOW DRIVING 6.5-
	10'	MOD. WEATHERED DIESEL ODOR IN CUTTINGS
	1700	PID RDG. =1 ppm IN BREATHING ZONE.
Silty Sandy Gravel	17:10	Strong diesel odor - 7ppm @ casing,
		3-4ppm in down-wind breathing zone
	21'	Crushed rock - weathering
	↓	decreasing w/ depth
		-Bedrock?
	29.5 BOB	

REMARKS 4/BORING FOR FUELS, 1/BORING FOR BTEX, TOC, METALS, NAT'L ATTEN. PARAM. 2/BORING FOR GRAINSIZE MOISTURE

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 29.5

NO. SAMPLES: ATTEMPTED
RECOVERED

TIME DISTRIBUTION THIS HOLE
DRILLERS OFFSITE 1620-1637
ON HOLE 1540
DONE DRILLING 10:00 8/26
DRILLING 1555
OFF HOLE Decon 11:15 8/26

BORING NO. 19B1 **SHEET** 1 **OF** 1
8/25, 26/04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER	JOB DACA85-03-D-00
DRILL CONTRACTOR DISCOVERY DRILLING	BORING NO. 20MW1 ELEV.
DRILLER JOE WIMMER, COLE, FRANK TYPE DRILL MOBILE	LOCATION MAIN OPERATIONS COMPLEX
SIZE & TYPE OF CASING TUBEX, AIR HAMMER	DATE 8-25-04 WEATHER

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	Time ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
						[illegible]
20MW1S1 SS	~~3~~ ~~6.5~~	35-29- 45	12 10"	1000 0ppm		DENSE BROWN SL. SANDY (F-M) SILTY GRAVEL (F-C) ANGULAR, MOIST + BROKEN ROCK
20MW1S2 SS	5 6.5	20-22- 22	10" 10'	1018 0ppm		" " MEDIUM DENSE (SOME what DISTURBED/SLOUGHED?)
20MW1S3 SS	10 11.5	11-11- 10	6" 5"	1040 0ppm		MED-DENSE BROWN/RUSTY SILTY GRAVELLY (F-C) SAND (F-M) MOIST 2x 2" ROCKS (INTACT)
20MW1S4 SS.	15 16.5	13-19- 10	12 12	1100 0ppm		MED-DENSE BROWN GRAVELLY (F-C), SILTY SAND (F-M)
20MW1S5	20 21.5	16-29- 47	12 9	1130 0ppm		3" BROKEN ROCKS DENSE BROWN SILTY, GRAVELLY (F) SAND (F-M) MOIST
20MW1S6 25'	25 26.5	42-32 32	6" 1	1210 0ppm	~22.5 GW	WET BROKEN ROCKS 1" SANDY SILT (PF? DRILLER THOUGHT) FS SAMPLE ONLY (20MW1 25")

DEPTH FROM	TO	FIELD LOG OF BORING
		SILT CUTTINGS AT ~1ft
		AIR HAMMER TO 30FT BGS

REMARKS SURFACE GROUND IS COARSE GRAVEL TO BOULDERS w/ SILT, UNEVEN/ROUGH, RECENTLY PLACED FILL?

HAMMER WT. STROKE
HAMMER LIFT SAMPLER
ROD DIA. NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 26.5

NO. SAMPLES: ATTEMPTED 6
RECOVERED 5

TIME DISTRIBUTION THIS HOLE

ON HOLE DONE DRILLING 1220
DRILLING 0940 OFF HOLE

BORING NO. 20MW1 SHEET 1 OF 1

8-25-04

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY JULIE KEENER
DRILL CONTRACTOR DISCOVERY DRILLING
DRILLER JOE WININGER COLE, FRANK
TYPE DRILL
SIZE & TYPE OF CASING TUBEX, AIR HAMMER

JOB DACA85-03-D-003 T.O.6
BORING NO. 20MW1
ELEV.
LOCATION MAIN OPERATIONS COMPLEX, SITE 20
DATE 8/24/04
WEATHER 60°F FOGGY

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	TIME ~~DRILL ACTION~~ PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION
~~20MW1S1~~ SS	5 6.5	30-22-32	4" 0	1855 —	SILT @ ?? ~2-3	MOIST SILT BROWN, ROCK DUST 3" ROCKS NOT SAMPLED
	10	70(4")	0			

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
		COARSE GRAVEL, BROWN SILT
	10'	REFUSAL → MOVE RIG
		→ SEE OTHER SHEET FOR SECOND ATTEMPT

REMARKS 3 SAMPLES / BORING FOR GRO/ BTEX, DRO/RRO, TOC, 4 METALS, 5FT INTERVALS.

HAMMER WT.
STROKE
HAMMER LIFT
SAMPLER
ROD DIA.
NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED
NO. SAMPLES: ATTEMPTED
RECOVERED

TIME DISTRIBUTION THIS HOLE

ON HOLE 1820
DONE DRILLING 1900
DRILLING 1835
OFF HOLE

BORING NO. 20MW1 SHEET 1 OF 1
8-24

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY B. Hoovner J Koenen

DRILL CONTRACTOR Discovery Drilling

DRILLER Wininger & Sons Jo, Cole, Frank TYPE DRILL Air/rotary

SIZE & TYPE OF CASING ~~Air Hammer~~ 4" steel

JOB ~~OTNE~~ USACE NE Cape DACA85-03-D-003, T.O. 6

BORING NO. ~~22MW2~~ 22B1 ELEV.

LOCATION Top (S) side of Main Complex

DATE 8/28/04 WEATHER 55° CLR.

SAMPLE DATA HNU 101

SAMPLE NO. / TYPE	DEPTH FROM / TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH / NO. SAVED	~~DRILL ACTION~~ TIME / PID	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION	
~~22MW2~~ B1	6	14-38	12" drive	10:42		Lt brown, dry, gravelly SAND; in cobbles	*
S1	7.5	54	12"	0.3		1x 8oz, 1x MeOH 4oz	
~~22MW2~~ B1	~~10~~ 12.5	12/28/19	18" drive	11:05	▽?	brown to gray, moist to dry, sandy GRAVEL;	*
S2	14		16"	0.3		1x 8oz, 1x MeOH 4 oz	
~~22MW2~~ B1	17	17/53/—	1' drive	11:25		Gray, dry, sandy GRAVEL	*
S3	18			0.5		1x 8oz, 1x MeOH 4 oz	
22B1	25	7/20/31	18" dr.	12:28		Slough & Ground rock (cuttings - RTH & Rock B124)	
S4	27		12"	0.2		1x 8oz, 1x MeOH 4oz	

DEPTH FROM	TO	FIELD LOG OF BORING
0'	5'	Recent Cobbly Fill
S1		Refusal
7'	12'	Solid rock, hard drill action, cutting
S2		top ½ moist, bottom ½ rock debris
15'		cemented frozen (?)
18' -	25	Just after spoon, grinding away at rock
S4		Jo commented hammer had broken up

REMARKS

HAMMER WT. 300 lb STROKE

HAMMER LIFT SAMPLER 18" x 2" ID SS

ROD DIA. 2" NO. OF TURNS

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 27'

NO. SAMPLES: ATTEMPTED 4

RECOVERED 4

TIME DISTRIBUTION THIS HOLE

ON HOLE 1000 DONE DRILLING 1230

DRILLING 1000 OFF HOLE 1420

BORING NO. ~~MW 22~~ 22B1 SHEET 1 OF

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY B. Heavner
JOB USACE DACA85-03-D-003, T.O. 06

DRILL CONTRACTOR Discovery Drilling
BORING NO. 22MW2 ELEV.

Winiger & Sons
DRILLER Jo, Cole Frank TYPE DRILL Air/Rotary
LOCATION Top (S) side of main complex

SIZE & TYPE OF CASING 4" Steel
DATE 8/28/04 WEATHER 50° wind

SAMPLE DATA

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	DRILL ACTION	Time CONTACTS/ GROUNDWATER Headspace	FIELD CLASSIFICATION
22	6	16/32/23	18" drive	Head	15:17	Brown to gray, Gravelly SAND w/rock debris. Dry to moist in bottom 4", Slight *
S1	7.5		12"		3.0 ppm	HC odor 1x 4oz MeOH 1x 8oz
22	13	~~15~~/24/25	18" drive		15:49	Br to gray, silty, Sandy, GRAVEL w/rock *
S2	14.5		12"		0.8 ppm	debris, dry to moist
22	17	16/17/18	18" dr.		16:06	Brown, moist gravelly SAND *
S3	18.5		11"		0.7 ppm	
22	22	20/19/20	18" dr		16:42	Br. slt. silty, sandy GRAVEL in cobbles
S4	23.5				▽ 22'	moist
						Marginal water contact (~6")
22	23.5	15/21/20	18" dr		16:42	
S4D	25		18"		1.0 ppm	
22	31	17/25/25	18" dr		17:28	Br. slt. silty, sandy GRAVEL in cobbles
S5	32.5				▽ 28' 0.3	wet.

FIELD LOG OF BORING

DEPTH FROM	TO	FIELD LOG OF BORING
0	2	Fill material w/steel, concrete, then
		into more soil material
~7.4		moist, H/C odor
10'		Encounter hard rock again - Joe "If
		like last one, I call Bedrock"
		Small pockets of just enough moisture to
		~~stick to rock~~ for dust to stick to rock
		debris
14		rock/fractures
22'		Water
30'		Possible frozen material? - Moisture
		on hammer
35'		Frost
38'		B.O.B ~~8/28~~ 8/29/04

REMARKS
S4 & S4D spoons mixed in pan, sampled

HAMMER WT. 300 lbs STROKE
HAMMER LIFT SAMPLER 18" x 2" ID SS
ROD DIA. 2" NO. OF TURNS

WATER LEVEL	TIME	DATE
22	1642 BH	8/28/04

FOOTAGE DRILLED
NO. SAMPLES: ATTEMPTED
RECOVERED

TIME DISTRIBUTION THIS HOLE
ON HOLE 1500 DONE DRILLING
DRILLING 1510 OFF HOLE

BORING NO. 22MW2 SHEET 1 OF 1

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY Randy Hessong

JOB N.E. Cape, DACA85-03-D-003, TO. 6

DRILL CONTRACTOR Discovery Drilling

BORING NO. 22MW3 ELEV.

DRILLER Winingerfsons Jo, Cole, Frank TYPE DRILL Air rotary

LOCATION Top (S) side of Main Complex

SIZE & TYPE OF CASING 4" steel

DATE 8/27/04 WEATHER Clear, fairly calm Cold in AM, warm in PM

SAMPLE DATA

HNU 101

SAMPLE NO. TYPE	DEPTH FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	DRILL ACTION	Time CONTACTS/ GROUNDWATER Headspace	FIELD CLASSIFICATION	
S1 (22MW3)	5.5 7	9/19/9	18" drive 10"	Hard	0.5ppm	Brown, sl. silty, sandy GRAVEL; moist; in cobbles GRO/DRO/RRO 1X8oz, 1X MeOH Collect ~~[illegible]~~ Grain size sample to represent common MOC overburden. (1981)	✗ GRO DRO RRO
S2	12.5 14	16/10/17	16"		0.0ppm	Fractured cobble @ 12.6' + 13.5' Grayish brown, sandy, gravelly SILT; moist; in cobbles. 2X8oz, 1X MeOH; GRO, BTEX, DRO/RRO, PAH, TOC, MS/MSD	
S3	17 18.5	10/15/19	16"		1.0ppm	Reddish brown, sandy, silty GRAVEL; moist; in cobbles. Cobble fractured at each end of spoon. 1X8oz (3/4 full), 1X MeOH	GRO DRO RRO
S4	22 23.5	13/37/28	12"		0.2ppm	Same material as S3, moisture at top of sample (w/ corn oil odor) above fractured cobble in spoon. May be zone of Minor water from Military well log. 1X8oz (partial) 1X MeOH	~~GRO DRO RRO~~
S5	27 28.5	28/32/52*	~~16~~ 3/4 14"		↓? 0.0ppm	Brown, silty, sandy GRAVEL; moist or frozen in cobbles *Frozen likely 1X8oz, 1X MeOH	GRO DRO RRO
HS1	33 34.5	26/56 ref.	10" drive		↓✓ 0.4ppm	3" of cobble in shoe, 2" soil like S5. 2" wet crushed rock 7" recovery - mostly crushed - No sample, Headspace only	
S6	38 39.5	31/34/36	14"	↓	0.1ppm	Brown, silty, sandy GRAVEL in cobbles Definitely Frozen turning wet in sun. QA/QC recovery 3X8oz, 3X MeOH	GRO DRO RRO

FIELD LOG OF BORING

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
0'	3'	Recent Cobbly fill
3	12	Cutting typical of MOC
12	15	Grayish silty stuff. May be a place for contaminants to perch.
15	19	Typical cobbly drill action
22'	27	Comment that drilling pretty hard for materials in sampler (Possible start of frozen ground)
33'		Not enough recovery to confirm frozen / Good water, though
38'		Definite Frozen
40.5	42	Drive spoon to confirm granular hard-frozen, 8" recovery, A bit sandier soil than S6 11/12/28 → set well.

REMARKS

Exact start of frozen ground not easily defined

No apparent contam.

HAMMER WT. 300 lb. STROKE Std.

HAMMER LIFT SAMPLER 18" x 2id SS

ROD DIA. 2" NO. OF TURNS 3

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 40.5

NO. SAMPLES: ATTEMPTED 8

RECOVERED 7

TIME DISTRIBUTION THIS HOLE

ON HOLE 10:15 DONE DRILLING 16:05

DRILLING 10:35 OFF HOLE 18:00

BORING NO. 22MW3 SHEET 1 OF 1

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY Randy Hessong
DRILL CONTRACTOR Discovery Drilling
DRILLER Wininger & Sons Jo, Cole, Frank
TYPE DRILL Custom Odex/rotary
SIZE & TYPE OF CASING 4" drive Steel, reverse threaded

JOB N.E. Cape DACA85-03-D-003 T.O.6
BORING NO. 26MW1
ELEV.
LOCATION Among scrap tanks above main site
DATE 8/30/04
WEATHER Overcast, w. wind 48-53°F, 10 Kt

SAMPLE DATA						
SAMPLE NO. TYPE	DEPTH	FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	DRILL ACTION	CONTACTS/ GROUNDWATER

No samples - simply observe cuttings/

FIELD CLASSIFICATION

Drill Action

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
0	6	Brown ~~Typical~~ silty, sandy GRAVEL in cobbles
		moist. [Fill]
6'	~~7~~ 5½	Darker brown silty fine sand; moist
		P.I.D. screen: 0.0ppm - air + soil.
7'	11'	Dark brown, silty, sandy gravel w/organics
		moist; Old topsoil.
11'	16	Lighter redish brown sl. silty, sandy gravel
		in cobbles, typical of site.
16	18	Siltier lense.
232	238	Pretty much all fresh rock chips
278	-	Brown soil in rock again
35-36'		Moisture in cuttings, more SAND frozen?
37½"		Water on rock chips
42'		bottom of hole
		water @ 38.6' before pulling casing

during well install, BH felt bottom w/ pipe - Rock

REMARKS

HAMMER WT. ______ STROKE ______
HAMMER LIFT ______ SAMPLER ______
ROD DIA. ______ NO. OF TURNS ______

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 42'
NO. SAMPLES: ATTEMPTED ______
RECOVERED ______

TIME DISTRIBUTION THIS HOLE
ON HOLE 9:20
DRILLING 9:48
DONE DRILLING 14:36
OFF HOLE ______

Site 26 MW1 BORING NO. SHEET 1 OF ______

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

FIELD LOG OF BORING

JOB NO. 32-1-16821-3

LOGGED BY Randy Hessong
DRILL CONTRACTOR Discovery Drilling
DRILLER Winninger & Sons Jo, Cole, Frank
TYPE DRILL Home built Odex/rotary
SIZE & TYPE OF CASING Odex-type air-rotary - 4"

JOB N.E. Cape, St. Lawrence Isd.
BORING NO. 04NE26MW3
ELEV.
LOCATION Rise off main road between Sugi culvert ("2nd Bridge) and MOC
DATE 8/22/04
WEATHER Smoky Haze, near 60°F

SAMPLE DATA No Soil Samples

SAMPLE NO. TYPE	DEPTH	FROM TO	DRIVING RESISTANCE BLOWS/6 IN.	LENGTH NO. SAVED	DRILL ACTION	CONTACTS/ GROUNDWATER	FIELD CLASSIFICATION

DEPTH FROM	DEPTH TO	FIELD LOG OF BORING
0	0.1	Thin tundra vegetation, lichen on cobbles, gravelly silt (or Cobbles w/ silt)
0.1	5.5	Silty, sandy gravel in cobbles
5.5	5.7	Wet soil, then water & soil up.
5.7		Sandy Gravel in cobbles, wet
		↓
22.2'		Gray silt - medium tight by drill action. - Till.
	26'	— B.O.B.

REMARKS

General lithology observed while drilling (based on cuttings & feel.

HAMMER WT. ________ STROKE ________
HAMMER LIFT ________ SAMPLER ________
ROD DIA. ________ NO. OF TURNS ________

WATER LEVEL	TIME	DATE

FOOTAGE DRILLED 26

NO. SAMPLES: ATTEMPTED 0
RECOVERED 0

TIME DISTRIBUTION THIS HOLE

ON HOLE 13:45
DONE DRILLING 17:45
DRILLING ________
OFF HOLE ~~17:45~~ 19:50

BORING NO. 26MW3 **SHEET** 1 **OF** 1

8/22/04

~~13~~:45 start

17:45 Finish

04NE26MW3

Shallow investigatory Well

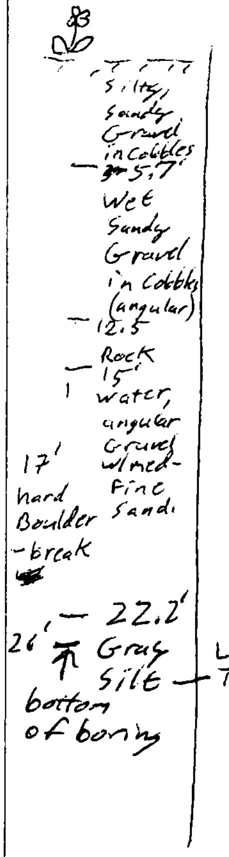
Surface: Cobbly, gravelly silt, minimal vegetation

silty, sandy Gravel ~~to gravelly~~ just below surface (0.1') to

Active frost patterning - post glacial.

Initial Casing = 7'10"
Bit stick-through = 7"

Easy Odex drilling initially - boulders slow underwater.



Water/wet ground coming up casing @ 5'7" bgs

Lots of water @ 10' down to ≃12.5

Reduced/shut off water 12.5-14.5'

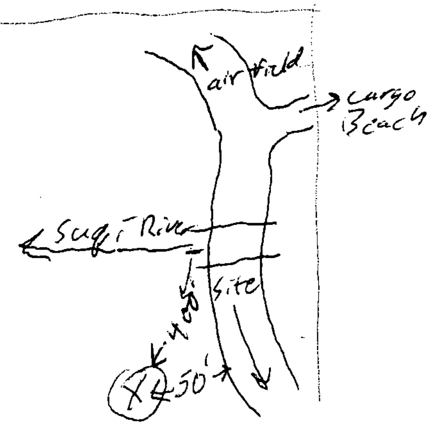
15' - Lots of water - w/ finer/Med. Sand
Air compressor having hard time with amount of water. (125psi, 375 cfm)

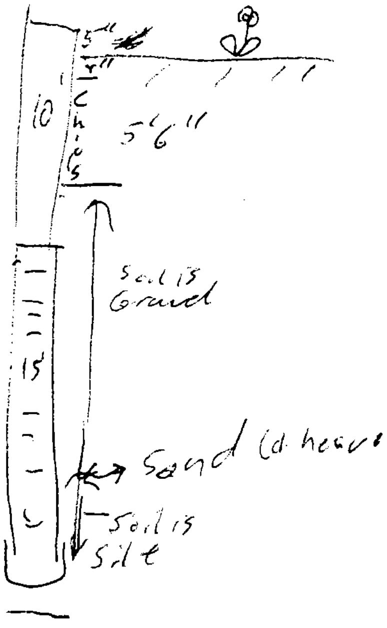
Casing down to 25.4' - keyed into silt

-Plan to instal 20' of screen. -maybe 15

Difficult to clear out

Casing pulled up out of silt → Over 100 gal/min water according to driller!





SHANNON & WILSON, INC.
Geotechnical Consultants

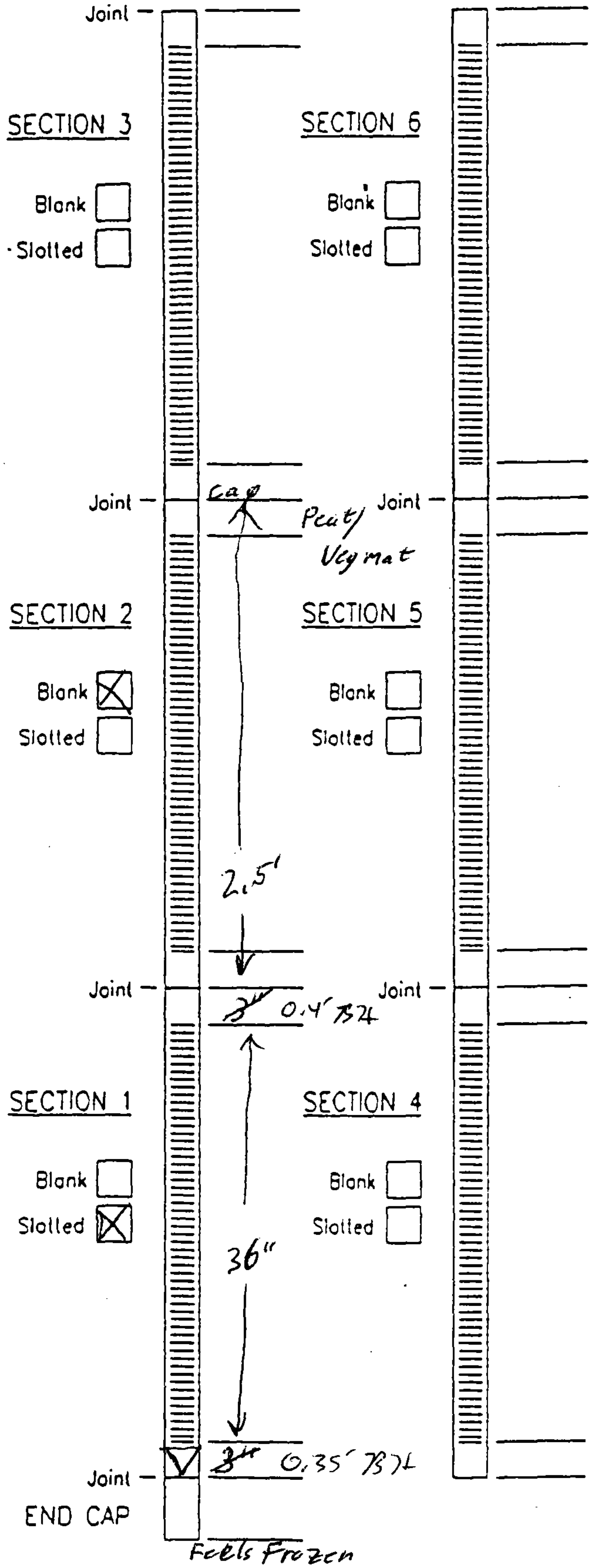
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3

Monitoring Well Number 03WP5

Date Installed 8/18/04

Engineer or Geologist RZH



SECTION 3
Blank ☐
Slotted ☐

SECTION 6
Blank ☐
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐
Stainless steel ☐
Other Galvanized Stl.

Diameter: 2" ☐
4" ☐
Other 1.25"

Slot size: 0.010 ☒
0.020 ☐
Other St. Steel, wound

SEALS: None

Depth below ground surface

	From	To
Bentonite:		
Cement:		

MONUMENTS:

Flush mount ☐ Post ☐
Description None
Depth below surface
Stickup

JOINTS:

Type THREADED

Pin end : Down ☐ Up ☐ Sleeve

SAND PACK:

Type or gradation None
Depth: From To

LOCKS:

Type Master padlock
Key number 2001

Length cutoffs, last section:

Well stickup 2.5'

New - small move, deeper

SHANNON & WILSON, INC.
Geotechnical Consultants

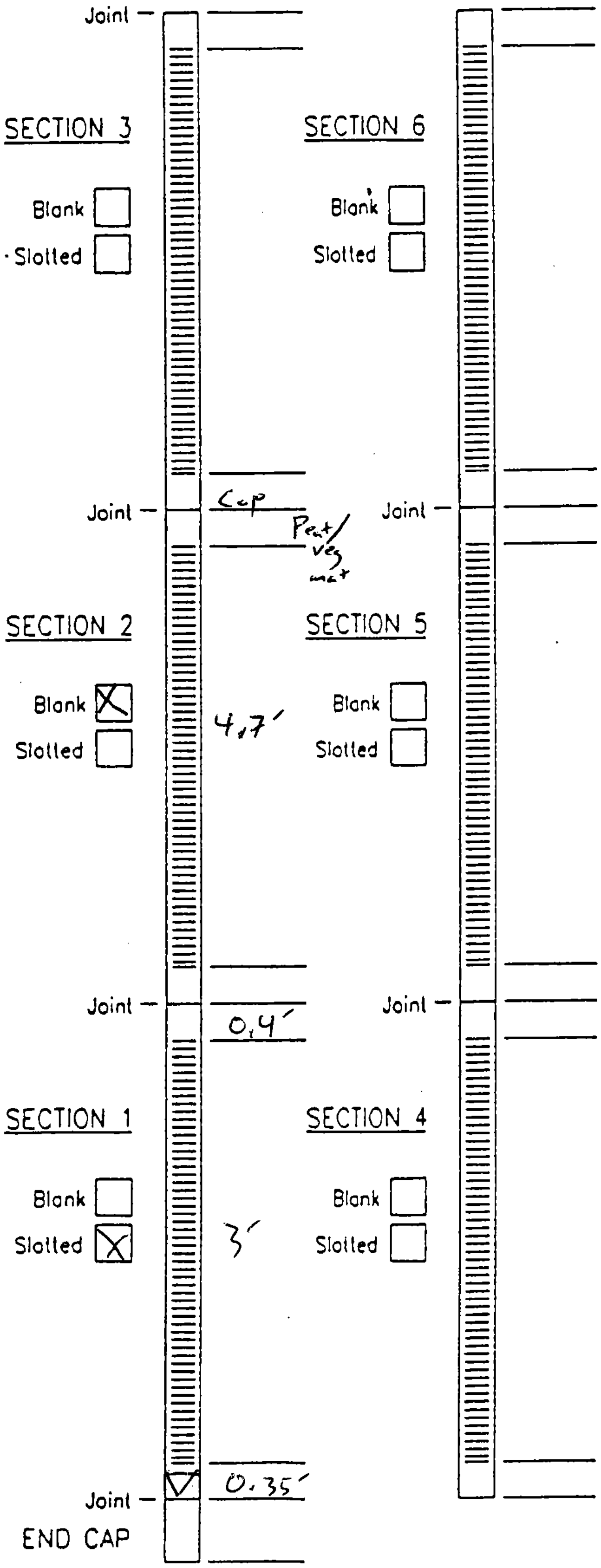
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3

Monitoring Well Number 03WP06 (2)

Date Installed 8/21/04

Engineer or Geologist Ben Heavner



SECTION 3
Blank ☐
Slotted ☐

SECTION 6
Blank ☐
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐ Stainless steel ☐ Other Gal. Steel

Diameter: 2" ☐ 4" ☐ Other 1.25"

Slot size: 0.010 ☐ 0.020 ☐ Other St. Steel Wound

SEALS: None

	Depth below ground surface From	To
Bentonite:	—	—
	—	—
Cement:	—	—
	—	—

MONUMENTS:

Flush mount ☐ Post ☐

Description None

Depth below surface

Stickup

JOINTS:

Type Threaded

Pin end : Down ☐ Up ☐ sleeve

SAND PACK:

Type or gradation None

Depth: From — To —

LOCKS: Type Master Padlock

Key number 2001

Length cutoffs, last section: 0.3'

Well stickup 0.48'

old

SHANNON & WILSON, INC.
Geotechnical Consultants

MONITORING WELL CONSTRUCTION DETAILS

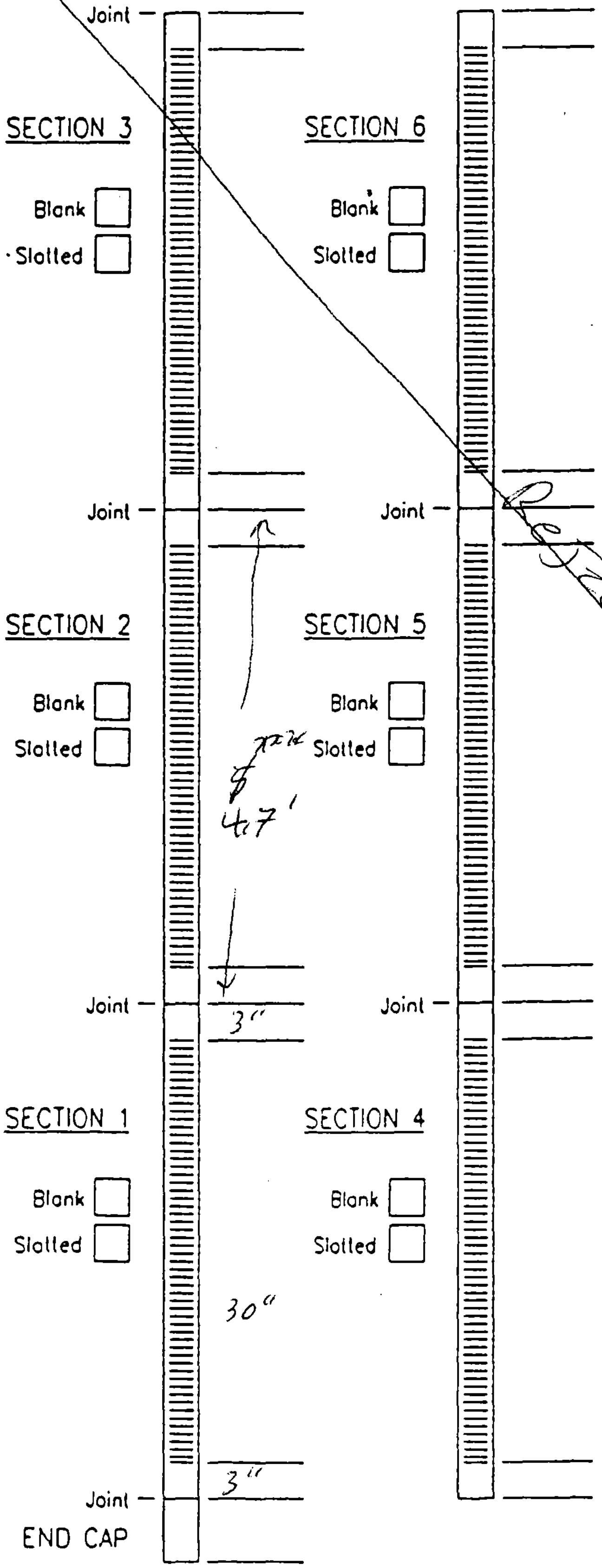
Job Number 32-1-16821-3

Monitoring Well Number 03WP6(1)

Date Installed 8/18/04

Engineer or Geologist RZH

Rejected



SECTION 3
Blank ☐
Slotted ☐

SECTION 6
Blank ☐
Slotted ☐

SECTION 2
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 1
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐
Stainless steel ☐
Other Galvanized Stl.

Diameter: 2" ☐
4" ☐
Other 1.25"

Slot size: 0.010 ☒
0.020 ☐
Other Wound St. Stl.

SEALS: None

	Depth below ground surface From	To
Bentonite:		
Cement:		

MONUMENTS: None
Flush mount ☐ Post ☐
Description
Depth below surface
Stickup

JOINTS:
Type Threaded Collar
Pin end : Down ☐ sleeve
Up ☐

SAND PACK:
Type or gradation None
Depth: From To

LOCKS: Type Master padlock
Key number 2001

Length cutoffs, last section:

Well stickup

SHANNON & WILSON, INC.
Geotechnical Consultants

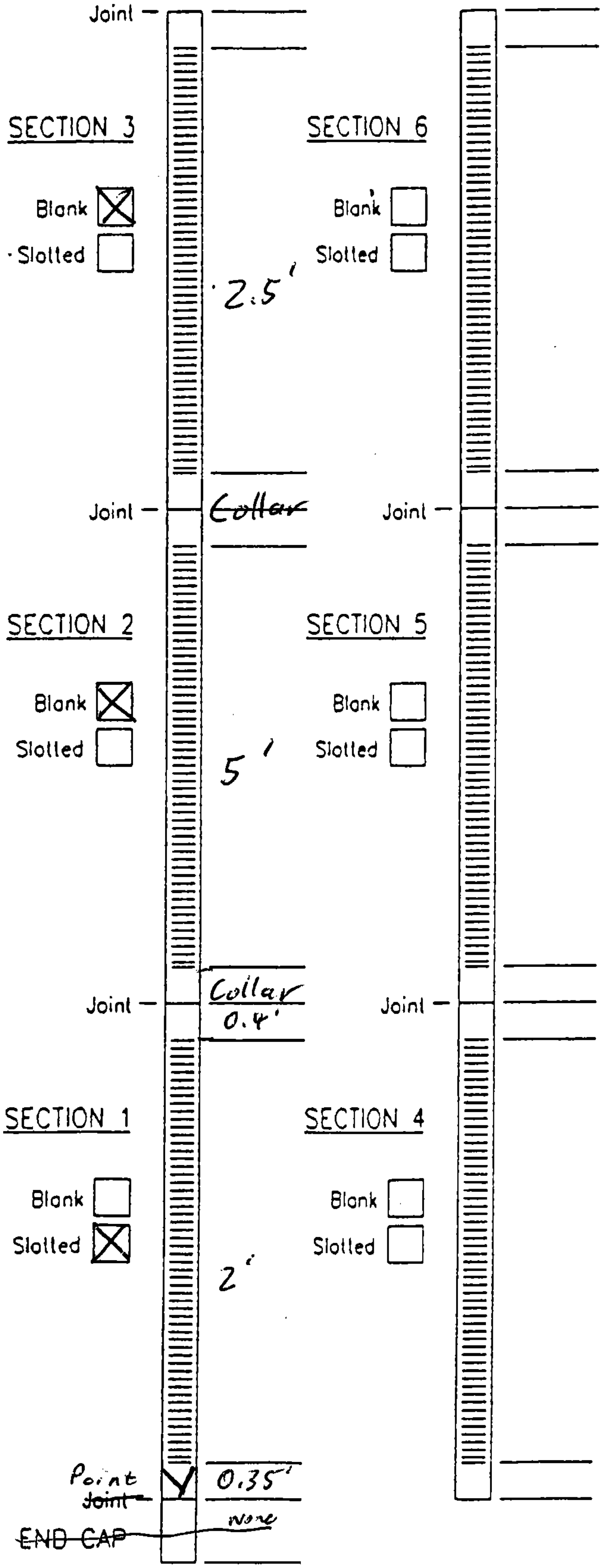
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3

Monitoring Well Number 06 WP5

Date Installed 8/21/04

Engineer or Geologist RLH



SECTION 3
Blank ☒
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐
Stainless steel ☐
Other Galv. Steel

Diameter: 2" ☐
4" ☐
Other 1.25"

Slot size: 0.010 ☒
0.020 ☐
Other St. Stl, wound

SEALS: None
Depth below ground surface

	From	To
Bentonite:		
Cement:		

MONUMENTS: None
Flush mount ☐ Post ☐
Description
Depth below surface
Stickup

JOINTS:
Type Threaded Collar
Pin end : Down ☐ N/A
Up ☐

SAND PACK:
Type or gradation None
Depth: From To

LOCKS: Type Master Padlock
Key number 2001

Length cutoffs, last section:

Well stickup 3.1'

NEW

SHANNON & WILSON, INC.
Geotechnical Consultants

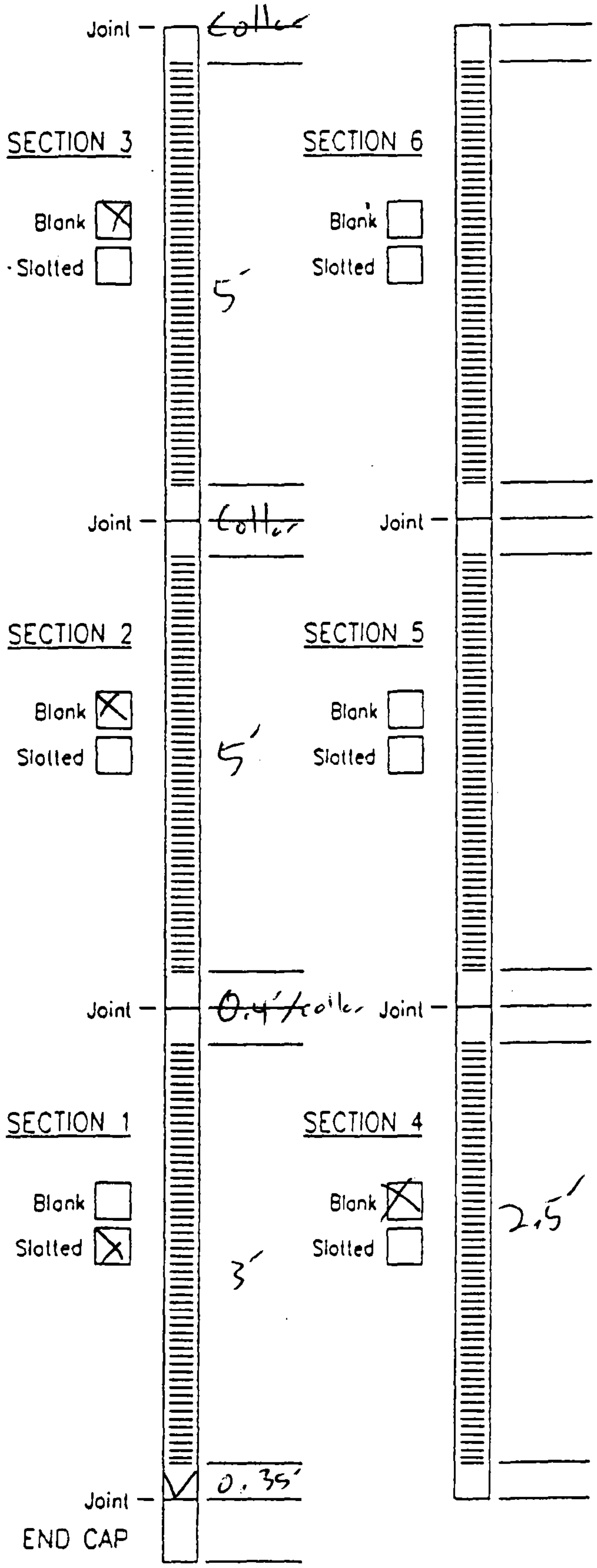
MONITORING WELL CONSTRUCTION DETAILS

Well Point ~~Monitoring Well~~ Number 06 WP6 New

Job Number 32-1-16821-3

Date Installed 9/1/04

Engineer or Geologist BJt



SECTION 3
Blank ☒
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☒
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐
Stainless steel ☐
Other Galvanized Steel

Diameter: 2" ☐
4" ☐
Other 1.25"

Slot size: 0.010 ☒
0.020 ☐
Other

SEALS: None

	Depth below ground surface From	To
Bentonite:		
Cement:		

MONUMENTS: None

Flush mount ☐ Post ☐

Description

Depth below surface

Stickup

JOINTS:

Type Threaded Collar

Pin end : Down ☐ Up ☐ N/A

SAND PACK: None

Type or gradation

Depth: From To

LOCKS: Type Master Padlock

Key number 2001

Length cutoffs, last section:

Well stickup 4.41'

[redacted] Driven deeper
9/1/04
BJH

SHANNON & WILSON, INC.
Geotechnical Consultants

MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3
Date Installed 8/21/04
Engineer or Geologist RZN

Monitoring Well Number 06WP6 old

Joint —

SECTION 3

Blank ☒
Slotted ☐

2.5'

Joint — ~~Collar~~

SECTION 2

Blank ☒
Slotted ☐

5'

Joint — ~~0.4'~~/Collar

SECTION 1

Blank ☐
Slotted ☒

3'

0.35'

~~Joint~~ —
~~END CAP~~

SECTION 6

Blank ☐
Slotted ☐

Joint —

SECTION 5

Blank ☐
Slotted ☐

Joint —

SECTION 4

Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐
Stainless steel ☐
Other Galvanized Steel

Diameter: 2" ☐
4" ☐
Other 1.25"

Slot size: 0.010 ☒
0.020 ☐
Other St. Stl. Wound

SEALS: None

	Depth below ground surface From	To
Bentonite:		
Cement:		

MONUMENTS: None

Flush mount ☐ Post ☐
Description
Depth below surface
Stickup

JOINTS:
Type Threaded Collar

Pin end : Down ☐ N/A
Up ☐

SAND PACK: None
Type or gradation
Depth: From To

LOCKS: Type Master padlock
Key number 2001

Length cutoffs, last section:

Well stickup 1.92'

NEW

SHANNON & WILSON, INC.
Geotechnical Consultants

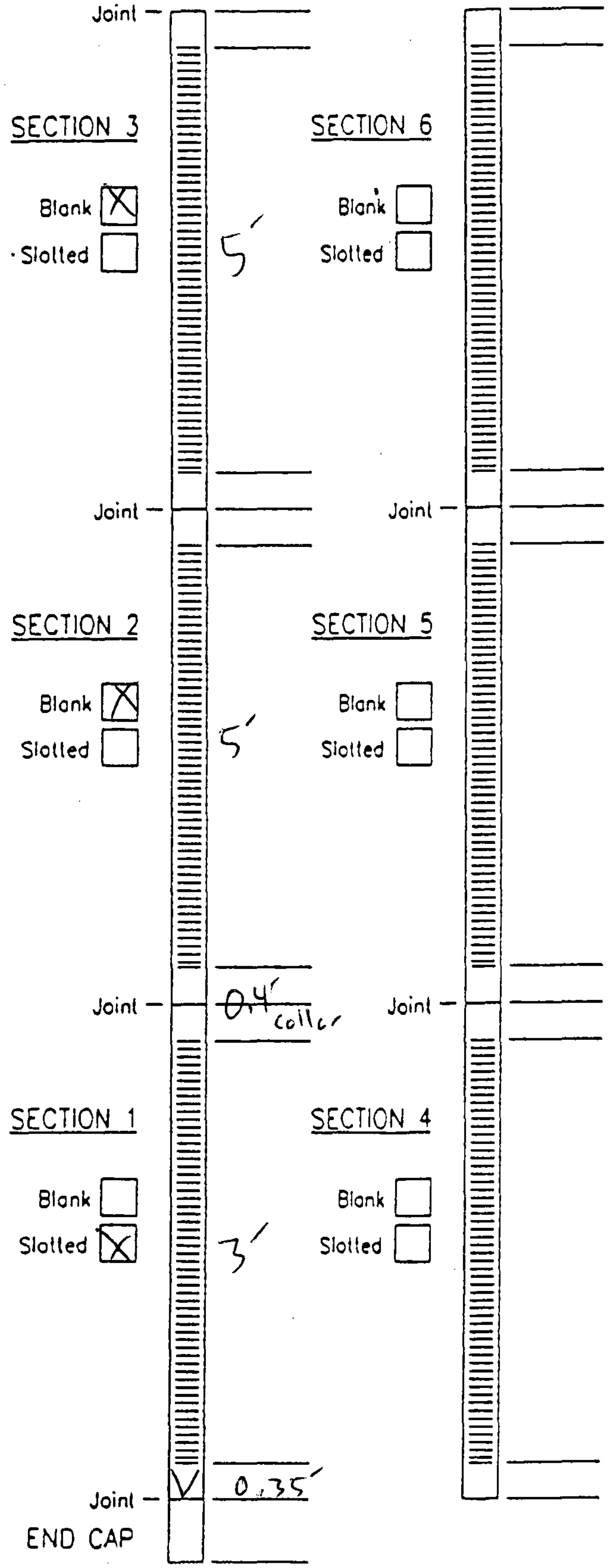
MONITORING WELL CONSTRUCTION DETAILS

Well Point ~~Monitoring Well~~ Number 06WP7 new

Job Number 32-1-16821-3

Date Installed 9/1/04

Engineer or Geologist BJt



SECTION 3
Blank ☒
Slotted ☐
5'

SECTION 2
Blank ☒
Slotted ☐
5'

SECTION 1
Blank ☐
Slotted ☒
3'

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐
Stainless steel ☐
Other Galv. Steel

Diameter: 2" ☐
4" ☐
Other 1.25"

Slot size: 0.010 ☒
0.020 ☐
Other

SEALS: None

Depth below ground surface

	From	To
Bentonite:		
Cement:		

MONUMENTS: None

Flush mount ☐ Post ☐

Description

Depth below surface

Stickup

JOINTS:

Type Threaded Collar

Pin end : Down ☐ Up ☐ N/A

SAND PACK: None

Type or gradation

Depth: From To

LOCKS: Type Master Padlock

Key number 2001

Length cutoffs, last section:

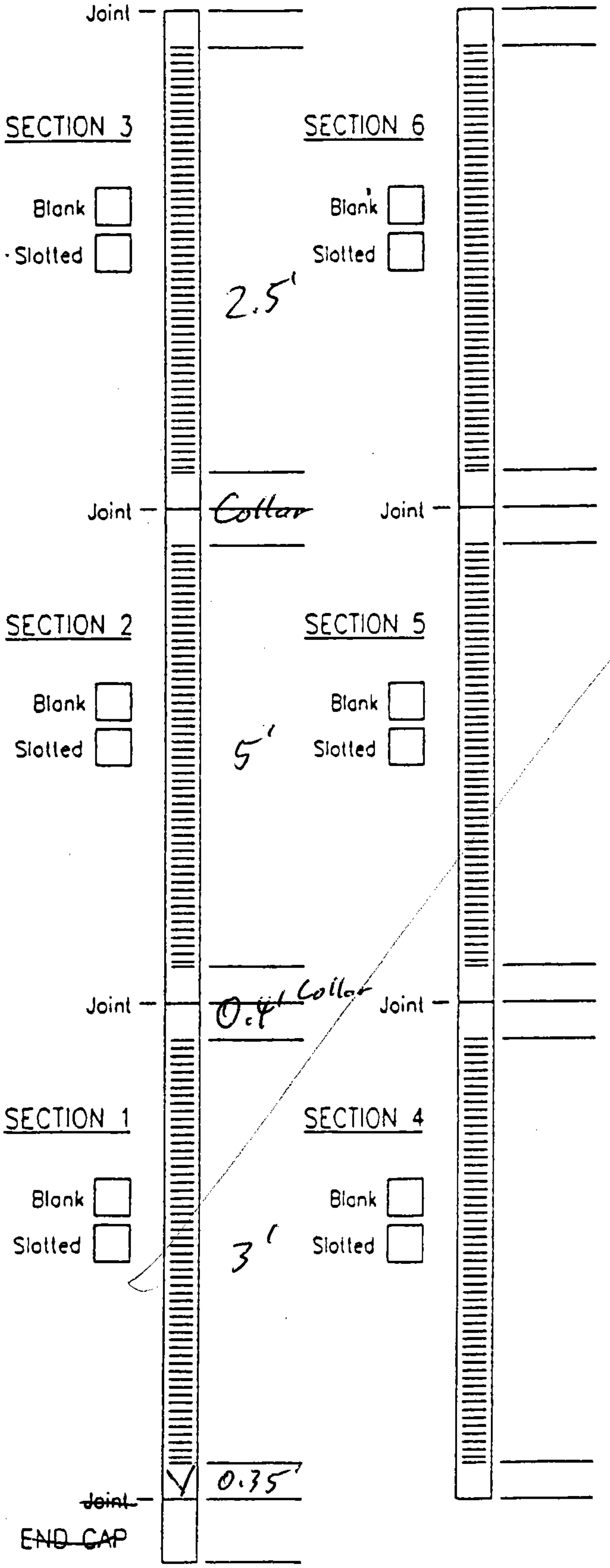
Well stickup 3.3'

SHANNON & WILSON, INC. [redacted] Moved 9/1/04
Geotechnical Consultants
BZH

MONITORING WELL CONSTRUCTION DETAILS

Monitoring Well Number 06WP7 old

Job Number 32-1-16821-3
Date Installed 8/21/04
Engineer or Geologist RZH



SECTION 3
Blank ☐
Slotted ☐

SECTION 2
Blank ☐
Slotted ☐

SECTION 1
Blank ☐
Slotted ☐

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☐ Stainless steel ☐ Other Galvanized Steel

Diameter: 2" ☐ 4" ☐ Other 1.25"

Slot size: 0.010 ☒ 0.020 ☐ Other St. Stl. Wound

SEALS: None

	Depth below ground surface From	To
Bentonite:		
Cement:		

MONUMENTS: None

Flush mount ☐ Post ☐

Description

Depth below surface

Stickup

JOINTS:

Type Threaded Collar

Pin end : Down ☐ Up ☐ N/A

SAND PACK: None

Type or gradation

Depth: From To

LOCKS: Type Master padlock

Key number 2001

Length cutoffs, last section:

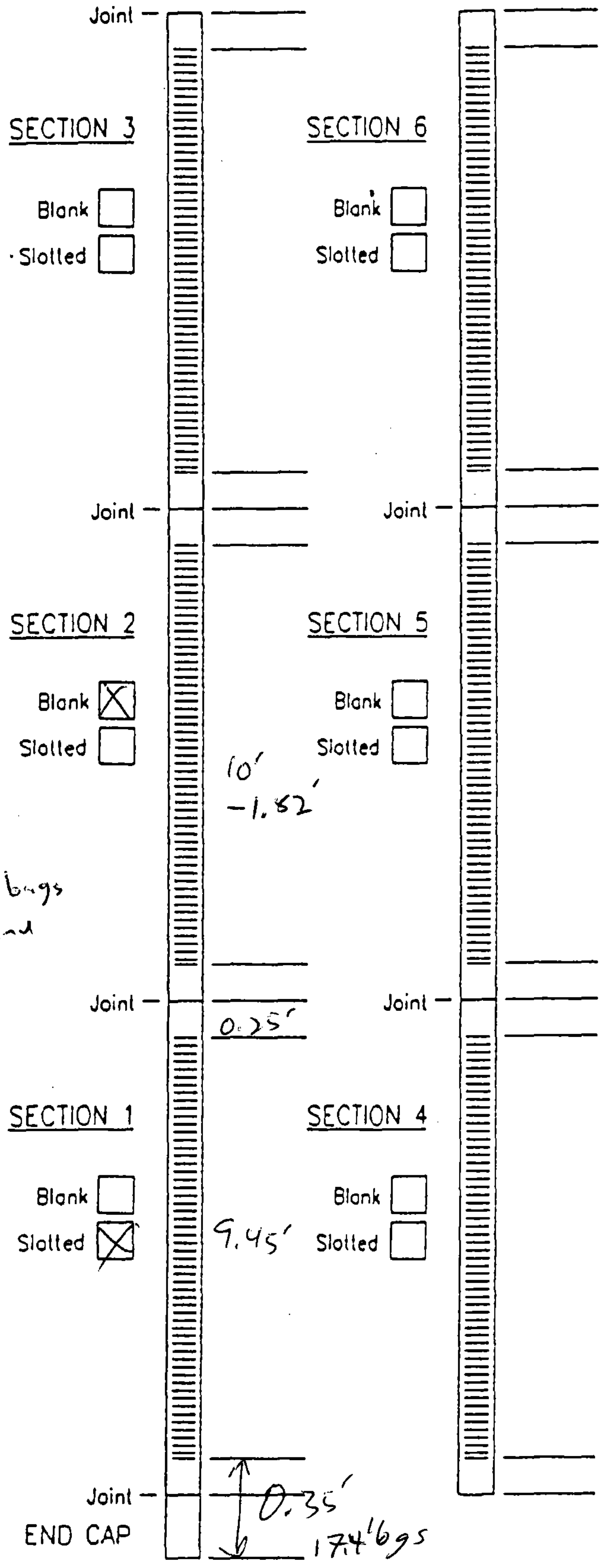
Well stickup 2.36'

SHANNON & WILSON, INC.
Geotechnical Consultants

MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3
Date Installed 8/29/04
Engineer or Geologist Ben Hesuner

Monitoring Well Number 17MW1



SECTION 3
Blank ☐
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

10'
-1.82'

2 bags
sand

0.25'

SECTION 1
Blank ☐
Slotted ☒

9.45'

0.35'
17.4' bgs

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☒
Stainless steel ☐
Other ______

Diameter: 2" ☒
4" ☐
Other ______

Slot size: 0.010 ☒
0.020 ☐
Other ______

SEALS:

	Depth below ground surface From	To
Bentonite:	1.9'	6.5'
Cuttings		
Cement:		
Slough	18'	23.16

MONUMENTS:

Flush mount ☒ Post ☐
Description Cast steel w/2 × 1/2" bolt heads
Depth below surface ______
Stickup ______

JOINTS:

Type ______

Pin end : Down ☐
Up ☒

SAND PACK:

Type or gradation Oslebay Norton CO Springs silica sand 10-20
Depth: From 6.5' To 18'

LOCKS:

Type ______
Key number ______

Length cutoffs, last section: ______

Well stickup ______

SHANNON & WILSON, INC.
Geotechnical Consultants

MONITORING WELL CONSTRUCTION DETAILS

NE CAPE 2004

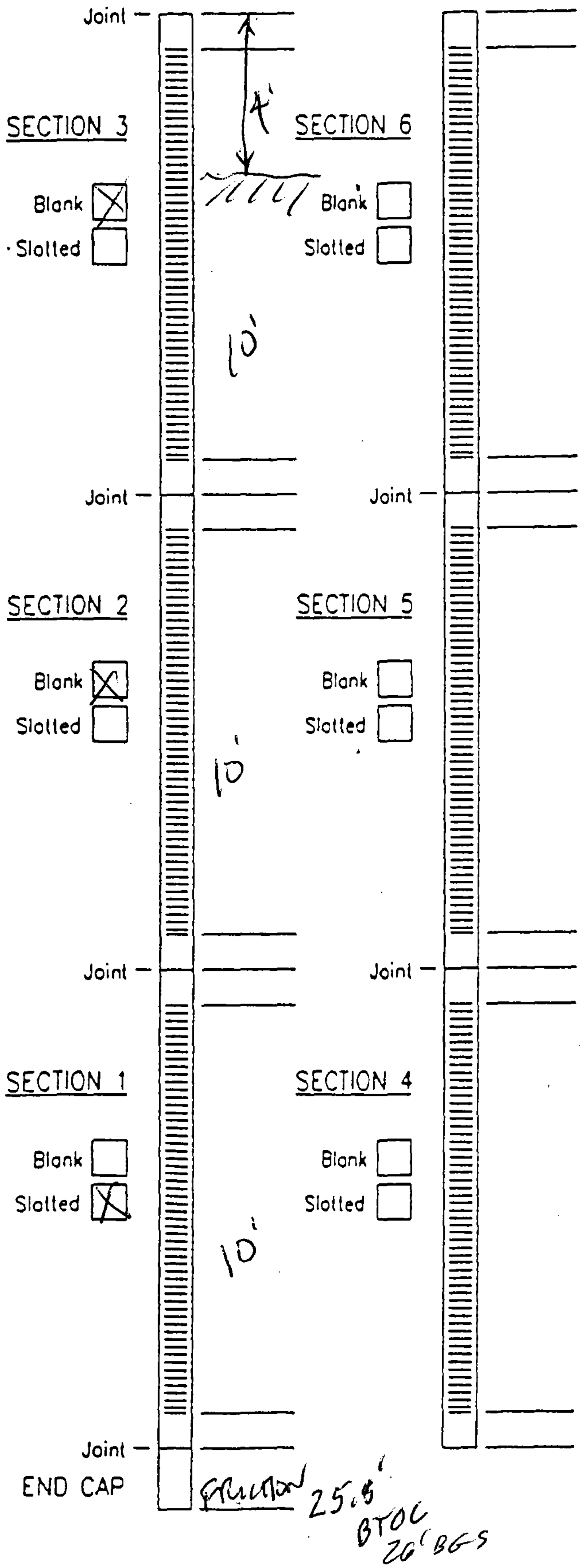
DACA 85-03-D-003 T.O.6

Job Number 32-1-16821-3

Monitoring Well Number 18MW1

Date Installed 8/24/04

Engineer or Geologist JULIE KEENER



SECTION 3
Blank ☒
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☒
Stainless steel ☐
Other ______

Diameter: 2" ☒
4" ☐
Other ______

Slot size: 0.010 ☒
0.020 ☐
Other ______

SEALS:

	Depth below ground surface From	To
Bentonite:	14 FT.	
Cement:		

MONUMENTS:

Flush mount ☒ Post ☐
Description ______
Depth below surface ______
Stickup ______

JOINTS:

Type THREADED

Pin end : Down ☐
Up ☒

SAND PACK:

Type or gradation 10-20
Depth: From 26' To 14' BGS

LOCKS: Type MASTER
Key number 2001

Length cutoffs, last section: 2.84' +

Well stickup ______

SHANNON & WILSON, INC.
Geotechnical Consultants

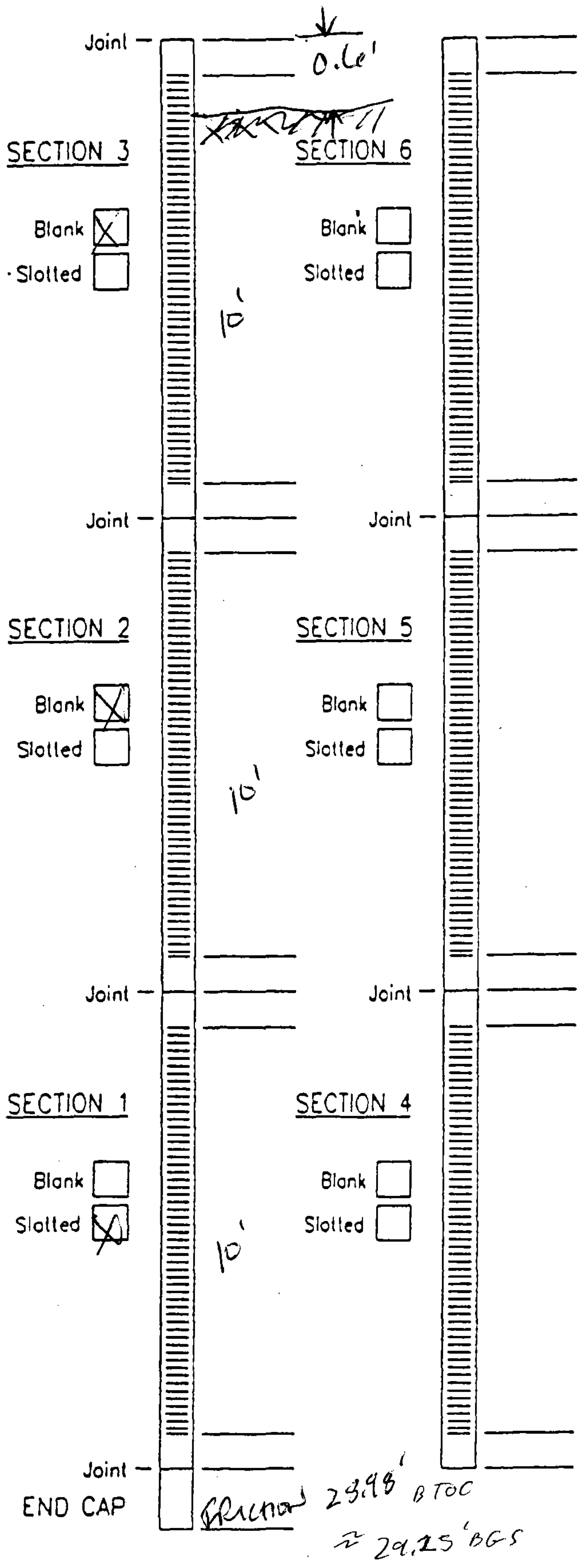
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16281-3

Monitoring Well Number 20MW1

Date Installed 8-25-04

Engineer or Geologist J. KESNER



Friction 28.98' BTOC
≈ 29.25' BGS

SECTION 3
Blank ☒
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☒
Stainless steel ☐
Other ______

Diameter: 2" ☒
4" ☐
Other ______

Slot size: 0.010 ☒
0.020 ☐
Other ______

SEALS:

	Depth below ground surface From	To
Bentonite:	16	8
SOIL	8	0
Cement:		

MONUMENTS:

Flush mount ☒ Post ☐
Description ______
Depth below surface ______
Stickup ______

JOINTS:

Type THREADED

Pin end : Down ☐
Up ☑

SAND PACK:

Type or gradation 10-20
Depth: From ~~30~~29 To 16

LOCKS: Type MASTER
Key number 2001

Length cutoffs, last section: 0.93ft.

Well stickup ______

SHANNON & WILSON, INC.
Geotechnical Consultants

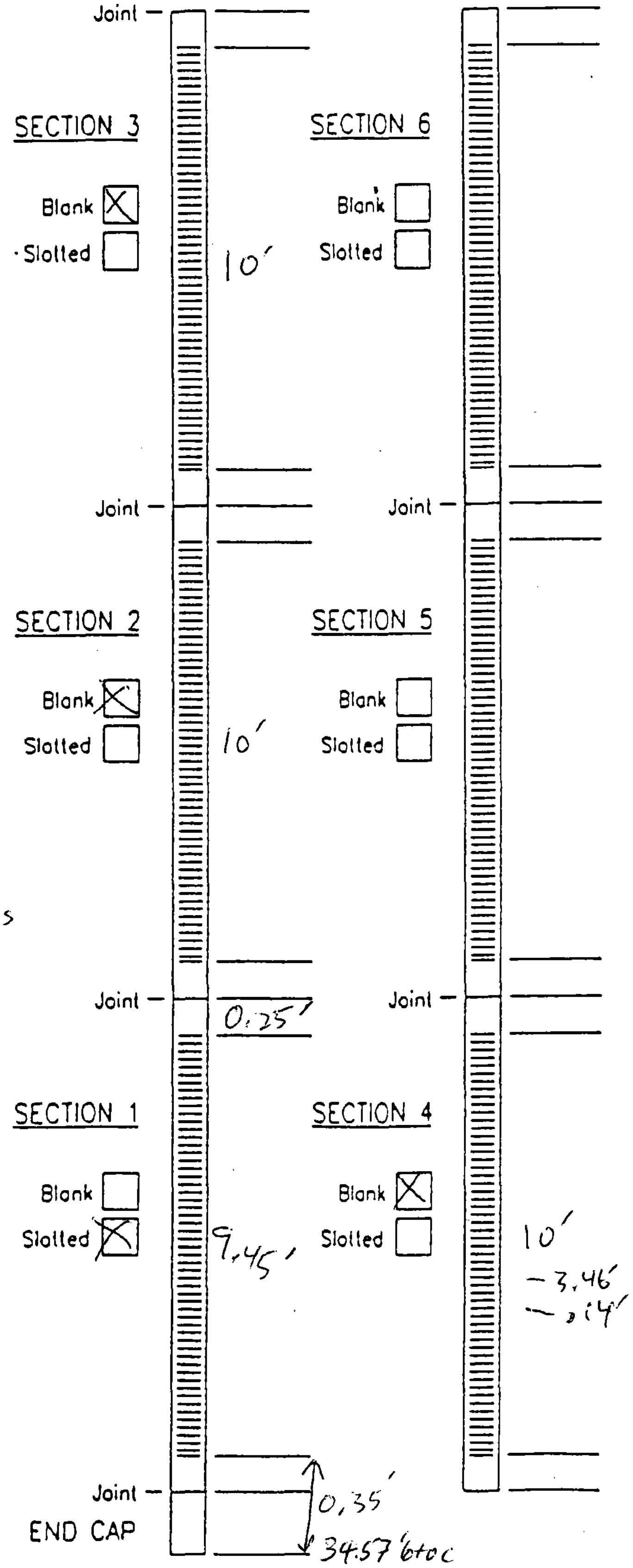
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3

Monitoring Well Number 22MW2

Date Installed 8/29/04

Engineer or Geologist BDH + RTH



SECTION 3
Blank ☒
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☒
Slotted ☐

4 bags Sand

34.57' btoc
≈ 34.8 BGS

WELL DATA:

Pipe Type: PVC ☒ Stainless steel ☐ Other

Diameter: 2" ☒ 4" ☐ Other

Slot size: 0.010 ☒ 0.020 ☐ Other

SEALS:

	Depth below ground surface From	To
Bentonite:	24'	20.8
Cuttings	20.8'	
Cement:		

MONUMENTS:

Flush mount ☒ Post ☐

Description Cast steel w/ 2X½" bolts

Depth below surface

Stickup

JOINTS:

Type

Pin end : Down ☐ Up ☒

SAND PACK:

Type or gradation Oglebay Norton Colorado Springs Silica Sand: 10-20

Depth: From 38' To 24'

LOCKS:

Type

Key number

Length cutoffs, last section:

Well stickup

SHANNON & WILSON, INC.
Geotechnical Consultants

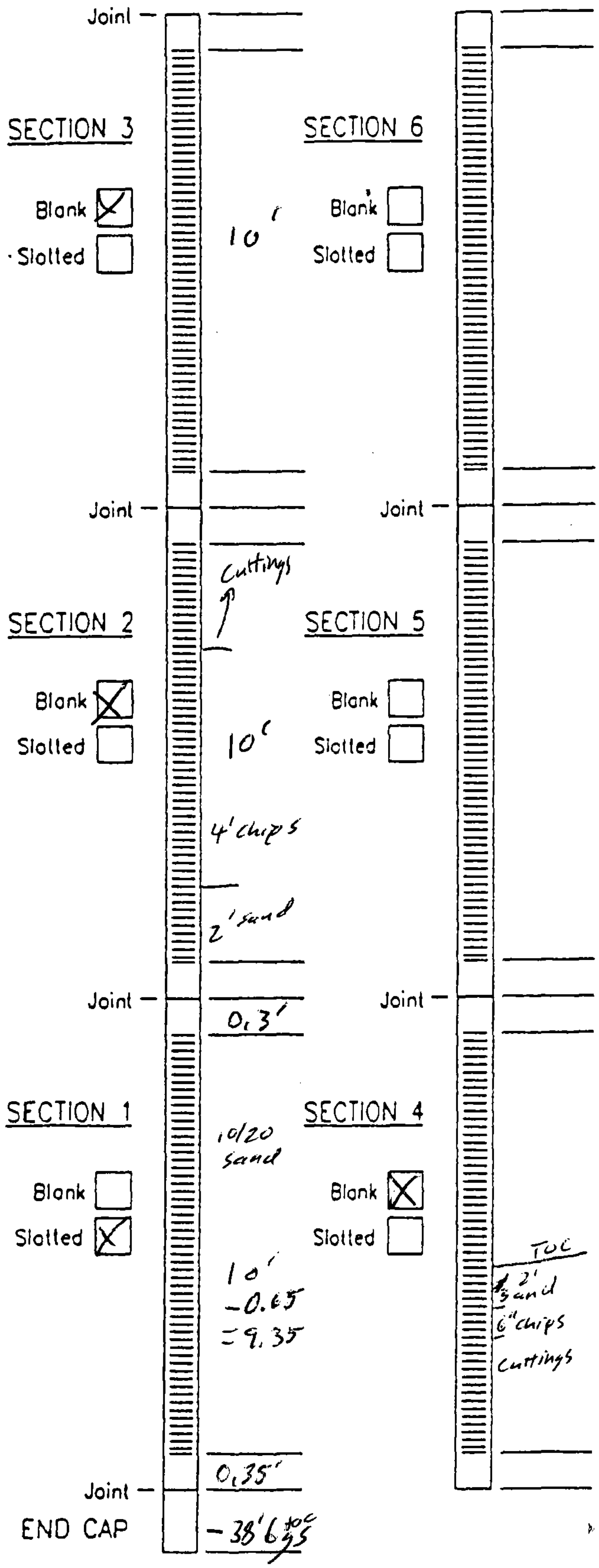
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3

Monitoring Well Number 22MW3

Date Installed 8/27/03

Engineer or Geologist R. Hessong



SECTION 3
Blank ☒
Slotted ☐

SECTION 2
Blank ☒
Slotted ☐

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☒
Slotted ☐

WELL DATA:

Pipe Type: PVC ☒
Stainless steel ☐
Other ______

Diameter: 2" ☒
4" ☐
Other ______

Slot size: 0.010 ☒
0.020 ☐
Other ______

SEALS:

	Depth below ground surface From	To 17 20
Bentonite:	26'	2~~1~~2'
	Cuttings to 3'	
Cement:		

MONUMENTS:

Flush mount ☒ Post ☐
Description Steel (cast), 2 bolts w/ 1/2" heads
Depth below surface ______
Stickup ______

JOINTS:

Type Machine threaded w/ oring
Pin end : Down ☐
Up ☒

SAND PACK:

Type or gradation Oglebay Norton Colorado Springs Silica Sand: 10-20
Depth: From 38bgs' To 26'

LOCKS: Type Master
Key number 2001

Length cutoffs, last section: ______

Well stickup + 0.85' (later -)
(Before final cut)

SHANNON & WILSON, INC.
Geotechnical Consultants

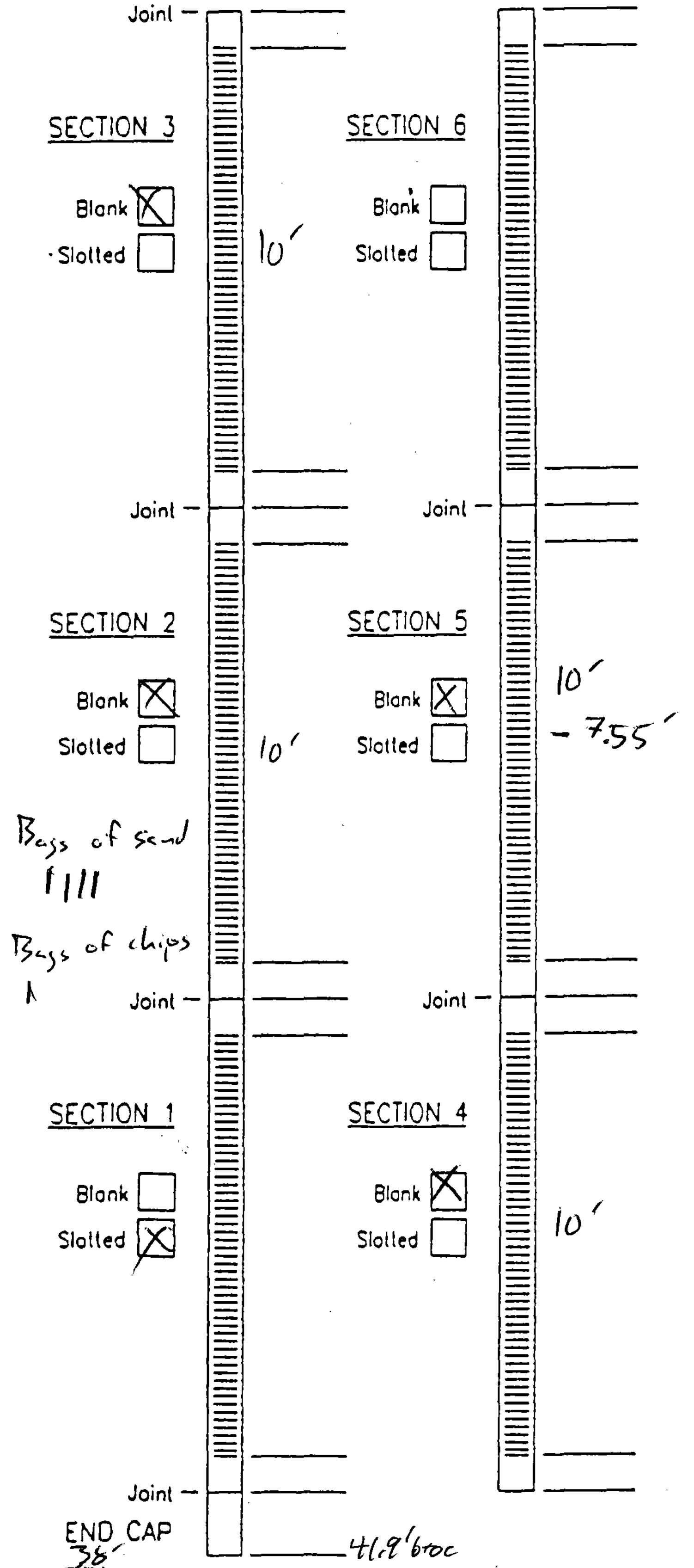
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-003

Monitoring Well Number 26MW1

Date Installed 8/30/04

Engineer or Geologist B. Heavner & R. Hessong



SECTION 3
Blank ☒
Slotted ☐
10'

SECTION 2
Blank ☒
Slotted ☐
10'

Bags of sand
||||
Bags of chips
|

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☒
Slotted ☐
10'
- 7.55'

SECTION 4
Blank ☒
Slotted ☐
10'

END CAP 41.9' broc

WELL DATA:

Pipe Type: PVC ☒ Stainless steel ☐ Other ______

Diameter: 2" ☒ 4" ☐ Other ______

Slot size: 0.010 ☒ 0.020 ☐ Other ______

SEALS:

	Depth below ground surface From	To
Bentonite:	22.5'	24.8'
Cuttings	4'	22.5'
Bentonite ~~Cement:~~	3.2'	4'

MONUMENTS:

Flush mount ☒ Post ☐
Description ______
Depth below surface ______
Stickup ______

JOINTS:

Type ______

Pin end : Down ☐ Up ☒

SAND PACK:

Type or gradation Oglebay Norton Co. springs Silica Sand 10-20
Depth: From 24.8 To 42'

LOCKS:

Type ______
Key number ______

Length cutoffs, last section: ______

Well stickup ______

@ ~~34'~~ 38' bgs, 2 bags of sand to set 1'

SHANNON & WILSON, INC.
Geotechnical Consultants

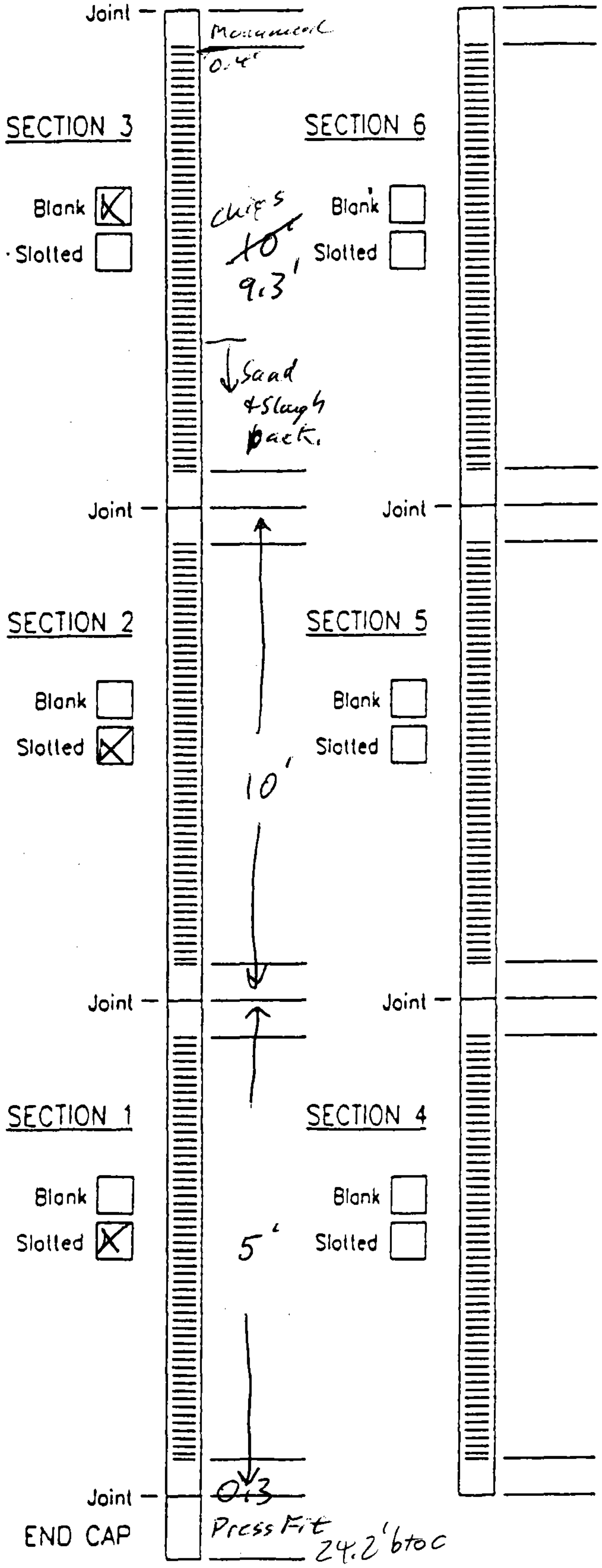
MONITORING WELL CONSTRUCTION DETAILS

Job Number 32-1-16821-3

Date Installed 8/22/04

Monitoring Well Number 04NE26MW3

Engineer or Geologist Randy Hessong



SECTION 3
Blank ☒
Slotted ☐

SECTION 2
Blank ☐
Slotted ☒

SECTION 1
Blank ☐
Slotted ☒

SECTION 6
Blank ☐
Slotted ☐

SECTION 5
Blank ☐
Slotted ☐

SECTION 4
Blank ☐
Slotted ☐

WELL DATA:

Pipe Type: PVC ☒
Stainless steel ☐
Other ______

Diameter: 2" ☒
4" ☐
Other ______

Slot size: 0.010 ☒
0.020 ☐
Other ______

SEALS:

	Depth below ground surface From	Depth below ground surface To
Bentonite:	-5.5'	-0.4'
Cement:		

MONUMENTS:

Flush mount ☒ Post ☐

Description Steel cap, 1/2" bolt heads

Depth below surface Just above

Stickup ______ No concrete

JOINTS:

Type Threaded

Pin end : Down ☐
Up ☒

SAND PACK:

Type or gradation 10-20

Depth: From 26 To 5.5' - 5 1/3 bags.
Tried to wet Z to 8'

LOCKS:

Type ______

Key number 2004

Length cutoffs, last section: 0.7'

Well stickup –

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

Page 1 of ______

Owner/Location: USACE. NE CAPE, ST. LAWRENCE ISLAND, SITE 3

Well No.: 03 WP02 Random No.: ______ Date: ______

Weather: ______ Time Started: ______ Time Completed: ______

MEASUREMENT DATA

Measuring Point (MP): TOP OF CASING

Height of MP Above or Below Land Surface: 3.6 FT

MP Elevation: ______ Water Level Elevation: ______

Total Depth of Well Below MP: 6.12 FT

Time of Depth Measurement: ______ DTW Below MP: 8/22 1610 3.94' / 1800 5.56' | 8/23 1745: 4.25'

Water Column in Well: ______

Diameter of Casing: 1.25" Gallons per ft: 0.064 Gallons in Well: ______

Gallons to be Pumped/Bailed : ______

Development Information: ______

FIELD PARAMETERS

Time: ______ Odor: ______ Color: ______

8/22 Time 1617-18 Volume: ORP: 32 pH: 6 Sp. Cond. 0.6 ms/cm² Temp: 12 ℃ DO: 12.4 mg/L Turbidity: BROWN ~~DTL~~ SILTY

8/23 1745 1800 0.15 gal ORP: 75 pH: 6 Sp. Cond. 0.408 Temp: 9.11 DO: 2.19 Turbidity: 527

Evacuation Method: PURGE : PERISTALTIC PUMP

Sampling Method: ______ Sample Time: ______

Sample ID, Analysis, Preservatives: ______

Remarks: ______

Sampling Personnel: ______

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

Page 1 of ____

Owner/Location: US ACE, NE CAPE, ST. LAWRENCE ISLAND, SITE 3

Well No.: 03WP03 Random No.: ____ Date: ____

Weather: ____ Time Started: ____ Time Completed: ____

MEASUREMENT DATA

Measuring Point (MP): TOP OF CASING

Height of MP Above or Below Land Surface: 2.93 FT.

MP Elevation: ____ Water Level Elevation: ____

Total Depth of Well Below MP: 6.09 FT

Time of Depth Measurement: ____ DTW Below MP: ~~6.09 FT~~ 8/22 1625 3.11 FT / 1813 3.33

Water Column in Well: ____

Diameter of Casing: [illegible]" Gallons per ft: 0.004 Gallons in Well: ____

Gallons to be Pumped/Bailed : ____

Development Information: ____

FIELD PARAMETERS

Time: ____ Odor: ____ Color: ____

8/22 1633	Volume:	ORP: 21.8	pH: 5.6	Sp. Cond. 0.456	Temp: 9.9	DO: 1.85	Turbidity: SILTY BROWN
1640	~1l	33.3	5.54	mS/cm² 0.413	°C 10.46	mg/l 1.2	
~~1817~~ 1823	~1l	80→76	5.67→5.52	0.378→0.350	9.74–10.64	5.7→3.49	

Evacuation Method: PURGE w/ PERISTALTIC PUMP.

Sampling Method: Peri Pump polyethylene tubing Sample Time: 8/24 12:04 ← see back

Sample ID, Analysis, Preservatives: ____

Remarks: ____

Sampling Personnel: BDH

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
Page 1 of

Owner/Location USACE. NE Cape, Site 3 - Former Pumphouse

Well No.: 04NE03WP5 Random No.: — Date: 8/20/04 & ~~8/~~22/04, 8/24

Weather: Haze/Smoke 50's Time Started: 1430 8/22 Time Completed:

MEASUREMENT DATA

Measuring Point (MP): N. site Top Cap housing

Height of MP Above or Below Land Surface: ~~2.47' ags~~ TBX 2.62' ags

MP Elevation:

Water Level Elevation: ~~3.01~~ TBX

Total Depth of Well Below MP: 5.48'

Time of Depth Measurement:

DTW Below MP: 8/20/04 3.01 @ 13:25 8/22/04 3.08 @ 1431 3.04 @ 1653

Water Column in Well:

Diameter of Casing: 1 1/4" ID Gallons per ft: 0.064 Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information: 3/4" bailer - poly - surge & purge. - Bailed dry in 5 min. 15:12 15:43 bailed dry in 3 min. | 17:09 3.10' - bail dry 17:14 8/21 10:18 3.10' - bailed dry 10:23 | 11:11 3.10' - bailed dry 11:16 11:48 3.17' - bailed dry 11:53

FIELD PARAMETERS

Time: Odor: Color:

TIME → Volume: ORP: 78 pH: 5.82 Sp. Cond. 0.6 Temp: 7.50 DO: <12 Turbidity: 614 TURBID

1503- 1651~1L 40-60 5.96 mS/cm² 0.78 °C 6.88 mg/L 14→4.2 LESS SILTY

Evacuation Method: PERISTALTIC PUMP

Sampling Method: Sample Time: 11:16 ← See back

Sample ID, Analysis, Preservatives: GRO/BTEX (AK101/SW8260), PAH SIM DRO/RRO (AK102/103)

Remarks:

Sampling Personnel: BDH & JAK

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

~0.1

0.562 in² 1.25" / x = 2" 1 in² / 0.16

0.5625 / 0.16

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
Page 1 of

Owner/Location USACE, N.E. Cape, St. Lawrence Isd Site 3

Well No.: 03WP06 (2)   Random No.:   Date: 8/21/04, 8/22/04

Weather: Hazy 50's, light variable breeze   Time Started: Time Completed:

MEASUREMENT DATA

Measuring Point (MP): N side Top cap housing   [New Smcct - New Point driven (deeper 8/21) Near old]

Height of MP Above or Below Land Surface: 0,48'

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: ~~8/21 1445 3.46'~~ ~~8~~ 8.07'

Time of Depth Measurement: DTW Below MP: 8/21 1445-3.46' / 8-22-04, 1530 2.50 / 1705=3.4'

Water Column in Well:

Diameter of Casing: 1¼"   Gallons per ft: 0.064   Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information: Surge & purge w/ micro bailer 15:01- 3.46' purged dry 1507 / 16:04 3.61' purged dry 1610 17:14 - 3.43' purged dry / 1904 No DTW surge, purged dry

FIELD PARAMETERS

Time: Odor: "BURNED" OIL   Color: GREY

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1540		-178	6.9	0.76	7.62	17.7	SILTY
		-217	6.8	0.92	6.3	2.90	
1552		-290	6.6	0.94	4.8	1.57	
1740		-73, 84	6.67, 6.64	0.87 0.881	4.86, 4.27	4.4→0.95	
1753		-102	6.64	0.888	4.81	0.93	

Evacuation Method: PERISTALTIC PUMP

Sampling Method: PERISTALTIC PUMP   Sample Time: 14:33   ← See back

Sample ID, Analysis, Preservatives: 04NE03, GRO/BTEX (AK101/SW8260), DRO/RRO (AK102/103), PAH SIM

Remarks: /

Sampling Personnel: BEN HEAVNER, JULIE KEENER

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3

Page 1 of

Owner/Location USACE, N.E. Cape, St. Lawrence Isl, Site 3

Well No.: 04NE03WP6 Random No.: Date: 8/20/04

Weather: Hazy, 50's variable breeze Time Started: Time Completed:

MEASUREMENT DATA

Measuring Point (MP): N. side Top cap housing

Height of MP Above or Below Land Surface: 1.25' ← New (after driving)

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 7.51' ← Drove WP deeper b/c slow recharge

Time of Depth Measurement: DTW Below MP: 8/20, 15:20 6.11' 16:56, 6.65'

Water Column in Well:

Diameter of Casing: Gallons per ft: Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information: Surge + purge w/micro bailer - 15:25-15:32 purged dry 17:00-17:05 purge dry after driving deeper. See Next sheet 8/21 10:27-6.4' bailed dry 10:35)

FIELD PARAMETERS

Time: Odor: Color:

Volume: ORP: pH: Sp. Cond. Temp: DO: Turbidity:

Evacuation Method:

Sampling Method: Sample Time:

Sample ID, Analysis, Preservatives:

Remarks:

Sampling Personnel:

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Removed Well Point 8/22/04
Replaced w/new nearby 8/21 - See other sheet

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

Page 1 of

Owner/Location: USACE, NE Cape, St. Lawrence Isd, Site 6

Well No.: WP 6-3 (01NE06WP103) Random No.: Date:

Weather: Time Started: Time Completed:

MEASUREMENT DATA

Measuring Point (MP): Top of casing

Height of MP Above or Below Land Surface: 2.45

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 9.24'

Time of Depth Measurement: DTW Below MP:

Water Column in Well:

Diameter of Casing: 1.25" Gallons per ft: 0.064 Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information:

FIELD PARAMETERS

Time: Odor: Color:

Time	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity: —	DTW
9/4 1601	0 g	-6.5	6.74	0.258 mS/cm	7.45 °C	5.21 mg/L	—	7.75'
1606	0.125	4.1	6.47	0.245	7.57	3.41	—	
1609	0.25	30.8	6.39	0.229	6.58	4.62	—	
1612	0.375	94.3	6.19	0.208	6.73	5.10	—	
1615	0.5	121.5	6.07	0.186	6.54	6.51	—	
1622	0.75	140.9	5.79	0.150	6.41	7.70	—	
1628	1	181.2	5.64	0.126	6.35	8.49	- (low)	

Evacuation Method: Peristaltic Pump

Sampling Method: Sample Time: 1654 9/5/04

Sample ID, Analysis, Preservatives: 04NE06GW107; 2x1 L HCL, 2x1 L UP, 6xVOA, 1x250 mL Poly, U.P. BTEX, GRO, RRO, DRO, PCBs, RCRA metals

Remarks:

Sampling Personnel: BDH

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Note volume after filling flow-through chamber (V ≈ ½ qt)

Turbidimeter not available

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
Page 1 of

Owner/Location: USACE, N.E. Cape, St. Lawrence Isl., Site 6

Well No.: 06 WP5 Random No.: Date: 8/23/04 8/24

Weather: Time Started: Time Completed:

MEASUREMENT DATA

Measuring Point (MP): Top of Casing

Height of MP Above or Below Land Surface: 3.11'

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 10.78

Time of Depth Measurement: DTW Below MP: 7.18

Water Column in Well:

Diameter of Casing: 1.25" Gallons per ft: 0.064 Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information: Surge & purge w/ peri pump high flow
purged dry 17:07 ~1.1 qt | 18:34 - 7.18' Purged dry 1840 ~1.2 qt
8/24: 7.24' purged dry 10:31 ~1.2 qt | 9/3: 7.99' Purged dry 12:34

FIELD PARAMETERS

Time: Odor: None noted Color: redish brown

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:	DTW
1534	0	-190.8	7.77	0.345 mS/cm	5.19°C	4.31 mg/L	—	7.96
1538	0.125 g	-225.3	7.92	0.373	5.24	1.73	—	
1543	0.25 g	-147.2	7.20	0.330	4.72	3.63	—	
1545	0.3 g	-99.0	6.93	.315	5.02	4.98		← well dry

Evacuation Method: Peristaltic Pump

Sampling Method: Sample Time:

Sample ID, Analysis, Preservatives:

Remarks:

Sampling Personnel:

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

1.25" [illegible]

Note: volume = amount after filling flow-through chamber (V ≈ ½ qt)
Turbidimeter not available

NEW
Deeper

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
Page ______ of ______

Owner/Location: USACE, NE Cape, St. Lawrence Isd., Site 6

Well No.: 06WP6 Random No.: ______ Date: 9/2/04

Weather: Cloudy, low 50's Time Started: ______ Time Completed: ______

MEASUREMENT DATA

Measuring Point (MP): Top of Casing

Height of MP Above or Below Land Surface: 4.41'

MP Elevation: ______ Water Level Elevation: ______

Total Depth of Well Below MP: 15.85

Time of Depth Measurement: ______ DTW Below MP: 9.57'

Water Column in Well: ______

Diameter of Casing: 1.25" Gallons per ft: 0.064 Gallons in Well: ______

Gallons to be Pumped/Bailed : ______

Development Information: Surge & purge w/ peri pump high flow
11:00 DTW 9.57' purged dry 1108, 3qt
20:04 DTW 9.81' purged dry 2014
9/3 11 50 DTW 9.78' purged dry 11 56

FIELD PARAMETERS

Time: ______ Odor: ______ Color: Grayish Brown

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity: —	DTW
9/4 17:20	0g	-123.7	6.48	0.408 mS/cm	5.76°C	4.90 mg/L	—	10.83
17:23	0.125g	-194.9	6.53	0.409	5.81	1.03	—	
17:25	0.25	-248.8	6.51	0.412	5.38	0.73	—	
17:28	0.375	-258.3	6.53	0.409	5.42	0.71	—	well dry
	~~0.5~~							

Evacuation Method: Peristaltic Pump

Sampling Method: ~~04NEO~~ Sample Time: 1535 9/5/04

Sample ID, Analysis, Preservatives: 04NE06GW102; 2x 1L HCL 2x1L U.P. 6x VOA HCL, 1x 250 poly U.P.
BTEX, GRO, DRO, RRO, PCB's, RCRA metals

Remarks: ______

Sampling Personnel: ______

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Note: Volume after filling flow-through cell (V ≈ 1/2 qt)
Turbidimeter not available

~~[illegible]~~ Driven Deeper

9/1/04 7374

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

Page 1 of

Owner/Location USACE, N.E. Cape, St. Lawrence Isl. Site 6

Well No.: 06 WP6 Random No.: Date: 8/23/04, 8/24

Weather: Time Started: Time Completed:

MEASUREMENT DATA

Measuring Point (MP): Top of Casing

Height of MP Above or Below Land Surface: 1.92'

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 10.81'

Time of Depth Measurement: DTW Below MP: 5.42' / 1825 8.29

Water Column in Well:

Diameter of Casing: 1.25" Gallons per ft: 0.064 Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information: surge & purge w/ peri pump high flow 16:44 purged dry -1651 1.75gt | 8/24 10:39-5.78' purged dry 10:44 ~1.5 gt. 8/24 16:13 6.76' no purge |

FIELD PARAMETERS

Time: Odor: Color:

Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:

Evacuation Method:

Sampling Method: Sample Time:

Sample ID, Analysis, Preservatives:

Remarks:

Sampling Personnel:

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

1.25"

New
Relocated

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
Page ______ of ______

Owner/Location: USACE NE Cape St. Lawrence Isl, Site 6

Well No.: 06WP7 Random No.: ______ Date: 9/2/04

Weather: Cloudy, low 50's Time Started: ______ Time Completed: ______

MEASUREMENT DATA

Measuring Point (MP): Top of Casing

Height of MP Above or Below Land Surface: 3.3'

MP Elevation: ______ Water Level Elevation: ______

Total Depth of Well Below MP: 12.90'

Time of Depth Measurement: ______ DTW Below MP: 9.36'

Water Column in Well: 73.2 ~~12.90'~~

Diameter of Casing: 1.25" Gallons per ft: 0.064 Gallons in Well: ______

Gallons to be Pumped/Bailed: ______

Development Information: Surge & purge w/ peri pump high flow rate
1126 DTW 9.36' purged dry 1137 ~1.75 qt
2023 DTW 9.39' purged dry 2029
9/3 ~~1150 DTW 9.76' purged dry 1156~~ 73x
1206 DTW 9.44' ~~purged dry~~ stopped pumping - less turbid, ~1 gallon 1221

FIELD PARAMETERS

Time: Odor: ______ Color: ______

DTW 9.50'

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
9/4 1645	0 g	21.0	6.55	0.092 mS/cm	5.99°C	11.50%	—
1650	.25	42.5	6.40	0.085	5.07	5.95	—
1655	0.5	60.9	6.23	0.080	4.61	7.31	—
17:01	0.75	85.2	6.03	0.075	4.38	8.50	—
17:05	1	101.6	5.89	0.074	4.17	9.02	—

Evacuation Method: Peristaltic Pump

Sampling Method: ______ Sample Time: 1327 9/5/04

Sample ID, Analysis, Preservatives: 04NE06GW101, 201, 301; 2x1L HCL, 2x1L U.P., 6x VOA HCL, 1x250mL Poly U.P.
BTEx, GRO, RRO, DRO, PCB's, RCRA Metals

Remarks: ______

Sampling Personnel: BDH

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Note: Volume after filling flow-through chamber (V ≈ ½ qt)
Turbidimeter not available

[redacted] Moved 9/1/04
BH

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
Page 1 of

Owner/Location USACE N.E. Cape, St. Lawrence Isl., Site 6

Well No.: 06WP

Random No.:

Date: 8/23/04, 8/24

Weather:

Time Started:

Time Completed:

MEASUREMENT DATA

Measuring Point (MP): Top of Casing

Height of MP Above or Below Land Surface: 2,36'

MP Elevation:

Water Level Elevation:

Total Depth of Well Below MP: 9.76' 16:25

Time of Depth Measurement:

DTW Below MP: 8.08' (18:21 9,14'

Water Column in Well:

Diameter of Casing: 1.25"

Gallons per ft: 0.064

Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information: Surge + purge w/ peri pump high flow rate 1625 purged dry - 1627 ~.75qt | 8/24 10:50 8.18' purged dry 10:53 ~.6g 8/24 16:24 8.79' not purged

FIELD PARAMETERS

Time:

Odor:

Color:

Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:

Evacuation Method:

Sampling Method:

Sample Time:

Sample ID, Analysis, Preservatives:

Remarks:

Sampling Personnel:

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

1.25"

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

Page 1 of ____

Owner/Location: SITE 11 - FUEL STORAGE TANKS

Well No.: 10-1 Random No.: ____ Date: 9-5-04

Weather: ____ Time Started: 1230 Time Completed: 1630

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: 2.55'

MP Elevation: ____ Water Level Elevation: ____

Total Depth of Well Below MP: 11.52

Time of Depth Measurement: ____ DTW Below MP: 4.89', 7.15'@1342,

Water Column in Well: 6.63

Diameter of Casing: 2" PVC Gallons per ft: 0.16 Gallons in Well: 1.07

Gallons to be Pumped/~~Bailed~~: ____

Development Information:

15 mg/L Alk, Fe^{3+} 0.0

FIELD PARAMETERS

Time: ____ Odor: NONE Color: TURBID Lt. BROWN → SL. TURBID

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1323		183	6.49	0.120	9.46	6.25	
1326	1l	200	4.68	0.105	9.38	4.71	
1328	2	210	5.41		10.08	4.98	
1334	2.5Gal	246	5.23	^0.1	9.98	4.18	
1336	3 "	248.4	5.26	~0.98	9.90	0.98	63
1338	4 "	249.9	5.25		10.04	0.91	68, 64
340 ~~1403~~	5 "	253.1	5.26		9.68	0.89	91.5, 88.6
1618	~~1350~~	215.4	5.44	0.095	10.17	3.80	86.3

Evacuation Method: GRUNDFOS 1l/min

Sampling Method: GRUNDFOS Sample Time: 1350 (No H2O @1353)

Sample ID, Analysis, Preservatives: 04NE11GW101,

Remarks: GRO/BTEX, DRO/RRO, ~~PAH~~, Cr/Pb/Zn/Hg, N.A.P.

Sampling Personnel: RH, JK

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

OAKTON TURBIDIMETER

H2O 6.39' BTOC @1413, 6.20' BTOC @1420

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
Page 1 of

Owner/Location: SITE 11

Well No.: MW11-3   Random No.:   Date: 9-5-04

Weather: Time Started: 1640   Time Completed: 1735

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: ≈2.7'

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 20.3

Time of Depth Measurement: DTW Below MP: 9.72'

Water Column in Well: 10.58

Diameter of Casing: 2" PVC   Gallons per ft: 0.16   Gallons in Well: 1.7

Gallons to be Pumped/Bailed :

Development Information:
START PUMPING 1650

FIELD PARAMETERS

Time: Odor: SL. WEATH. DIESEL   Color: NEARLY CLEAR

TIME	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1657		93.7	5.63	0.20	6.83	3.38	
1700	1 GAL.	72.3	5.40	0.190	6.95	1.96	11.8 @ 1703
1705	2	132	5.15	0.163	7.45	1.33	
1710	3	162	5.11	0.158	7.89	1.18	8.89
1714	3.5	170	5.09	0.156	7.70	1.15	10.06
1719	5	175.6	5.08	0.153	7.78	1.01	10.4
1722		178.4	5.07	0.153	7.87	0.95	10.7
1734		181.4	5.08	~ ~~0.0~~ 0.15	7.07	1.70	18.6

~~Evacuation~~ PURGE Method: GRUNDFOS   3 to 4 DROPS → 15-20 mg/l ALK.

Sampling Method: GRUNDFOS   Sample Time: 1725

Sample ID, Analysis, Preservatives: 04NE11GW102

Remarks: 80 Hz → <1l/min

Sampling Personnel: RH, SK

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
Page ______ of ______

Owner/Location: USACE NE Cape

Well No.: 16-1 Random No.: ______ Date: 9/12/04

Weather: ______ Time Started: ______ Time Completed: ______

MEASUREMENT DATA

9/9 1530: DTW = 15.73 ft ~~BTOC~~ Bmx

Measuring Point (MP): Top of PVC casing

Height of MP Above or Below Land Surface: +

MP Elevation: ______ Water Level Elevation: ______

Total Depth of Well Below MP: ~ 16.7'

Time of Depth Measurement: 9/12 11:20 DTW Below MP: 15.94

Water Column in Well: ______

Diameter of Casing: ______ Gallons per ft: ______ Gallons in Well: ______

Gallons to be Pumped/Bailed: ______

Development Information: ______

FIELD PARAMETERS

Time: ______ Odor: ______ Color: ______

Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:

Evacuation Method: Peristaltic - Not enough water, disturbs sediment, got a fly!

Sampling Method: Not Sampled Sample Time: ______

Sample ID, Analysis, Preservatives: ______

Remarks: Discussed Lack of water w/ DOM, PM → Don't sample

Sampling Personnel: ______

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

16mw-1

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No:

Page ______ of ______

Owner/Location:

Well No.: 16-2
Random No.:
Date: 9/12/04

Weather:
Time Started:
Time Completed:

MEASUREMENT DATA

Measuring Point (MP): Top of PVC casing

Height of MP Above or Below Land Surface: +

MP Elevation:
Water Level Elevation:

Total Depth of Well Below MP: 16.65'

Time of Depth Measurement: 9/12@11.48
DTW Below MP: (9/9) 1530 : 15.48' / 15.57

Water Column in Well:

Diameter of Casing:
Gallons per ft:
Gallons in Well:

Gallons to be Pumped/Bailed :

Development Information:

FIELD PARAMETERS

Time:
Odor:
Color:

Volume: ORP: ______ pH: ______ Sp. Cond. ______ Temp: ______ DO: ______ Turbidity: ______

Evacuation Method: GeoSquirt - Not enough water

Sampling Method:
Sample Time:

Sample ID, Analysis, Preservatives:

Remarks: Not Sampled (See 16-1)

Sampling Personnel:

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

16 MW-2

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
Page ______ of ______

Owner/Location: USACE NE Cape

Well No.: 16-3 Random No.: ______ Date: 7/18/04

Weather: ______ Time Started: ______ Time Completed: ______

MEASUREMENT DATA

Measuring Point (MP): ______

Height of MP Above or Below Land Surface: ______

MP Elevation: ______ Water Level Elevation: ______

Total Depth of Well Below MP: 16.61'

Time of Depth Measurement: 9/12 17:11 DTW Below MP: 15.93' 9/9 1530: 15.81'

Water Column in Well: ______

Diameter of Casing: ______ Gallons per ft: ______ Gallons in Well: ______

Gallons to be Pumped/Bailed: ______

Development Information: ______

FIELD PARAMETERS

Time: ______ Odor: ______ Color: ______

Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:

Evacuation Method: Bailer - barely enough water

Sampling Method: ______ Sample Time: ______

Sample ID, Analysis, Preservatives: ______

Remarks: Not Sampled - See 16-1

Sampling Personnel: ______

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

16 MW-3

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
Page 1 of 1

Owner/Location USACE NE Cape, corner of perimeter road, NW

Well No.: 17MW1 Random No.: Date: 9-9-04

Weather: Time Started: 1600 Time Completed:

MEASUREMENT DATA

Measuring Point (MP):

Height of MP Above or Below Land Surface: -0.3

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: ~~~18~~ 17.1

Time of Depth Measurement: DTW Below MP: 9.63' (9/7 = 9.59' @ 15:30)

Water Column in Well: 7.47

Diameter of Casing: 2" PVC Gallons per ft: 0.16 Gallons in Well: 1.2

Gallons to be Pumped/Bailed : 3.6

Development Information: ~9/7 15:42-15:55 ≈18 gl.
1620-1634 (~1 GALLON), 1639-1705
9.65" TO H_2O

FIELD PARAMETERS

Time: Odor: Color: ~~NEARLY CLEAR~~ SLIGHTLY TURBID.

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1622		168	6.1	0.094	5.00	11.8	
1628	1	199	5.57	0.082	7.32	9.38	468
1640	~2	216	5.49	0.082	6.63	11.14	105
1643	2.5	228	5.28	0.078	6.30	9.64	$
1645		223.8	5.36	0.081	7.51	9.26	77.7
1648	3	228.2	5.31	0.081	7.50	9.09	63.3
1653	3.5	225.2	5.39	0.081	8.98	8.48	
1655		222	5.45	0.081	9.74	10	78
1707	6	238.3	5.40	0.082	5.11	10.7	43.5

Evacuation Method: GRUNDFOS Pump @ 13

Sampling Method: Sample Time: 1700

Sample ID, Analysis, Preservatives: 04NE88GW108 → G/B, D/R, 4 METALS, NAP

Remarks: TURNED PUMP UP → SHOULD BE 04NE87GW104

Sampling Personnel: JKOETNER, R HESSONG

ALK = 5 mg/l

FERROUS = 0.11 mg/l

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
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Owner/Location: USACE, N.E. Cape Across perimeter rd. from site 14

Well No.: 18 MW-1 Random No.: ____ Date: 9/9/04 | 9/10/04

Weather: Overcast, breezy, upper 50s Time Started: 17:36 Time Completed: 19:15

MEASUREMENT DATA

Measuring Point (MP): Top of PVC casing, N.

Height of MP Above or Below Land Surface: -0.2'

MP Elevation: ____ Water Level Elevation: ____

Total Depth of Well Below MP: 25.8'

Time of Depth Measurement: 9/9 19:30, 19:40 | 9/10 17:40 DTW Below MP: 9/9 18.54', 19.63' | 9/10 19.68'

Water Column in Well: 7.26'

Diameter of Casing: 2" Gallons per ft: 0.16 Gallons in Well: 1.16

Gallons to be Pumped/Bailed: up to 3.5

Development Information: Well makes good water. Used Geosquirt. Purged 30 gallons - Very clear mid-column, nearly clear at hard bottom and top water level. 18:30 - 19:30. Lots of corn oil on last 6-7' of pump, lead, tube.

FIELD PARAMETERS

Pump 1817 -

Time: ____ Odor: ____ Color: SL. TURBID

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1819		230	5.66	0.090	3.17	14.8	47.2 750ml/min
1823	>1	214.6	5.97	0.088	5.08	14.52	39.3
1826	2	213.2	6.00	0.090	5.28	14.61	36.6
1829	2.9	214.9	6.03	0.087	5.33	14.60	24.2, 24.6
1834	3.9	218	6.01	0.087	5.32	14.63	

Start sample @ 4 gal. purge

Evacuation Method: Grundfos.

Sampling Method: Grundfos Sample Time: 1835

Sample ID, Analysis, Preservatives: 04NE18GW104, G/R, D/R, 4M.

Remarks: D.O. readings way too high. Calibrate pH & Cond. regularly. Don't do DO often - need atmospheric pressure.

Sampling Personnel: RET, JK

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
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Owner/Location: USACE NE Cape

Well No.: 20 MW-1 Random No.: Date: 9/10/04 / 9-11-04

Weather: Mostly clear, 50s E wind to 10 Time Started: D=13:50 Time Completed: D=14:35

MEASUREMENT DATA

Measuring Point (MP): Top of PVC casing

Height of MP Above or Below Land Surface: -0.3

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 28.98'

Time of Depth Measurement: 9/10 13:48/14:48 DTW Below MP: 22.48/9/10 23.32/9-11 22.58'

Water Column in Well: ~~8'~~ 6.5'

Diameter of Casing: 2" Gallons per ft: 0.16 Gallons in Well: 1

Gallons to be Pumped/Bailed: 3 1

Development Information: Geosquirt w/ 1/2" tubing – moved up + down through water column. – Some rusty color, but significant clearing around 35 gal. 48 gal. total purge. Pump 1042 -

FIELD PARAMETERS

Time: Odor: NONE Color: SILTY, TURBID, LT. BROWN

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1043		157.3	7.08	0.118	3.58	13.72	
1047	1	200.5	6.19	0.04-0.1	4.54	13.04	721
1050	2	200	6.22	0.08	5.23	12.74	397
1052	3	200.6	6.14	0.21	5.43	12.90	259
1057	4	213.7	6.05	0.03	5.25	12.77	191
1101		217.6	5.98		5.17	12.99	122
1104	5	218.2	5.97	0.193 W	5.25	12.87	548

Evacuation Method: GRUNDFOS, SET PUMP AT 26 FT BTOC

Sampling Method: GRUNDFOS Sample Time: 1105

Sample ID, Analysis, Preservatives: 04NE20GW104 G/B, D/RO, 4m, NAP

Remarks: 1 l/min purge – surprisingly turbid.

Sampling Personnel: C HESSONE

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Alk = 15 mg/l

mg/l = 0.18 Ferrous

SW

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No:
Page ____ of ____

Owner/Location:

Well No.: MW 88-1   Random No.:   Date: 9-6-04

Weather: Time Started: 1640   Time Completed:

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface:

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 24.16'

Time of Depth Measurement: DTW Below MP: 15.87' (@1827 = 15.85')

Water Column in Well: 8.29'

Diameter of Casing: 2" PVC   Gallons per ft: 0.16   Gallons in Well: 1.3

Gallons to be Pumped/Bailed:

Development Information:

START PUMPING 1715, DRY @ 1742,

FIELD PARAMETERS

Time: Odor: Color: NEARLY CLEAR → CLEAR

	Volume	ORP	pH	Sp. Cond.	Temp	DO	Turbidity
1722	1 GAL.	211	3.28	0.058	5.03	3.23	12.53
1725	2 GAL	212.0	5.81	0.117	5.05	3.12	7.97/7.86
1728	3	207.5	5.80	0.102	5.08	3.26	5.76
1731	4	266.3	5.76	0.121	5.16	3.31	7.71/6.66
1735	4.5	202.1	~~5.36~~ 5.79	0.153/.066	5.36 - use tubing	3.43	5.34/4.90 - use this
1741	~~6~~ 5.5	201.2	5.74	0.104	5.98 - pause in pumping	3.24	~~2.66~~ @1835

PURGE ~~Evacuation~~ Method: GRUNDFOS SET SCREEN AT 19.2 FT BTOC. 500 ml/min

Sampling Method: GRUNDFOS   Sample Time: 1830

Sample ID, Analysis, Preservatives: 04NE88GW101

Remarks: GRO/BTEX, DRO/RRO, 4 METALS,

Sampling Personnel: RANDY HESSONG, JULIE KEENER

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

— ALK = 15 mg/L

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

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Owner/Location USACE N.E. Cape

Well No.: MW 88-2 Random No.: Date: 9/7/04

Weather: 55°F Time Started: 1130 Time Completed: 1300

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: -0.5'

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 19.45'

Time of Depth Measurement: DTW Below MP: 7.61' @ 11:40

Water Column in Well: 11.84

Diameter of Casing: 2" PVC Gallons per ft: 0.16 Gallons in Well: 1.9

Gallons to be Pumped/Bailed :

Development Information:

Pump START 1159, 1238 STOP

FIELD PARAMETERS

Time: Odor: SLT. HC ODOR Color: SILTY SL. TURBID

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:	
1159		256	6.01	0.145	4.8	6.23		750 ml/min
1204	1/GALLON	208	5.82	0.144	4.40	0.55	256	
1208	2	145	5.88	0.146	5.65	0.47	367	
1211	2.5	128.5	5.90	0.147	5.83	0.32	413 NTU	
1216	3	107.5	5.94	0.152	5.78	0.27	129	
1221	4.5	95.8	5.95	0.154	5.71	0.27	54.3	
1226	~~6.5~~ 5.5	90.9	5.95	0.154	5.63	0.26	45.1	
1237	~7	83.2	6.02	0.159	4.94	0.58	930	

PURGE ~~Evacuation~~ Method: GRUNDFOS

Sampling Method: GRUNDFOS Sample Time: 1230

Sample ID, Analysis, Preservatives: 04NE88GW102, GRO/BTEX, DRO/RRO, 4METALS, PAH, NAP

Remarks: MRB. INCREASED DURING SAMPLING

Sampling Personnel: S. KOENER, R. HESSONE

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

1.34 mg/l FERROUS

40 mg/l ALK.

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

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Owner/Location:

Well No.: MW88-3   Random No.: ______   Date: 9/7/04

Weather: ______   Time Started: 1310   Time Completed: ______

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: -~0.5'

MP Elevation: ______   Water Level Elevation: ______

Total Depth of Well Below MP: ~19.6' → Screen

Time of Depth Measurement: ______   DTW Below MP: 11.46' @ 13:20   Pump down @ 15.5'

Water Column in Well: 8.14

Diameter of Casing: 2" PVC   Gallons per ft: 0.16   Gallons in Well: 1.3

Gallons to be Pumped/Bailed : 3.9

Development Information: Looks pretty clear, from start. Pump start 1343 ~~1347~~ 1351 pump 2½ gallon - dry, repeat - well recovers to 11.5' btoc in about 20min, yet can't pump slow enough.

FIELD PARAMETERS

Time: ______   Odor: s   Color: SL. TURBID → NEARLY CLEAR

1349	Volume:	ORP: 33.8	pH: 6.32	Sp. Cond. 0.269	Temp: 6.27	DO: 1.30	Turbidity: 48.9	250ml/min
1614		80	6.16	0.158	7.2	1.25	13.19	

Evacuation Method: Grundfos Rediflow II

Sampling Method: Same   Sample Time: 1615

Sample ID, Analysis, Preservatives: 04NE88GW103 GRO/BTEX, DRO/RRO, 4METALS

Remarks:

Sampling Personnel: JK, RH.

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 321-16821-3
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Owner/Location USACE/ NE Cape

Well No.: MW88-4 Random No.: Date: ~~9/7/04~~ 9-8

Weather: OC, 50s Time Started: 1035 Time Completed:

MEASUREMENT DATA

Measuring Point (MP): Top of Casing @ Notch

Height of MP Above or Below Land Surface: ≈-0.3'

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 16.1' btoc

Time of Depth Measurement: 10:40 DTW Below MP: 7.62' btoc @ 10:40

Water Column in Well: 8.48'

Diameter of Casing: 2" Gallons per ft: 0.16 Gallons in Well: 1.36

Gallons to be Pumped/Bailed : ≈4

Development Information:

Pump 1101-1146

FIELD PARAMETERS

Time: Odor: MOD. HC Color: YELLOWISH SL. TURBID

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1105		-10.7	6.23	0.312	2.25	0.85	
1109	1.5 GAL.	-44.7	6.34	0.299	4.46	0.27	
1112	2	-52	6.44	0.318	4.77	0.26	137
1116	~3	-59	6.46	0.328	4.83	0.26	38.2
1121	~3.5	-57.6	6.41	0.352	5.17	0.26	20.3
1125	4	-58.5	6.39	0.362	5.05	0.24	12.5
1130	5	-59.7	6.37	0.372	5.48	0.21	13.2

Evacuation Method: Grundfos - pump @ 12' btoc

Sampling Method: GRUNDFOS Sample Time: 1125, 1130, 1135

Sample ID, Analysis, Preservatives: 04NE88GW104, 04NE88GW204, 04NE88GW304

Remarks: MS/MSD ON METALS (1), GRO/BTEX, DRO/RRO, 4METALS

Sampling Personnel: JR, RH

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

1110 CALIBRATED TURBIDITY METER

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3
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Owner/Location USACE NE CAPE

Well No.: MW 88-5 Random No.: Date: 9-8-04

Weather: 50°F CDY, WINDY Time Started: 1220 Time Completed:

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface:

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 14.9 ft.

Time of Depth Measurement: 1230 DTW Below MP: 7.28 ft

Water Column in Well: 7.62

Diameter of Casing: 2" PVC Gallons per ft: ~~1.2~~ 0.16 Gallons in Well: 1.2

Gallons to be Pumped/Bailed : 3.6

Development Information:

Pump 1244-1306 (DRY), 1319 - Get parameters & sample

FIELD PARAMETERS

Time: Odor: MOD HC Color: ~~SL~~ TURBID YELLOWISH SLIGHT SHEEN

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1246		21.6	5.93	0.454	3.95	1.02	407
1249	~1 GALLON	21.1	5.80	0.421	5.24	0.63	419
1251	<2	21.6	5.78	0.405	5.57	0.65	296
1255	2.5	10.1	5.82	0.395	6.07	0.41	303
1258	3	1.7	5.91	0.391	6.88	0.30	298
1302		-5.8	5.91	0.390	7.33	0.29	266
1320	4	-27.81	6.1	0.391	6.75	1.2	289

Evacuation Method: GRUNDFOS - SET PUMP AT 12FT BGS

Sampling Method: GRUNDFOS Sample Time: 1325

Sample ID, Analysis, Preservatives: 04NE88MW105 GRO/BTEX, DRO/RRO, 4 METALS, N.A.P.

Remarks:

Sampling Personnel: RH, JK

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Ferrous Fe = 1.79 mg/l

ALK 25 DROPS → 125 mg/l

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 321-16821-3

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Owner/Location: USACE NE CAPE DACA 85-03-D-003- T.O.6

Well No.: MW88-6 Random No.: Date: 9-8-04

Weather: 55° CDY. Time Started: 1720 Time Completed:

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface:

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 15.18 FT.

Time of Depth Measurement: DTW Below MP: 8.05 FT.

Water Column in Well: 7.13

Diameter of Casing: 2" PVC Gallons per ft: 0.16 Gallons in Well: 1.1

Gallons to be Pumped/Bailed : 3.4

Development Information:

PUMP 1738 - 1750 (DRY), 1808 - ~~1824~~ 1840

FIELD PARAMETERS

Time: Odor: Color: SL. TURBID, GREY

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1742		-5.8	6.36	0.907	6.35	4.6	
1745	1/2 GAL	-33	6.48	0.910	6.11	0.68	193
1747	1	-49	6.51	0.781	7.28	0.42	116
1750		-55	6.54	0.679	8.27	0.33	
1816	1.5	-57	6.51	0.663	8.63	2.81	89.2 → 69.3
1817	2	-53	6.51	0.515	8.64	1.65	34
1828	3.5	-38	6.56	0.616	6.35	0.73	
1832	4.5	-48.8	6.57	0.502	5.63	0.21	265
1839	6	-49.7	6.58	0.458	5.75	0.14	169
							105

500 ml/min

Evacuation Method: GRUNDFOS PUMP SET AT 13FT. BTOC

Sampling Method: GRUNDFOS Sample Time: 1835

Sample ID, Analysis, Preservatives: 04NE88GW106, GRO/BTEX, DRO/RRO, 4 METALS, PAH

Remarks:

Sampling Personnel: R HESSONG, J. KOSTNER

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

PUMP SLOWED DOWN AT ~ 1828 → SPED UP ??

~~ALK → 18 DROPS → 90 MG/L~~

~~FERROUS-~~

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
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Owner/Location: 2004 USACE NE CAPE

Well No.: MW88-8 Random No.: Date: 9-9-04

Weather: 55°F, CDY Time Started: 1230 Time Completed: 1400

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface:

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 18.61 ft

Time of Depth Measurement: DTW Below MP: 12.01 ft

Water Column in Well: 6.6 ft

Diameter of Casing: 2" PVC Gallons per ft: 0.16 Gallons in Well: 1.1

Gallons to be Pumped/Bailed: 3.2

Development Information:

pump 1316 - 1340

FIELD PARAMETERS

Time: Odor: H2S Color: SL TURBID

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
1319	1/2 GAL.	-376	6.42	0.359	5.89	0.33	25.6
1322	1.5	-39	6.35	0.318	7.28	0.24	[illegible]
1324	2	-36.8	6.36	0.314	7.45	0.18	13.1
1326	2.5	-40.3	6.39	0.310	7.49	0.25	11.1
1328	~3	-43	6.40	0.313	7.53	0.28	9.63
1342	7	-50.5	6.44	0.318	7.42	0.80	24.3

Evacuation Method: GRUNDFOS, SET PUMP AT 15 ft BTOC

Sampling Method: GRUNDFOS. Sample Time: 1330

Sample ID, Analysis, Preservatives: 04NE88GW107

Remarks: GRO/BTEX, DRO/RRO, 4 METALS, PAH, NAP

Sampling Personnel: J KOESTER, R. HESSONG

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

CALIBRATE YSI (COND., 2PT. PH), TURBIDIMETER

ALK, 18 DROPS = 90 mg/L

FERROUS: 3.30 mg/L

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
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Owner/Location: USACE NE CAPE

Well No.: MW88-10   Random No.: ____   Date: 9-11-04

Weather: ____   Time Started: 1145   Time Completed: ____

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: ____

MP Elevation: ____   Water Level Elevation: ____

Total Depth of Well Below MP: 25.55'

Time of Depth Measurement: ____   DTW Below MP: 9-6, 1800=20.11' | 9-11: 20.30'

Water Column in Well: 5.2

Diameter of Casing: 2" PVC   Gallons per ft: 0.16   Gallons in Well: ~0.8

Gallons to be Pumped/Bailed : ~3/ 2.5

Development Information: PURGED ~5GALLONS

Pump 1220-1234, 1247-
RAN DRY ~3 TIMES

FIELD PARAMETERS

Time: ____   Odor: MOD HC   Color: BROWN TURBID

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:
		191	6.27	0.135	5.05	4 ~~0.135~~	932
12298	~1	100	5.96	0.128	5.79	1.03	594
1229				0.124	6.42		
1231	22	145	5.81	0.123	9.16	3.11	531
1234	2.4	130	6.06	0.119	8.46	2.95	307
1231		123.7	6.04	0.116	8.16	1.90	
1250	~5	~~114.6~~	~~6.00~~		8.09	4.45	109
1256	3	125.6, 69	5.98	0.117, 0.107	9.47, 5.85	1.92, 2.90	69.8

TURNED ↓FLOW

Evacuation Method: GRUNDFOS SET PUMP AT 23FT

Sampling Method: ____   Sample Time: 1300

Sample ID, Analysis, Preservatives: 04NE88GW108 GRO/BTEX, D/R, 4M, NAP

Remarks: Cathy DEV. ~4 GALLONS w/BAILER 9/10.

Sampling Personnel: SK, RM

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

ALK: 30 mg/l
FERROUS= ~~0.6~~ 0.48

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16821-3

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Owner/Location: USACE N.E. Cape, St Lawrence Isl.

Well No.: 22MW2 Random No.: Date: 9/11/04

Weather: WINDY ~~Chilly (40s)~~ COLD Time Started: 1745 Time Completed: 1900

MEASUREMENT DATA

Measuring Point (MP): Top of PVC casing

Height of MP Above or Below Land Surface: − 0.25

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 34.57'

Time of Depth Measurement: DTW Below MP: 27.87' (9-7 1730)

Water Column in Well: 6.7 ft

Diameter of Casing: 2" Gallons per ft: 0.16 Gallons in Well: ~~6.7~~ 1.1

Gallons to be Pumped/Bailed: 3.2

Development Information: ~~Ing~~ GeoSquirt, Pump ~25 Gallons

Purge 1825.

FIELD PARAMETERS

Time: Odor: NONE Color: NEARLY CLEAR → CLEAR

1826	Volume:	ORP: 215	pH: 6.10	Sp. Cond. 0.081	Temp: 2.67	DO: 13.73	Turbidity:	800ml/min
1828	~1/2 GAL	216	5.86	0.080	2.48	13.30	12.87	
1831	1	216	5.71	0.078	4.66	12.94	6.59	
1833	1.5	217	5.75	0.079	5.19	12.84	2.13	
1838	2.5	217.2	5.85	0.078	5.42	12.75	1.2	
1840	3	211.3	5.83	0.078	5.54	12.62	1.14	
1848	4	? 174 ? unstable	5.?	0.079	5.19	12.93		← post-sampling (flow through not purged enough?)

Evacuation Method: GRUNDFOS

Sampling Method: GRUNDFOS Sample Time: 1845

Sample ID, Analysis, Preservatives: 04NE22GW115 G, D/R, N.A.P

Remarks:

Sampling Personnel: CH, JK

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

ALK = 5

FERROUS = 0.03

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
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Owner/Location: USACE NE CAPE

Well No.: 22MW3 Random No.: Date: 9-11-04

Weather: 40S, WINDY Time Started: 1340 Time Completed: 1715

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: ≈ -0.2

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 38' (10' SCREEN)

Time of Depth Measurement: DTW Below MP: 32.4

Water Column in Well: 5.6

Diameter of Casing: 2" PVC Gallons per ft: 0.16 Gallons in Well: 0.9

Gallons to be Pumped/Bailed: 2.7

Development Information: ~~SET~~ PUMP AT 36 FT BTOC, PUMP ~~1420~~ - ~55 GALLONS, VERY SILTY → SL. SILTY PUMP MORE, ~80 GALLONS ~~85~~ TOTAL.

FIELD PARAMETERS

Time: Odor: NONE Color: NEARLY CLEAR

	Volume	ORP	pH	Sp. Cond.	Temp	DO	Turbidity	
1631		198	6.29	0.090	4.6	13.1	35.5	HAD TO
1634		193	5.53	0.089	5.74	11.42	22.9	RUSSL FLOW
1643	1.5	187	5.47	0.084	7.12	11.09	49.6	RATE
OFF 1648	2.5	184	5.51	0.086	8.67	10.95	80.6	231.7
ON 1651 1656	4	158	5.35	0.087	7.51	11.18	67.6	17.05
1702	~4.5	187	5.31 either	0.159	7.47	10.84		
1711	7.5	205.1	5.60	0.086	<5.23	<13.3		← Post-sampling

Evacuation Method: GRUNDFOS

Sampling Method: GRUNDFOS Sample Time: 1705

Sample ID, Analysis, Preservatives: 04NE22GW10* 1,4 G, DRO/RRO, N.A.P.

Remarks:

Sampling Personnel: JK, RT

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Alkalinity, 5-10
Fe^{3+} ; 0.00 mg/L

Shannon & Wilson, Inc.

GROUNDWATER SAMPLING LOG

Job No: 32-1-16821-3
Page 1 of

Owner/Location: USACE NE CAPE

Well No.: 26MW-1 Random No.: Date: 9-12-04

Weather: 50's CLDY Time Started: 1600 Time Completed: 1830

MEASUREMENT DATA

Measuring Point (MP): TOC

Height of MP Above or Below Land Surface: Est.-0.25

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: ~~38~~ 41.9

Time of Depth Measurement: 1620 DTW Below MP: ~~38?~~ 36.74'

Water Column in Well: ~~1.26'~~ 5.16'

Diameter of Casing: 2" PVC Gallons per ft: 0.16 Gallons in Well: 0.8

Gallons to be Pumped/Bailed :

Development Information: GRUNDFOS ~~1445~~ 1643-1725 SL/MOD. TURBID. TURN UP PUMP SPEED → PUMP TOTAL ~ 1 2/3 DRUMS.

FIELD PARAMETERS

Time: Odor: Color: NEARLY CLEAR

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:	
1753		226.8	6.26	0.061	4.94	13.25		750mL/min
1756	1 GALLON	244.6	5.95	0.059	5.39	12.43	14.09	
1802	2	256.6	5.72	0.058	< 6.7	13.3	10.33	
1806	4	257.9	5.72	0.058	4.37	13.21	5.03 → 3.88	
1830	10	<276	5.39	0.058	~~5.17~~ 5.31	12.18		

Evacuation Method:

Sampling Method: Sample Time: 1805, 1810, 1815

Sample ID, Analysis, Preservatives: 04NE26GW102, 202, 302. G/B, D/R, PAH, NAP

Remarks: MS/MSD ON 102 FOR G/B, D/R → ONLY SAVE PROJECT SAMPLE, NOT MS/MSD, ~~BUT~~ AND DUPLICATE, TRIPLICATE FOR PAHS

Sampling Personnel: JK

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

ALK 5 to 10 mg/L

Ferrous = 0.01/0.00 mg/l

GROUNDWATER SAMPLING LOG

Shannon & Wilson, Inc.

Job No: 32-1-16321-3
Page 1 of

Owner/Location USACE NE Cape, St. Lawrence Isl'd AK Site 26

Well No.: 26MW3 Random No.: Date: 8/25/04

Weather: Time Started: Time Completed:

MEASUREMENT DATA

Measuring Point (MP): Top of PVC casing, N. side

Height of MP Above or Below Land Surface: -0.25

MP Elevation: Water Level Elevation:

Total Depth of Well Below MP: 24.22'

Time of Depth Measurement: DTW Below MP: 13:55 - 5.06'

Water Column in Well: ~~18~~ 19.16'

Diameter of Casing: 2" Gallons per ft: 0.16 Gallons in Well: ≈ 0.32

Gallons to be Pumped/Bailed: 1

Development Information: Screen ≈ 9' btoc - Pump @ 14' btoc Start: 14:23
Use 1 gallon to adjust flow - 1 l/min = 63 to 64 Hz. Watch parameters for info.
2 gal 14:26 = 12 min/gal. @ 75 Hz. No drawdown.
Surge + Purge 20 gal 14:39 = DTW = 5.07
varying depth + flow rate up to 10 gpm

FIELD PARAMETERS YSI 556

Time: 15:00 Odor: Corn Oil - Not Strong Color: Lt. reddish brown

	Volume:	ORP:	pH:	Sp. Cond.	Temp:	DO:	Turbidity:	
		90.8 mv	6.65	0.158 mS/cm	3.7°C	1.7 mg/l	64 NTU	
15:08	2 gal.	90.8	6.62	.148-.201	4.02	1.65	49.0	
15:12	3 gal	90.3	6.59	.144-.205	4.16	1.64	43.9	
15:16	4 gal.	92.4	6.53	.153-.205	4.17 4.16	1.69	RH ~~4~~36.3	
15:20	5 gal	93.8	6.51	.152-.203	3.95	1.73	32.0	
15:24	6 gal	94.0	6.48	0.180-.166	4.06	1.75	29.6	∇ 5.07' btoc
15:28	7 gal.	94.1	6.51	0.177-.179	3.97	1.70	29.0	
15:32	8 gal	95.7	6.48	0.177-.178	4.02	1.73	24.7	

Evacuation Method: Grundfos Redi Flo-2

Sampling Method: " Sample Time: 15:38

Sample ID, Analysis, Preservatives: Ø4NE26GW101: HCl GRO, BTEX, DRO/RRO, PAH, Nitrate/Sulfate, total Iron

Remarks: Development blended into Purging - very good aquifer connection.

Sampling Personnel: Ben Heavner, Randy Hessong

WELL CASING VOLUMES

GAL/FT 2" = 0.16 3" = 0.37 4" = 0.65 6" = 1.46

Ferrous Iron Hach powder pillow: 0.48 mg/l

Alkalinity Hach powder pillows: 55 mg/l Methyl orange alkalinity as $CaCO_3$

	Temp.	Cond.	DO	pH	ORP	Turb.
16:14 18.5 gal.	3.53°C	0.179 mS/cm	1.74 mg/l	6.61	77.8	11.34

5.07' dtw

APPENDIX I

Field Log Books

CONTENTS

PAGE	REFERENCE	DATE
	EMERGENCY #S	
	AK AirForce Rescue Coord. Center:	
	1-800-420-7230	
	or 1-907-428-7230	
	Bering Air: 1-907-443-5464	
	Nome Hospital: 1-907-443-3311	

"Rite in the Rain"®

ALL-WEATHER WRITING PAPER

ALL-WEATHER

HORIZONTAL LINE BOOK

Name Randy Hessong
Shannon & Wilson, Inc.

Address 5430 Fairbanks St.
Anchorage, AK 99518

Phone (907)

Project Phase IV RI, N.E. Cape,
St. Lawrence Island, AK

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

Specifications for this book:

Page Pattern		**Cover Options**	
Left Page	Right Page	Polydura Cover	Fabrikoid Cover
Lined	Lined	Item No. 390N	Item No. 390NF

RTH 32-1-16821

2

RTH
8~~9~~/8/04 (Sun)

15:00 - Taxi to TSAIA for
1700 Flight to Nome.
Meet Ben Heavner - S&W Field
Eric Schmidt - AK Minerals
(cook) Exploration Svc.
(= AMES)

See Lyndon C130 Herc in
Kotzebue - It's flying!

Aurora Inn in Nome ≈ 20:30

RTH
8/9
~~9/10~~/04

10:30 - To airport - Bering Air.
Visit w/ AK Air cargo about
Shipment of samples.
Pickup air bills. Confirm
Lyndon C-130 flying.

Land @ NE Cape ≈ 13:30 in
Navahoe.
Wx: Overcast, diminishing drizzle
SW. wind ≈ 15 mph.

RTH 32-1-16821

3

RTH
8~~9~~/9/04

14:30 - Lyndon C-130 on ground
in N.E. Cape. Tim Dugenia
w/ AMES on board.
drizzle stopped, wind steady
Off load gear, begin camp
setup. Meet Locals - Eugene
& guys from Savoonga
Dinner ≈ 20:00
Shut Down ≈ 22:00

RTH
8~~9~~/10/04

8:45 Preshift Safety Mtg.
4 people on site.
Satellite phone use review,
Wx: Overcast, calm, 50°F
Breeze from E increasing
A.M.: Freezers running
4 tent platforms & frames
2 tents up →

12:45 lunch Eugene & Maria stop by
Shower setup, Sampler Staff
setup

8/10/04

4:00 Call John S. → NO carbon In treatment system for organics – call Mike & get,

Continue setup.

19:00 Dinner.

20:30 → 23:30 More setup, water system

8/11/04

RZH

9:50 – Preshift.
Wx: fairly Calm, 50s 1200' ceiling
Work on Sugi water sampling w/ Ben. –Jars, labels, etc.

Noon call to AMES – Flights will be tomorrow afternoon.
Shift focus to more camp setup so Tim can leave on tomorrows flight.
– 2 tents up.
13:30, lunch

8/11/04

After lunch – Run water from creek through samplers activated carbon into drums, use water supply pump to get ~~to~~ RH 150 gal. into bladder. Transfer 100 gal. to drums at camp for use. Eugene stops by
No chlorine here to sterilize system.
Work on heaters. Drip heaters in tents O.K. Togo type heaters for shower & kitchen not functioning. Seem to be electronics issue.
Wind sock up at N.E. end.
Camp plumbing near complete.
Some bad parts.
11:00 (23:00) Bed.
Eugenes daughter & Son-in-law stop in.

8/12/04

RZH

9:20 Pre-shift / Safety Mtg.
Wx: Clouds hangin on mountains rain overnight – stop ≈ 7:30. light N. ~~L~~ RH breeze, good visibility, 50°F

8/12/04

Setup fuel containment, generator enclosure; general organize.

11:00 Tim calls Mike Smith - AMES - Lyndon has cancelled HERC flight due to Gambell/Savoonga weather reports.

Ben - sample labels & prep.

13:00 Sample Lower Sugi R.

Fuss w/heaters
Wx: light fog, rain

13:50 Lunch. → 14:20

Package samples
Water system problems - Jet pump seems to cavitate over 40psi, cuts on over 30 ~~psi~~ ft.
Checkvalve bad - repaired.
Used a sump pump to help jet pump.
No bleach to shock system.

8/12/04

Use mostly GAC treated water. Some residual untreated. - No drinking
Dinner - 1hr.
May run shower in morning.
No flights in today.
Continued low clouds, light rain, variable wind.

(22:00)
10:00 Off.

TZK

8/13/04

10:00 Pre-shift
Wx: NNE wind 5-15kt, 54°, low clouds to fog, rain intermittent.
No Satellite Phone pickup.
Tent heaters: One more operational.
Inverter/battery checks & tests - working too hard.
Water system - Jet pump fine on little 2KW generator, no good on main 5KW - try various things to optimize. (Ground, shorter wire, tweaks)
5KW power is just "dirty." Heaters & pump prefer other power.

8/13/04

Horiba pH a little flaky - let soak.
other water instruments O.K.

13:00 Lunch w/ Eugene.

14:00 - OVM calibration inconsistent.
Dry, clean detector.
Won't charge - bad wire. Re-solder,
cut out section.
HNU fine.

14:30 Phone locks on Satelite.
Call John Spielman.
· Julie & Driller's helpers have returned home from Nome.
· No MS/MSD for QA samples O.K.'d in plans.
· No HNO_3 preservatives in total metals samples approved. Just note on COC that acid must be added 24 hrs. before analysis.
· Call John or Lyndea ~ 8:30 to 9:00 in A.M. if reception to give weather report for HERC.

8/13/04

One fox has been a nusance around camp. Locals say they will keep eye out. Have had problems w/ rabid fox. (Eugene's son Floyd)
17:00 Floyd shots a fox near camp. Wx break?
17:30 Dinner. Wx. descends again
18:30 - Pump more water through activated carbon from creek.
Prepare to try showering
20:00 off
Shower works

8/14/04

High winds overnight from S. Cooks tent moves. Fuel jug upside down, but not empty - minor fuel release, maybe 1 to 2 gallons.
No major damage in camp - all had poor sleep, wet gear.
9:30 - Call John Spielman - No flying today.
Wx: Winds to 30Kts, primarily south upper 50s F, mists, fog around, but relatively clear hole overhead.

8/14/04

Treat water
Max treat back
Work on anchoring tents
Hand dig fuel spill area -
screen w/ OVM 580B PID
calibrated today to 100ppm Iso
≈ 1/4 drum
Headspace Camp HS01 11:45, 0.2' bgs
Brown sandy GRAVEL ~~Dmoist~~ moist to wet.
HS: OVM acting like water interference. - slow continuous climb
HNU 101: 84 ppm - Small "Hot"
12:00 → 13:00 Lunch.

Will need to fuss w/ OVM more.
use HNU for now. Screen again -
find hot spots.

Fill ≈ 1/3 drum - run out of hot
spots.
13:50 - HS02 (camp) 0.6' bgs same soil
Headspace: 0.0ppm (HNu)
Photo Randy 1 - POL release area w/rocks kicked in.
Put available weight next to
tents for anchors.

8/14/04

14:30 → 16:30 Tour M.O.C., drainage basin
+ White Alice sites w/ Ben

16:30 → Sample Sugi River
mid - reach.

Photo: Cable Junction box in a landfill area
just below SW. corner of MOC.
- Type that may contain PCB potting.
Photo: Cable Junction Box w/ MOC in
background.

17:50 In camp. Complete labels,
ICC samples.
COCs, prep lablels for tomorrow
18:20 - 19:20 Dinner
19:20 → 20:20 - Prep/paperwork.

8/15/04

Wx: Higher winds overnight, to
45kt? Misty/drizzle, 500-1000' ceiling,
Continued 15kt winds. 50s.
Tent anchoring was effective.
9:36 Pre-~~Safe~~

8/15/04

Ben & Eric - water treat & pump
Ben - Upper Sugi water sample
Randy - Dallies, Sample tracking
Tim - Pallets to ship out
- Wx clearing up a little.

Lunch 13:00 - 13:30
Call John S. - No flights today, call in Wx.
Prep & Sample POL Release - Pipeline
Walk / Ride around Sagitrughneq Estuary, looking for sediment sample locations. Estuary is more of a lake. Water level is over 1 ~~foot~~ higher than upon our arrival. Water level is 6" higher than low tide (est), and yesterdays storm surges Just topped the dam a little in a couple of places.
~~No Dinner~~
Check samples (Wx quite nice)
20:36: Off.

Dinner

8/16/04

Wx: 15-1800' ceiling, light SE wind dry.

9:00: Call Lyndon Operations (Air Cargo) w/ Wx report - Herc is starting engines.
Call Bering Air - Wx report. They are planning to come out in an hour or two - call back w/ Wx in 1 hr.

Final Package 5 coolers - 1 to NCA, 4 to SGS

12:00 Lyndon Herc. on ground.
Jo Winninger on board w/ drill rig.
Load out 2 pallets w/ extra camp gear, trash, samples.
Bering Air diverted while Herc. takes off? - Call Bering - flight delayed until evenings.
13:00 Lunch 13:45
Look @ QA letter from Julie Sharp-Dahl.

8/16/04

Work on camp set up w/
new stuff. Send Ben to
recon Cargo Beach Road sites.
Jo sets up & test drilling
equipment.
18:50 - Call Bering w/ weather report
Review Ben's findings. Previous
IRA activities may interfere with
some site access, but looks pretty
good over all.
19:30 Dinner Ben & Jo off.
20:00 - Daily Rpt.
20:30 Off

8/17/04

Wx: 1800' overcast, lt E. breeze,
dry. 09:00 Call Bering Air w/
weather report. They anticipate
an 1130 departure w/crew.
9:30 Bkfst done
Joe & Ben work on latrine
hole
Randy works on carbon filters
for watersystem

8/17/04

12:30 Bering Air plane in w/
Julie Keener, Frank and Cole Wininger.
1300 Safety Meeting - primarily
general camp & emergency response.
13:30-1400 Lunch
Continue working on latrine -
2 augers for anchors. ~~Ice~~ Frozen
silt at 3' bgs.

Drill & drive tent anchors
Paper work
Setup latrine, general camp/
sample prep.
Wx: Misty rain, continued calm,
19:30 Dinner
Wx: Misty, lifting, E. breeze

16821

8/18/04

Wx: Mostly clear, mild E. wind, 50s F
10-15kt gusts overnight.

9:24 Pre-shift safety Mtg.
- Drill crew continues w/ tent anchors, then set up for sites 3&6
- Samplers Calibrate HNu, Prepare sampling & Decon materials for Sites 3&6.

11:00 - Samplers scouting sites
Drillers fuelling / loading

13:00 → 13:30 Lunch
14:00 Setting up at Site 3.
15:00 1st Sp. Spoon at 03B2
Gotta keep after drillers for eye, ear, hand protection.

Air Monitoring: 0.0ppm at breathing & in hole.
15:45 - Same breathing air -
16:05 - Move to 03B1
Trouble getting rig close due to previous pipeline exc.

8/18/04

work - melting permafrost & big stockpile.
- Unexpected - B1&B2 essentially clean, while strong odors from stockpile, and location where truck sunk a tire.
- Ice/frozen ground is quite solid over 4' to 5' bgs.
Add another boring near B1 - shallow to ice - some fuel odor.

Well points installed up hill and down from pumphouse site.
03WP5 is up hill (   ) of site in tundra. Water level in partially driven screen is 0.5' bgs. Drive point flush to ground, add 2.5' riser

03WP6 is in the last vegetated hollow between pump house and beach. Water encountered about 4' bgs.

20:30 Back in camp
20:45 Dinner.

8/19/04

Wx: Partly clear, light E wind, 50s F.

9:00 BKfst.

9:20: Work out better decon plan

9:40: Pre shift Safety meeting

Check lamp, wiring of OVM 580B

- Ben & Julie set up sampling gear for Site 6.
- Winingers set up for decon w/ drums (2) on drill rig ~~s~~ - strapped down.

Water problems - Primary particulate filter clogged. No valve to remove presure tank from filter system. Filter casing over-tightened, can't open.

Swap housing around - crack one - get filter replaced and decon water filled in time for lunch.

13:30 → 14:00 Lunch

14:10 On site, site 6

Calibrate OVM 580B - still slow, but #s all look good.

RLH

8/19/04

Setup drill on 06BZ. - Boulders

Air monitoring 14:45 - 0ppm, minordust ~~from~~ rock

WP6-3 WL = 6.88' bgs Total depth 9.22' @ 15:30

No impacted ~~to air~~ soil (by PID) encountered at 06BZ.

Difficult drilling - boulers, then soft heaving sand.

Randy off site @ 18:00 - Dailies, forms

Crew back @ 17:00 - help w/ samples.

Dillers clean, re-set gear to try auger/hammer combo.

Corn oil in air system seems to cling.

19:45 Dinner.

20:40 → 21:00 Drillers/Ben gather rocks for interior tent anchors

Julie & Randy - Sample logging & paper work to 23:18

RLH

8/20/04

Wx: Over cast - fairly thin & burning off. Cool overnight (upper 40s?) Mild variable breeze.

9:30 Pre-shift mtg.
Prep for sites 6 & 7

10:30 Out of camp.
help setup on 06B3

11:00 Ben & I to Site 7 landfill.
Appears 0INE07SS127 location has been plowed (last year?) Sample 0INE07SS125 is part way up a definite debris pile. Lots of drum in vicinity

11:45 Call Office - John S. on road to Fairbanks - no contact on cell. Talk with Tim Terry - basic status - no emergent needs, site 3 borings to permafrost, site 6 - on 2nd boring - boulders.

11:50 - Leave Message on Carey Cossaboom's phone - site 7 sample locations definitely on debris. QA sample set

8/20/04

should include 1 more metals analysis - probably just mercury.
- Things to discuss w/ John so when I call next we can get direction.

12:00 - Photos & GPS of Site 7 locations.

12:45 - Site six - still drilling in loose cobbles @ 11' bgs.
Ben & Randy prep to sample Site 3 sediment, develop wellpoints.
Locals hunting reindeer around us.
14:00 - 14:30 lunch.

Site 6 - 15' - go to 20'

14:50 - Ben & Randy @ Site 3.
Develop WP05, 06.

Intermittent Stream surface water samples: No flowing water for last 5 days of observation. Stream on plan is a mix of the old

8/20/04

quarry access road and another short drainage from the area immediately south of the Pump house site. (The quarry access road was reported to have been made by the original site contractors by pushing the thawed tundra aside so that equipment could drive on the permafrost to access ~~rock~~ rock for road development)

Sample sediment (rooty peat) instead of water. (Saturated tundra - holes fill w/ water)

15:45 04NE03SD102 0.8' bgs Brown organic silt and active grass roots. Below junction of 2 small drainages (down grade from Site 3 pad) Headspace: 0.6 ppm
1X4oz w/25ml MeOH - AK101/SW8260BTEX,
1X8oz - DRO/RRO, PAHSIM

~~15:~~ RRH 16:15 04NE03SD103 0.8' bgs - same material up grade from Site 3 pad and former 01NE03WP. Headspace: 0.0 ppm
1X4oz w/25ml MeOH - AK101/8260BTEX
1X8oz - DRO/RRO

8/20/04

19:20 - Back at Site 6
Site 3 well points slow + dirty in organic silt/peat.

Crew at Site 6 - on 06B2 (2nd today, grinding toward 10' bgs

Air monitoring has remained casual. No dust, no vapors detected in air.

Water levels in existing wells, Site 6

	TOC / BTOC	Ground-TOC *	DTW	TOC - Bottom
WP6-3	6.96'	2.44'	4.52'	9.24'
PVC by WP6-3	4.76	≈1.0	~~4.76'~~ RRH 3.86'	3.86'
WP6-2	No water	3.08'		4 RRH ~~5.22~~ 6.05'

18:30 - Drillers work on decon for 15' to 20' of drilling for next hole. Takes too long to start hole. Decide that Decon of augers in ~~troughs~~ at camp, each day, with ~~daily~~ per-hole ~~[illegible]~~ stuff at rig in drums.
19:15 off site

8/20/04

19:15→19:45 - Setup decon, re org. - put samples on ice.

19:45→20:30 Dinner.
Sample packing/forms
23:30

RRN

8/21/04

Wx: Hazy, scattered clouds, calm, 50s F.
9:18 Pre-shift. Drills complete decon, samplers prep gear.
10:10 - on road.
Eric to call in supply order for Monday.
10:40 - Crew hammering up surface rocks @ Ø6B5 Ben developing Site 3 wellpoints.
Left message for John Spielman
Silty material in B5 - Water at 8' or less Sample to 11.5 seem more than adequate (2X depth of previous investigations)

RRN

8/21/04

No volatiles in air detected w/ PID walk-around. (Site6)

Borings B5 & B6 appear to be located in the fines uplift portion of a frost-patterned ground cell, while B2, B3, and to a lesser extent B4 are in the coarse rock portion.

The frost circulation creates soft soil between rocks that is very difficult to sample. Exact depths of soil samples are not realistic. Soil may have moved some distance with augering.

With water at 4-5' bgs, don't see need to go to 20' - difficult w/ auger, hard on rig also.

B1 location back in cobble/sand area.

Site 3: WP6 not making much water - slow recovery. Have ~~Ben~~ RN Ben drive a second point nearby + deeper. Seem to have hit better water,

RN

8/21/04

but 03WP10~~6~~8 RZH new screen is below water - possible minor confinement from silts below organic mat.

Wx: High haze has settled down to ground - 100 yd. visibility, smoke odor, fog, traces ash.

Rinsate - Site 6 split spoons

Site 6: B1 ~~in north~~ RZH Complete B1 to 10-11.5' bgs. Move over and use air hammer to breakup rock to about 8' bgs. Drive well points with air hammer assistance. Aim for top of screen @ 5 to 6' bgs. Use available air to blow fines from well point screen.

19:50 off site

20:15 Dinner

21:00 Julie & Randy label
↓ 22:42 ↓ 22:12

RZH

8/22/04

Wx: Misty, smoky haze, near 60°F
Minor breeze from E., increasing through day

9:18 Pre Shift Sfty Mtg.

Drillers: Weld trailer hitch - good safety procedures. Move compressor to shallow well (Const. lamp) location
Clean augers

Samplers: Treat decon water w/ Granular activated carbon (GAC)
Lable & package samples,
COC / well paperwork

11:30 - Eric (cook) minor 1/4" cut on R. pinky - clean & bandaid. (Cleaning knife)

13:00 Lunch → 13:30

13:32 - On site - Site 26 Deep/Shallow investigatory wells. -

13:45 - Down hole hammer to probe 1st 5', then Odex - see boring log.

RZH

8/22/04

Photos: Camera Randy 2 1st Frame (#27): 26MW3 location to NNW, 2nd Sugi bridge/road intersection in background.

#26: To SSE, MOC steel + outline of mountains through smoky haze.

#25: 19.5' of casing in - water coming out, sitting on boulder. 26MW3

Silt (glacial till likely) encountered at ≈ 22.2-22.5' bgs - gray, little evidence of clay - drys out.

Water ≈ 6' down - put in 15' screen.

19:50 Off site
20:12 Dinner.
Movie Night - Smoke thick
Raindeer in camp.

8/23/04

Wx: Clear but smokey - mild E. breeze - 60s F
9:24 Preshift safety meeting
9:40 Call Bering Air w/ Wx report 1.5 mile vis, mild winds. O.K. Call back in ≈ hour and see if it stays.
Crew sets up for Site 10 borings
Randy + Ben final prep samples for shipping, Complete repairs/upgrades on water system.
10:50 - Call Bering - won't fly 'til mid afternoon
12:00 → 12:18 Lunch
12:45 - Site 10 - select boring locations - leave Julie + drillers. Ben to Site 3+6 wells continue admin/packing
15:00 Call Bering - still gunshy about flying due to smoke, Savoonga Wx report - call back in 45 min/hr. while they get a pilot.
16:00 Wx still good - Fly.
16:45 - Fog + N. wind - visibility 1/2 mi. - No fly.

8/23/04

17:00 Crew back in camp
-Have prep for MOC wells.
Work on dailies - print for
package to John Spielman.
19:30 Dinner
20:15→22:30 - Dailies, planning, logging
Julie & Randy

8/24/04

Wx - low fog, less than 1/4 mi vis.
mild breeze from N. 50°F
9-9:20 Breakfast
9:20 Pre-shift safety mtg.
Set for MOC wells.
Ben to sites 3/6 wells.
10:50 - locate 18MW1. - Set on hole
w/ odex setup.

Locate/mark other wells, borings
at MOC.

11:45 - Fog lifting a little.
12:15 - Flying weather
Mark Site 14 PCB sample locations

8/24/03

- East line of 2001 grid marked,
West line + corner of building also
marked - fiberglass rod + faded
orange paint.

Location for samples are in angular
rock fill ≈ 3' from edge of fill
Soil may not be present w/in 2'.

13:30 - To depth in 18MW1
14:00 Lunch
14:10 - Call Bering air - Flyable
for last 2hrs. - they will
get a pilot going.
14:45 - Back to 18MW1
15:30 - Bering air flight coming
in - supplies, 3 coolers out
to SGS (#6, 7, 8)

18MW1 making water
Set PVC to 26' bgs
16:15 Photo #24 MW1 at Site 18
- PVC being cut off, looking W.
Photo #23 18MW1 w/ Emergency
Power Foundation in background

8/24/04

Mark PCB soil sample locations at Site 13 - Electrical Power Building. Pad 13-1 easy - a corner is exposed through soil. Dimensions given.

Pad 13-2 - No sign of pad, former sample locations. Scale on plans not accurate enough to dial in locations. 98NE13SS802 markings gone. - look @ survey data. Samples between 88MW5 & 88MW6 fairly easy to mark based on line between wells. Sample locations 96NE13SS107 & 108 gone.

18:00 18MW1 complete
Move to 20MW1.
No samples recovered to 10'
Move.
Site 22 - very altered.
No obvious locations
20:00 Off Site
20:30 - 21:30 dinner
Randy - prep driller task list
22:30 off

RAH

8/25/04

Wx: Foggy, mid 50s F, NE breeze, smoky smell.

8:25 Pre-shift.
Prep for 20MW1 & 17MW1 @ MOC
More water from Sites 3 & 6 well points.
Drillers get odex hammer dimensions.

Call John Spielman: Hammer dimensions so Kyle Brown can get a spare headed out here.

- Request John work w/ Kyle on getting appropriate materials out for seperating upper & lower aquifers at Site 26 deep well.
- Concrete for flush mount wells? Note jacking of older wells.
- Discuss getting samples from cuttings diverter. Difficulty getting soil samples from split spoon in rocky/cobbly ground. Drill setup not condusive to sampling very far off 5' intervals.
- Directed not to move holes. Get what we can get

8/25/04

from split spoon with good faith effort. John will discuss sampling diverted cuttings w/ USACE if no split spoon recovery is obtained.

- Air bill number for 3 coolers to SGS out yesterday John will check to confirm SGS receives them
- Discuss slow well point recovery, lack of WP4 @ site 3 (pipe on ground, screen gone)
- Hope to have load of samples to ship tomorrow
- 26MW3 → Water will be needed to drill through silt - consider using water from shallow aquifer if test results clean?

Fuel inventory: ~~4~~ full gasoline, 1 partial
4 full diesel, 1 partial

11:00 Test Grundfos pump / DI rinse, Tubing is NEXPOLY by Nexgen polyethylene, 1/2" i.d.

JZH

8/25/04

Take supplies to 26MW3 w/ Ben
12:30 → 13:00 Lunch.
Ben to 26MW3
Randy w/ crew to MOC - mark site 22 locations for wells.
14:00 - Work on Developing 26MW3. - Makes good water, min. draw down.
See Well sampling log.
16:40 - Look for 88-X wells
17:10 - Drillers hit diesel odor @ 15' bgs (10-15') at 19B1 - 7ppm out of casing, 3-4 ppm in air - breathing level, down wind side.
Crew stays up wind.
Sample station: 2 ppm.

Volatiles reduce once casing driven further

18:30 Off site
19:30 Dinner (R)
21:24 → 01:00 Sample packing.

Photo 22 - come to site w/ good light

16821-3

RRH

3/26/04

Wx: Breezy to 15kt out of E overnigh - high 40s, fog on mountain Clear overhead.

8:24 Pre-shift Mtg.

Continued sample prep - Julie
Ben to ~~treat~~ decon water
Randy — 19B1

9:30 On site 19B1 - about ready to drive spoon - 28'+
- still looks + acts like bedrock.
- Call boring complete @ 9:48.

10:00 - In camp, Call Bering air - Noon flight - Finish cooler pack
- 3 coolers (9, 10, 11) out,
- Concrete + waders in.

Ben Calls John S. to inform: coolers shipped.

12:00 Lunch.

12:30 - Head back for 13B1 at MOC.
Julie + Randy - Julie to check wells.
- Gray till-like silt at 12-05'
- possible bedrock @ 23'
- Very smelly, but winds from E. have kept PID

3/26/04

readings in breathing zone minimal.

15:00 Ben has purge + decon water treated. Will work on site 6.

16:00 - Lots of water in 13B1 - air off - still coming out. Artesian or pressurized from drilling?

Photo 21 - 13B1 @ 38' - water
" 20 - " " to S. - mountains.

17:30 camera R2

18:45 Dinner

20:30-2400 Dailies, sample logs, forms.

9/27/04

Wx: Cool, clear, mild W. breeze
40's overnight.
8:30 preshift 8:40 Safety.
Drill steel well cleaned, - set up
of Site 22 wells before 17MWL.
PCB at Site 13 for Ben + Julie Julie
to finish well search.

10:15 - 22MW3 drilling
No odors, or PID hits in air
Wx: Warming, breeze moves around
to come from SE. 60's F mid day.

13:00 → 13:50 Lunch.
Julie updates QA/QC table, then
back w/ Ben - PCB sampling @ Site 13
Photo 19 Camera A2 Drilling 22MW3
to SSE.
Photo 18 22MW3 drilling to E

Consider possibility that tight
material at 23' bgs and down is
frozen after lunch. Breaking rock
and warm air from drilling makes
it difficult to tell.

9/27/04

15:45 - 38 foot sample has enough
sub-gravel sized material to
confirm frozen ground. Start
of frozen difficult to define.

Start setting well 22MW3 @ 16:15

17:00 Ben to look at upper site
Julie to continue investigating
samplable wells.

17:45 Rinsate Sample 04NE22SQ201
6xVOA w/HCl (GRO/BTEX), 2x1l w/HCl (DRO/RRO),
2x1l unpres. (PAH (+TOC?)) 1x250ml pdg (metals)
Good sample to determine
influence of corn oil on analysis.
Corn oil is used to lubricate air
drilling system. Pam® is also used
on drill steel threads. This split
spoon was randomly selected from
two that were used a number
of times today on an apparently
clean well installation. Normal decon,
with fresh rinse water, and wash
water that was used for 3 split-

(27)
8/27/04

spoons as rinse yesterday before adding 1 packet of alconox. There did appear to be a deep-set oilyness to parts of the split spoon. Include Oily threads. (top 1/2 of D.I jug used as a funnel over an unpreserved 1 l, then transferred to other jars)

18:00: 22MW3 completed to final 2' fill & ~~casing~~ monument set.

18:30 Dinner
19:30-2000 Notes
22:00-23:00 Dailies

8/28/04

Wx Chilly - ground fog - Clear overhead, SW wind to 5.
8:48 Pre shift/Safety Mtg.
Drill 22MW2 - Ben to log, Julie to oversee & label samples. Randy to deal w/ fuel, instrument, print dailies, Admin.

12:30 lunch - 13:00
-22MW2 hit what acts like bedrock - 10' of drilling
- Direct crew to pull out & Mark location for boring.
14:00 Call Bering Air - arrange for flight tomorrow. Drill hammer in Nome. Will send out fuel drum - Chris thinks will fit in Navahoe.

- Drill 22B1 → Thin zone of fairly dry staining, able to keep going down. - Make 22B1 monitoring well 22MW2, analyze 3 recovered samples from 22MW2 as 22B2

RZN

8/28/04

Julie works out labelling/
COC's for samples.

22MW2 Hole left open - Install
well tomorrow.

18:30 Dinner
1900 → 20:00 Complete Paperwork
(Randy/Julie) Movie Night

8/29/04 RZK

Wx: Light rain until 08:00. Overcast
800-1000' ceiling, decent visibility
low 50's F.
8:40 Pre-shift
Julie - sample handling
Bert Randy w/crew - well install
Randy - admin
12:00 - 12:30 lunch
Crew to 17MW1.
Randy & Julie prep latest 22 samples.
17MW1: Good water @ 10' bgs
14:00 - Randy & Julie to Site 13 -
Pad 13-2 sample locations selected
based on witching rod location

8/29/04

of pad under fill (re-tar)

15:45 04NE13SS120; 1.2-1.3' bgs
Brown sl. silty, sandy GRAVEL in Cobbles;
moist. Fill 1X8oz glass: PCB 8082 ms/msd

15:50 04NE13SS121; 1.0-1.3' bgs
Brown, sl. silty, sandy GRAVEL in cobbles
moist, pits of sulfur foam. 1X4oz - PCB

15:55 04NE13SS221; QC duplicate of
04NE13SS121, 1X4oz - PCB

16:00 04NE13SS321; QA replicate of
04NE13SS121, 1X8oz - PCB 8082

16:10 04NE13SS122; 1.3-1.4' bgs
Brown, sl. silty, sandy GRAVEL; moist;
in cobbles; bits of wood. 1X4oz PCB.

16:45 04NE13SS123; 3.0-3.2' bgs
Dk. brown loose Medium SAND; moist;
in cobbles & debris. 1X4oz PCB

17:00 - look @ Site 16

8/29/04

17:30 Look at Site 26, select 26MW1 location.

18:30 Dinner
20:00 - 20:42 paperwork

8/30/04

Wx: Winds 10-15 from WSW, 48-50°F
Overcast ≈1000'.
8:36 Pre Shift Mtg.
- 26MW1, sample shipping, switch to auger setup.
9:20 crew setting up on hole
9:48 start drilling
Julie packaging samples,
Ben - A.M. off.
10:20 - Call Bering Air - Wx. consistent
-They plan to fly @ 13:00.

Photo 17 RZ 26MW1 location
during drilling, to E. 10:50

Look at White Alice, Mark septic line/outfall using witching rods.

8/31/04

12:00 - Grinding on big rock @ 38' - 12:05 - break for lunch, then swap to air hammer.
Call Bering Air → They will wait ~~for load~~ on another
12:30 lunch → 13:00
Julie + Randy finalize sample shipment
Ben to oversee drilling
Prep for PCB sampling
13:50 - Coolers 12 → 15 out on Bering Air w/ 1 drum diesel (empty).

14:00 - Crew installing well ≈4' into bedrock @ 26MW1
15:00 - Julie & Randy - Site 14 PCB sampling

15:30 <u>04NE14SS101</u> 1.4'-1.6' bgs: Dark brown, sl. silty, sandy GRAVEL; moist; in cobbles trace organics. Just below old vegetation layer under recent fill. 1X4OZ. -PCB

15:45 Call Office / John S. cell
W.O. # number on C.O.C.s → find. No Site 26-3 well results.
Call in morning

16821-3 RAK

8/30/04

15:40 04NE~~26~~14SS102 1.6' bgs Dark brown sl. silty, sandy Gravel; moist; tr. organics. ~~1X4oz~~ Below old vegetation layer. 1X4oz PCB.

14:00 26MW3 Completed

Ben to get 03MW102 purged again

16:20 04NE~~26~~14SB103 2.0-2.2' bgs, Dark brown sl. silty, sandy GRAVEL; moist directly beneath 26SS102 1X4oz - PCB

16:30 04NE~~26~~14SB104; 2.0-2.2' bgs Brownish grey, sandy SILT; in cobbles; moist - Lens may be soil from before facility construction. 1X4oz - PCB Co-located w/ 14SS101

16:35 04NE~~26~~14SB204; ~~QA~~ C duplicate of 14SS104; 1X4oz - PCB

16:40 04NE14SB304; QA replicate of 14SS104; 1X8oz - PCB

Wx: Clearing, warmer

RAK

16821-3 RAK

8/30/04

Photo 16 RZ Sample locations 14SS101-104 to E.

Photo 15 RZ 14SS101-104 to W, Emergency Power foundation behind.

17:00 To White Alice Site 31 - More time locating sample locations, borings - place pin flags base on witching rod reactions.

18:30 Dinner

19:30 - Paper work. - 21:30

16821-3 8/31/04 RAK

Wx - High Overcast, calm, 50s F

8:20 - Pre-shift safety Mtg.

- Prep for White Alice
- Ben to pump out 03WP102 again

9:15 - Call John Spielman - SGS doesn't have GW results - tomorrow Gretchen - Phone # 784-3532 USACE W.O.# 04-042 - ~~COCs~~

RAK

8/31/04

Discuss deep well installation method. Jim need to talk w/ Kyle Brown.

9:55 - Onsite, White Alice; 31B1 completes

Photo 14 RZ Drill on 31B2, Julie deconning SZ spoon, Ben Digging 04NE31SS111.

Ben digs, samples PCB shallow samples
Julie logs / handles samples

HNU + OVM 580 B both read 0ppm while boring. Diesel odor noted @ NE31SB106.

Sample shallow subsurface (2-4') from auger flights.
Swap out auger flights between sample types.

13:00 Lunch → 13:36
Return to White Alice

8/31/04

04NE31SS123; 15:30; 1.8-2.0' bgs 1x4oz PCB analysis. Brown, silty, gravelly SAND; moist; metal pipe (1"-1¼") along side of hole.

04NE31SB124; 15:38; 3.8-4.1' bgs 1x4oz-PCB Brown/Dark brown silty, gravelly SAND; moist in cobbles co-located w/ 123.

04NE31SS120; 15:45; 1.9-2.1' bgs - 1x4oz PCB Lt brown, sl. silty, sandy GRAVEL; moist; cobbles. Cobbles larger than 123 location

04NE31SB121; 16:00; 4.0-4.2' bgs 1x4oz PCB Brown, gravelly, silty SAND; moist; in cobbles Colocated w/ SS120

16:18 - Ben found a drum with fluid North of Site 31 in a basin, 250' down hill - Thumping suggests solids with thin layer (1"?) fluid drum on side. Blue paint on lid. Rust hole ≈ 2" up from ground. 1st drum encountered w/ fluid. HNU PID: 310ppm next to hole - napthalene odor noted.

8/31/04

17:55, Ø4NE31SS132; 1.4-1.6' bgs, 1X4oz-PCB
Brown, silty, sandy GRAVEL; in cobbles; moist. Shallow of co-located w/ 133

19:05; Ø4NE31SB133; 3.5-4.0', 1X8oz - PCB
Brown, sandy, silty GRAVEL; moist

18:30; Ø4NE31SS135; 1.1-1.2' bgs; 1X4oz-PCB
Brown, silty, sandy GRAVEL, moist, in cobbles.

18:40, Ø4NE31SS136; 1.3-1.5' bgs, 1X8oz - PCB
Dark brown, sl.silty, sandy GRAVEL; moist
Tri. organic se. Shallow of co-located w/ 137
MS/MSD ?

137 RAH
19:45; Ø4NE31SB ~~173~~, 4.2-4.5', 1X8oz - PCB
Brown, sl. silty, sandy GRAVEL; moist; in cobbles

19:00; 04NE31SS139; 1.4-1.6' bgs, 1X4oz - PCB
Brown, silty sandy GRAVEL; moist in cobbles.

Decon boots 19:15 off site

19:30 Dinner + some paperwork

9/1/04

Wx: 500 Overcast, chilly E breeze to 5kt - near 50°F

8:30 Preshift - have Ben conduct. Prep for Site 13 Co-located deep PCBs.
10:00 On site
Drizzly rain.

10:10/10:15/10:20 Ø4NE13SB124/224/324
2X4oz, 1X8oz; PCB w/ QA/QC req.
Brown, sl. silty, sandy GRAVEL; moist. - Colocated w/ SS107

10:15 Ø4NE13SB125; 3.8-4.0' bgs; 1X4oz PCB
Brown, sl. silty, sandy GRAVEL; moist
Colocated w/ SS110 (Tried 11th location - sat on big rock 3 times - move to 110)

11:30 Ø4NE13SB126; 3.5-3.9' bgs, 1X4oz PCB
Brown, sl. silty, sandy GRAVEL; moist
Colocated w/ SS113

11:50 Ø4NE13SB127; 3.5-3.8' bgs 1X4oz PCB
Brown, sl. silty, sandy GRAVEL; moist
Colocated w/ SS112

9/1/04

Tried to co-locate at SS106 location - hit concrete at same elevation 2X, Slab dimensions wrong in plan?
moved to SS105 vicinity.
wx: Rain ending

12:15 04NE13SB128 3.6-3.9' bgs 1X4oz
12:20 " SB228 " 1X8oz QC, MS/MSD
12:25 " SB328 " 1X8oz QA
All for PCB 8082
Brown, sl. silty, sandy GRAVEL moist. Co-located w/ SS105.

12:30 Some decon.
12:35 Off site - 13:15
Reset, fix hose routing on drill rig.

13:45 - On site, Site 13.

Photo 13RZ: Site 13 to NE, drill on SS119/SB129 - pin flags @ sample locations
Photo 12RZ: Same to N.

9/1/04

14:00 04NE13SB129; 3.4-3.6' bgs - 1X4oz PCB
Gray sandy GRAVEL, tr. silt
co-located w/ SS119.

14:18 04NE13SB130; 3.3-3.5' bgs - 1X4oz PCB
Brown, sl. silty, sandy GRAVEL; moist
Co-located w/ SS116

14:35 04NE13SB131; 3-3.2' bgs - 1X4oz PCB
Dk. brown fiberous peat - near interface w/ sandy gravel to gravelly SAND mix. (SS115)
Strong w/ diesel odor. (Touch of gray clayey silt @4.5')
All Site 13 deep (2.5'+) SB samples collected from auger flights.

14:45 04 Decon boots, shovel.
To Site 7.

14:55 On Site 7 - Land fill - 01NE07SS127 location

15:08 04NE07SS101 4' bgs 1X4oz PCB
Brown gravelly, sandy SILT; moist; in cobbles
NE sample point
Air monitoring - HNU PID = 0.0 ppm

9/11/04

15:10 04NE07SB102; 4-4.5' bgs, 1X4oz-PCB
15:15 " SB202 " , 1X4oz-PCB
15:20 " SB302 " , 1X8oz-PCB
Co-located w/ 07SS101. Lt. Brown, silty, sandy GRAVEL; moist; soft, no debris some cobbles.

15:25 04NE07SS103; 0.4-1.8' bgs, 1X4oz-PCB
Brown, silty, sandy GRAVEL; moist

15:30 04NE07SB104; 2.8-3.0' bgs, 1X4oz-PCB
Redish brown, silty, sandy GRAVEL; moist trace cobbles. Co-located w/07SS103

15:42 04NE07S~~B~~S105; 1.8-2.1' bgs 1X4oz-PCB
Brown, silty, ~~sandy GR~~ gravelly SAND; moist, tr. cobbles.

15:50 Drillers off site - reset to air for Site 6 well point relocation.

15:50 04NE07SS106; 1.1'-1.2' bgs 1X4oz, PCB
Redish brown, sandy SILT; in gravel/~~cobble~~; moist w/ traces of debris, organics.

9/11/04

16:00; 04NE07SS107; 0.7-0.9' bgs; 1X4oz-PCB Gray and rusty brown, sandy SILT in gravel/cobble matrix; moist

End former 01NE07SS127 location
Start 01NE07SS125 Location.

16:20; 04NE07SS108; 0.5'-0.6' bgs; 1x4oz. PCBs; Lt. brown sandy SILT/DK. brown peat interface; moist. At toe of fill-slope.

16:25; 04NE07SS109; 0.7'-0.8' bgs, 1X4oz-PCB, Gray + lt brown, sl. sandy SILT; moist; Tr. organics. Mound above bog, toe of fill.

16:36; 04NE07SS110; 0.8-0.9' bgs; 1X4oz-PCB
Brown silty SAND; tr. organics, moist
Ground surface is rusty metal/debris.

16:45; 04NE07SS111; 0.5-0.6' bgs; 1X4oz-PCB
Brown silty SAND; moist; w/ bits of rust + paper debris.

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9/1/04

16:55 04NE07SS11Z; 0.6'-0.8' bgs.
1X8oz - PCBs, (MS/MSD if needed) Lt. brown gravelly, sandy SILT; moist; w/ small roots.

17:00 Off site.

17:10 Select new location for 06MW5 - air hammer to 10' Drive point in a little deeper looks like good water

18:10 - Drive MW6 (Site 6) a few feet deeper. Area water levels has dropped in last 10 days.

18:45 Off site

17:00 Dinner

20-20:30 Daily

16821-3

9/2/04

Wx: Broken high overcast; 20kt wind from SE overnight, Mild E breeze 40s overnight

8:20 - 8:40 Phone Conv w/ John Spielman - BTEX, DRO, RRO non-dect. for 26MW3. GRO, PAH not done - Call Shane in P.M.

- Julie Shap-Dahl would like to get location I.D.s to lab for their electronic data system. Provide boring/depth & co-located info. for sample I.Ds
- Shelley - Surveyor still heading this way today.
- Call Berry Air to check on shipment from Discovery, get fuel.
- Last cooler had a trip blank @ 6.8°C, Temp of cooler = 4.2°C Temp blank maybe?

8:40 Pre Shift/Safety
Drillers to Cement well monuments
Ben to Sites 3+6 wells
Julie/Randy Sample handling, QC review/table updates, rinsate.

9/2/04

12:30 - 13:00 Lunch, try to call SGS
Julie gets up to screen around
airfield - head space for burn area
Floyd - Eugenes son in law comes
by & reports a 5 gal can of
air filter cleaning solvent leaking
on the beach.
Ben contains it in 2 drum liners
and tote, places it in fuel
containment cell.
~~1400~~ Ben preps to do Sugi
Estuary sampling - sediment.
Try to call Shane @ SGS
14:15 Drillers setup w/ Randy @
26MW2 location to install 4"
casing to silt.

Wx - changes to drizzly rain
@ 14:00.

14:50: Drilling @ 26MW2:
Location NW of 26MW3 has more
silt. @ 10' - Gray angular gravel
in gray silt. - 16' - "gooey" silt up.

9/2/04

15:00 Call SGS - get Shane Postan.
He looked at 8260 chromatogram
- Should be No GRO based on
chromatogram.
- DRO/RRO - not detected
- sulfate and iron in common levels
- PAH - has a hit of napthalene -
lab cross contamination - method blank
has it also - was one hot sample
in batch.
- BTEX not detected.
15:20: Call ~~tnt~~ 3D Air Service - Sunnygor
has checked in. Wx: rainy, but
calm w/ good visibility. They
plan to fly @ 4:00.

15:50 - Back @ 26MW2 location - Ice
(clear, frozen water) coming up casing - @ 16'
Drive s. spoon. 26/11/11 blows
Horizontal - MW2 is 78.5 NW of MW3.

Photo 11 R2; Core of frozen silt w/
rock/gravel lenses. 19-21.5' bgs
No clear ice here.
Sample 26SB103 @ 16:00 - Frozen silt for
Grainsize (atterberg?)

9/2/04

Drill doesn't handle material well. Hot air melts, silt plugs up casing preventing air release hammer stops.

Air warms casing, causes it to slip - stop drilling.

Jo (driller) is now pretty sure silt at bottom of 26MW3 was frozen based on feel + split spoon from 26MW2.

16:40 - Call John Spielman - Shut down drilling - not set up to seal a casing in frozen, rocky ML type material.
- Discuss rinsate for Eckman dredge (take from GW analysis of destroyed wells)
- Did he deal w/ nat. attenuation parameters on hold? Yes - w/ Shane
- 2 coolers out to SGS

16:45 - Bering air in w/ surveyor, supplies.

17:30 - Group gathering, 1800 Dinner

9/2/04

19:12 → Ben to Site 6, Julie looks at Barn area - select screening locations.

Randy - starts daily, main generator dies - work on - was run w/ choke on - carboned up.

21:12 Back - Ben + Julie.

9/3/04

Wx: High (3000'+) broken overcast
lt. E breeze, ~40F.

8:15 Preshift/Indoctrination safety meeting. Ben Conducts, introduces Shelly to cover emergency procedures.

Drill crew to pull rig off 26MW2, demobe. Ben + Shelly to sites 3+6, Julie to site 1.

9:15-10:15 Randy off.

Call John Spielman → will try to get a Lyndon here on backhaul.

Call Bering Air → 2-2:30 here w/ propane bottle.

RGK

9/3/04

12:00 - Julie has 19 headspace from area around air terminal/tower @ Site 1
Shelly has points for Site 3.
12:30-13:00 lunch
Drillers ready to go.
Julie - Site 1 samples
Ben - Site 29 sed prep.
15:00 On site - Sugi Estuary w/ sample gear.

1st location @ 2001 SC4 South.
26' to lathe, 14' to shoreline ⊥,
3.2' below water surface
<u>15:25 04NE29SD104</u>; Dark brown to black sediment with rusty algae, sand and anaerobic decomposition products 1X4oz MeOH, 1X8oz
Eckmann dredge - in eddy/backwater just below where creek becomes lake.

<u>Photo-last R1</u> - Ben pulling up SD104 (to W.) - (Waded to sample locations)

Move down flow (NNE) + look for depositional area - stretch of rock extending

---

9/3/04

down-flow for 75', except at 04NE29SD104 eddy. (Ice scour likely)
16:20 - Bering Air in, Winingers out.
<u>04NE29SD105</u> Location - Takes several shots with dredge to remove fiberous vegetation before getting more sediment. Hydrocarbon odor + sheen noted
Kept 1st sample of fiberous vegetation, silt, and decomposing veg.
After several attempts, 1st sample was best. Gravelly below - difficult for dredge.
<u>17:00</u> Sample 29SD105: 2X8oz, 1X4oz MeOH
Black/with shiny flecks, Fiberous decomposing vegetation, sli silty, ≈3.5-4' below water.
<u>Photo BenA27</u> - Dropping Eckman Dredge @ SD105.
<u>Photo BenA26 + 25</u> - Sediment dredged + sampled.

16' ⊥ from lathe to sample
76' from 29SD104 lathe.

RGK

16821-3

RCH.

9/3/04

18:15 04NE29SD106 Black/dk brown decomposed organics, silt, trace sand
11' cut ⊥ from lathe
2x4oz MeOH, 2x8oz (for MS/MSD
tried for an extra dredge to fill the Triplicate volume - not successfull. - Just enough for extra MS/MSD. ≈4' below water

18:30 - Demobe/Decon for dinner
- Julie has packaged & logged Site 1 samples. - Shelly is staying out at "beach" sites a little longer to take advantage of clear visibility. Eric helps surveyor.
- No propane for forklift on this plane
19:00 Dinner.
20-21:00 Extra paper work. - survey list.

16821-3

RCH

9/4/04

Wx: High, broken clouds, sunny breaks
Gusty wind & rain overnight. Near 50F

Morning off - 10:00 breakfast

Shelly to beach sites @ 11:00
Julie updates QA/QC table 10:00 → & Locations
Randy - Ben - 11:00 -
Ben to Sites 3&6 - Purge/sample
Julie & Randy - Sugi Sediment 14:30 →
18:30 Ben back ≈18:45 - All Purged.
Dinner - 18:45 → 19:30
19:30 → 20:00 - Rinsate sample -
Eckman dredge - used rinse bucket, cleaned w/ DI. Added to 2 gallons DI, submerged & agitated dredge. - Dipped w/ 250ml Poly. Julie & Randy

Randy - Dailies 20:00 → 22:00
- Survey/Sample Loc. Table
23:00 → 0318

9/5/04

Wx: Rain overnight. Broken overcast ≈3000', mid 50s in A.M., minor breeze

9:40 Pre-shift safety mtg.
Shelly to work on Sugar River points
Ben to sample Site 6
Randy - camp org.
Julie - Site 11 well prep.

12:30 - Randy + Julie to Site 11
Wx - cooling, winds out of E increasing. Light rain.

MW 10-1 Produces well to ≈ 6, or 7 gallons. - runs out mid-sample
- Give some time - finish sample, then ~~run~~ out while remeasuring water quality parameters. Hach Colorimeter display fails.
- No ferrous iron.
Sample 04NE11GW01 - see log
Decon, set up on MW 11-3.
Makes good water.
Sample 04NE11GW02 see log
No ferrous iron. Instrument warming, drying.

9/5/04

Sample crew + survey converge on MOC - survey + look for Monitoring wells.

19:00 Dinner
20:30 → 24:30 Sample packing party
- Dailies to John.

9/6/04

Wx: Similar to 9/5. gusts + rain overnight.
10:00 - Preshift Safety Mtg.
Ben to Site 6 wells - finish sampling - ? → Demobe Site 3
Shelly - MOC points
Julie / Randy - Complete packing process
Plane in Afternoon

- Lots of work trying sample packing
1500 complete
16:00 → 88MW-1 → 18:30
Good water Look at 88MW-10 - will work.

9/6/04

Update Sample Log - analysis tracking. 20:30 → 22:30

9/7/04

Wx: High overcast, mild breeze
50s F

930 Start / Safety Mtg -
Julie sleeping in attic.
See other's notes for today. (Details)
- Ben - wrap up site 6 well
- Shelly - Survey airstrip area
- Julie - G.W. prep., sample 88-MWs
- Ben Look @ + prep for background, help Shelly, Treat Decon
- Randy - help 88-MW sampling (23) Develop 17MWl.

Call John Spielman - Hope for wrapup this weekend. O.K. for Ben to use surveyors GB for Bkgrnd,

9/7/04

Just as she would - John would have preferred pre-marked, but comfortable that data will be ~~about~~ the same. Ask Call labs -

Stop 04WE1355120,121,221,321,122, 123 → missed location by 24'.
Stop 04WE0755105,106,107 - all samples on one side of former 01NE0755127. Will re-collect. Other estimated PCB Locations look O.K. To me.

- Change repeated name 31SQZ01 (9/2) to 31SQZ02.
- John wants me to call in everyday now that things are starting to wrap up.

9/8/04

Failed To Keep track of Notebook
1st 2 samples on COC from
Site 6 04WE06GW101/201
VOAs froze in CTFE's cooler
20:00 Phone Con w/ John Spielman.
Measure lengths of Fork, Compressor,
rig, pickup. → for fitting in HERC/DC-6
Look at Fork lift & compressor
weights, possibility of Fork picking
compressor
- Lyndon Here scheduled for a
back haul next Wednesday -9/15
- No other apparent availability.
Thinking about a DC-6 on Tues.

Recreation of Day
9:25, Pre-Shift Meeting
Wx: High overcast. rain in early
morning, upper 50's F. Winds 0-10
out of E/SE.
Shelly - pack for de mobe - check
a few points - check BCA's data
gathering on GPS against surveyed points.
Randy checks plotted points by sites.

9/8/04

Ben & Eric (cook) to background
areas west.
Julie & Randy to MOC wells.
88MW-4, 5, 6 - all have obvious
wx diesel odor - setup decon system
for good scrubbing.

13:00 - Call Bering Air - Shelly
ready to depart.
15:30 - All in camp to re-set
Plane in - 1 cooler GW out w/
surveyor.
17:00 → 19:00 - 88MW6 -
Odd failure - pump stops like
out of water, yet water is
near original level. - Allow
water to drain back & restart -
pumps fine - lots of water,
minimal drawdown.
Treat water from 10MW-1,
11MW-3, 88MW1, 88MW2. - Need
to modify treatment system.
Gravity feed best w/ GAC.
20:00 - All return to camp.
Call John S. - see previous

9/8/04

Help Cook, since he helped make background work.
22:18 → Paperwork. 23:00
7 background collected. (4 sites)?

16821-3 9/9/04 RAH

Wx: High overcast, low clouds around mountain. Light rain overnight. 505, calm.
9:30 Pre-shift.
Ben to I more western background location near beach.
Julie - check water container inventory, prep for MWs @ 88.
Randy - Computer logging (11:50)

12:30 On-site 88MW-8
- Randy to treat purge water from 10MW1, 11MW-3, 88MW1, 88MW2 ↑ (also 88MW-3) RAH through GAC - discharge to AST tank farm pad.
- 88MW-8 makes good water, clear, slight diesel odor.

RAH

9/9/04

Wx: Rain showers & intermittent sun.
13:40 - Call John S. - he's on phone to John Lindstrom - Chemist.
88MW-8 done - Nat. Atten. & PAH.
Decon - rinsate Photo 8R2
Collecting rinsate sample
14:00 Call back - John S.
- Give dimensions of large equipment
- Loading compressor in DC-6 w/ fork lift does not look good, or safe.
- PCB sample run (of batch we cancelled) = 04NE1355120 - 2+ ppm
- John will check w/ Bering Air about using Casa to haul out compressor. - Maybe a flight tomorrow w/ samples & empty drums also.
- Lisa Geist concerned about getting GW from wells 88MW7 & 9 - explained that area regraded, 95 monument found - destroyed, surveyor marked MW-7 location
- Dug, used witching rods to no avail.
- John will look @ Hach directions powder pillow method is for

9/9/04

up to 3 mg/l Ferrous iron - have had a bit higher results.

-John will have Shane ~~for~~ look for possible corn oil interference in boring samples.

Move to Site 16 wells. Only 1.1 to 0.8' of water. Grundfos needs about 0.8' of water to submerge screen.

Call John S. back ≈16:00 - Try to sample w/ 1/2" tubing & peristaltic. If no go, call in a tubing order.

Move to 17MW4. Good water, Nat. atten. parameters.

17:30 - Take Julie to camp to pack samples. Pick up supplies. Move to 18MW-1 to purge.

• Start Water treatment - 88MW4 through MW8 purge water

9/9/04

18:00 <u>Photo 7RZ</u> - Water treatment system in action near 88MW-5, looking SSE. (Return line installed).

18:30 - Develop 18MW-1
19:30 - Complete development - very clear, high production.

Lots of corn oil on tubing and pump - last 6'-7'.
Decon. pump & cable, cut off hose.

20:00 Pickup generator, hose - offsite.
20:45 - Dinner.
Ben has 3 more background.
21:30-22:30 - De breif, sample handling.

9/10/04

Wx: High broken clouds, calm, 50s

9:45 - Pre shift plan

10:24 - Safety review

Call John Spielman - Only available HERC is wednesday. Camp has to go out Tuesday. Must get compressor on DC-6.

Print dailies Calibrate Oakton T-100 turbidity meter.

12:00 - At MOC - Move treatment system to 17MW-1, setup, start.
Setup on 20MW-1 to Develop ~~purge~~

13:00 - Check water treatment - problem w/ particulates, corn oil plugging things up. Drum was a mix of drill steel decon & 17MW-1 purge water.

- Use a settling bucket, pre-filter cleaning bucket.

Water still turbid out GAC.

13:30 back at 20MW-1.

9/10/04

Allow 20MW-1 to purge just off bottom while looking @ 88MW-10

14:20: DTW, btoc = 20.30' - 88MW10
Bail w/ 1⅝" poly bailer - 1st aggressive, then easy to get soil that may have fallen in when monument destroyed/cap pulled off.
alternate w/ 20MW-1 development.
4½ gallons from 88MW10 - started to clear up. should be a good well. Place extra monument over PVC.

15:30 - Clean out sediment from drill decon/17MW1 drum, move treatment to 18MW1, setup equipment for sampling @ 18MW1

17:00 - Return to Camp. Check on Eric, pick up some supplies. 17:30 - 18MW-1
Julie & Ben stop by from background sampling. Julie helps w/ 18MW-1
Sample 04NE18GW104. ↳ Calibrates YSI

9/10/04

1845- Complete Grundfos decon- pump stops partway through D.I. rinse.
Complete treating purge water

19:2Ø Off site. -Dinner

20:00→21:30 Label making.
Calibrate DO on YSI using 32' for camp elev. on altimeter to get in. Hg → convert to mm. Makes sense - saturated 13°c air = 10.3 range.

9/11/Ø4

9:30 Pre shift.
Wx - 40° winds from NNE, 10 to 20 mostly clear.
Ben - label/package Background
Julie/Randy - MOC wells 20 MW1, 88MW-10.

10:15 - Setup at 2Ø MW-1
11 Ø5 sample

9/11/Ø4

Setup water treatment @ 20 MW1 (w/ 88MW-10 water also) - damage hose, return to camp to get parts. Julie sets up 88MW10 - Start 11:45
Complete sample @ 13:05

Wx - remains windy, chilly, now overcast.

Develop 22MW-3 - slower water, really never gets clear - while fixing Carbon filter fitting - have to empty carbon drum, fix, reload.
Treat 20 MW1, 88MW-10 water

Julie:
Sample 22 MW-3 - 16:30 - Ben to quarries for 2 background gravel samples.

Randy: Develop 22 MW-2
16:00 - 2Ø gallons - pretty clean well.

18:00 Setup on 22 MW-2 to sample.
Good, clear water

19:00 Off site - dinner.

20:00 Call John S. - Tim on way out here tomorrow. Will try to get compressor on Casa

9/11/04

Need to remove axel, wiring harness, fenders. Lost contact - John's phone lost charge? - Tried again.
Discussed air cooler cleaner.
20:30 Ben & I don respirators, splash protection, gloves. Look at "Air Cooler Cleaner" (Not Regulated)
Diesel Fuel CAS 06834305
Nonylphenol CAS 25154523
couldn't make out manufacturer
- Address = Slidell, Louisiana, USA
21:00 → 23:00 Randy - QA/QC count/plan.

9/11

9/12/04

Wx: Busy morning: Rain showers, sunshine, N wind, snow on mountains, mid 30s.

9:20 Preshift (9:30 safety)

Complete QA/QC count/plan

10:30 On Site - Drop equip. @ site 16, move treatment system to 22MW-3, Drop equip @ 26MW, Take drum to Site 16

~~R~~ 16MW-1 ∇ = 15.84' btoc @ 11:24
1/2" poly tubing adapted to peristaltic pump. 11:40 - No water out. ∇ is at hard bottom (16.63') - Water only enough to fill tubing to ≈ 3' below top.

16MW-2 ∇ = 15.57' btoc @ 11:48.
Try GeoSquirt pump, but of course pump has no check valve, so water in tubing will drain back. Just get ≈ 50ml out before well is dry.

RRK

9/12/04

Turn on peristaltic @ 16MW-1 -
get a few ml out, bubbles.

Take rest of gear to 26MW-1,
Finish treating 22MW-3 water
12:25 - Camp. Call Bering Air
w/ Wx report - Plane is in
the air - early! Not ready.
Tim in.
Pack coolers fast, just earliest
background for water holding
times

14:00 - 6 coolers out
1400-1420 lunch. reset. Fuel
15:50 - Move Compressor to disassembly
area for Tim,
16:00 - 26MW-1 w/ Julie Dev. 26-1
16:~~50~~20 - Treat 22MW2 purge water

16:52 - 16MW-1 - $\underline{\nabla}$ = 15.84' - fully recovered,
or hose emptied? 16.54 w/ peristaltic
running - getting H_2O out! ≈ 1 cup
+ a dead fly

9/12/04

7:00 - 16MW-2 $\underline{\nabla}$ = 15.53'
Try purge pump again -
water ≥ 2" above TOC in tubing.

17:15 16MW-3 $\underline{\nabla}$ = 15.73' (0.68' H_2O)
Bailed dry

Back to 26MW-1 - Finished Developing -
75 to 80 gal.
Sample w/ Julie - Get dup/Trip,
MS/MSD

19:00 - Julie to Site 13 RCB replacement
@ 802 location
Fuel generator, Finish treating
26MW-1 water (100 Gal).

16MW-2 : 15.75'

8:20 Call John S. • Site 16 not sampleable
Cap Markings on Monument by Camp
Gravel sampling slow. for Shelly
Still working on Compressor lifting

9/12/04

22:00-2400 sample for QC
~~2200~~ -Labelling for Ben+Julie

9/13/04

Wx: Mostly clear, 30s overnight, NW breeze-5kt.

Tim, Eric, Floyd- Camp takedown
Julie + Randy - MOC + Site 7 PCB,
Bulk samples
Ben background.

10:45-12:00- Help take apart air compressor- remove axel, wiring, bumper to fit Casa.
Call John S. + Ck. on compressor - call Bering for flight w/CASA. Here now on for late Tuesday. DC-6 for mid-late afternoon.

12:20 - Call Bering air - David - request CASA - probably 4 P.M

9/13/04

12:50 -- 26 MW-3 WL - see Julie's Notes 12:55 on site MOC.
Julie - Last Site 13 re-sample,
Randy - pickup containers @ site 16,
Use last, partially hardened bag of concrete to re-set 88MW-10 casing -
Photo 6 R2 - MW-10 re-set. w/ its concrete.

Wx - Rain showers.

04NE135B135 14:25; 2.8'-3.0' bgs:
At location marked for 76NEC135SB02.
Brown, gravelly SAND; tr. silt; in cobbles.

Location has concrete rubble, and partially set concrete waste at 1.5-2.2' bgs - Top 1' is beach material (cobbles, gravelly sand)

Photo 5 R2 04NE135B135 location
Photo 4R2 " +88MW-6, looking toward cancelled samples (closest pin flags)
Decon equipment

9/13/04

RTK

15:20 04NE88SS101; 0.6' below slab
Bulk sample of structural fill from beneath building slab.
2X5gal buckets
Brown, sandy Cobbles; fractured; moist.
156' N of 88MW-10, 145' W of 88MW-1
Photo 3 R2 88SS101 location to W,

15:50 04NE88SS102; 0.6' to 1.2' bgs
Bulk sample of material near center of M.O.C. reddish brown, silty, gravelly sand to sandy GRAVEL; moist.
Scraped top layer w/ debris off adjacent to a partial slab.
148' S of 88MW-8, 231' E of 88MW-10
Photo 2 R2 88SS102 location to S.E.

16:20 - Julie has all 20 area wells measured.
Load & off site - to camp
16:25 - CASA from Berry Air arrives.
-3 crew - load compressor

RTK

9/13/04

RTK

Compressor difficult to load, but fits on CASA - send out ~~dis~~ RTK some sand, PVC well casing, empty fuel drums also.

17:30 - Went to Site 7 for 3 surface PCB samples
Measure Site 6 water levels
19:00 - Get treatment systems, drums
Treat Site 6 purge water.

19:45 Back in Camp
Dinner
20:45-21:45 - Minor packing

Camp is down to kitchen tent, sample gear

9/14/04

Wx: Blustery N. winds, rain showers, mid 40s.

9:45 - Ben & Julie on sample labels
Tim, Eric, Floyd on camp.
Randy - w/ Plu - Takes 15 gal gas, 40 gal. diesel to Eugene Toolies.

Measure Site 3 all at once - wet period yesterday/today
Water Levels - Site 3

04NE03WP05 3.36' btoc @ 10:45
Measurement Δ 0.25'

01NE03WP102 2.29' btoc @ 10:50
Measure Δ = 0.08'

01NE03WP103 measure Δ = 0.08'
3.11 btoc @: 10:53

04NE03WP06 3.65' btoc @ 10:56
~~measure Δ = ? no survey mark, possibly 0.25~~ in 2004 toc surveyed

11:10 - back in camp.

9/14/04

Coolers 31 → 38 shipped via Everts Cargo
3 empty open top drums left for Eugene & Floyd, along w/ Tent floors

18:30 - Everts in - loaded all desired - Out @ 19:30
Eugene - can stop log & start equipment for Herc. tomorrow

Bering Air in @ 19:00,
Off island @ 19:35 Nome @ 20:10

End Field Effort 9/14/04

16821-3

9/15/04

Transition day in Nome.

10:45 - Call Gary White @ Lynden Cargo → Will the Herc to Buckles stop in Nome for fuel? → No, probably after going to NE Cape.

11:15 - John Spielman. - Get 7 coolers from Everts, 6 to SGS, 1 to NCA. NCA cooler needs to be opened & re-iced.

- Cooler 27 found - got to SGS yesterday - samples over 8°C.

17GW104
88GW107 Lorp Chemist requests
WQ - Rinsate resample.

15:48 Call John S. - Herc in air. Buckland.
latest eta N.E. Cape : 7:30 #495
Some analysis at extraction time for SGS - might be difficult.
NCA cooler re-packed & shipped.

19:00 - On Ground, NE Cape - Vehicles to load on Herc - out of Gas. 20:18 in air

---

16821-3

9/23/04

Emerald Alaska - Keith stops by to do a Chlor-N-Oil 1000 on Air cooler cleaner recovered from beach - Over 1000 (but possible salt water influence) (11:48 → 12:12)

14:45 - S&W annex w/ Ben Hearner -
Empty un-analyzed sample jars into drum w/ diesel spill soil, decon & development solids. Mix thouroughly by rolling drum. Sample resulting wet soil (over-saturated)

15:15, 04NE1DWSC1 1X4oz - SW8260 (VOC) 1X8oz : DRO/RRO (AK102/103), PCB (SW8082), RCRA Metals (SW 6000/7000)

15:30 - Drum closed, decon shovel,
Discover that 5' & 15' samples from 20MW1 intact, ~~same~~ material visually - Combine for grainsize
04NE20SB104 - sieve & Zm (12:30 8/25)

Bering Air

Larry - Pilot
Denny - Cargo → No problem running coolers to gold streaks w/ Satellite
(907) 443 use 5464
(443-5464)

AK Air Janice Marie
Cargo Service Ctr.
243-3322
1800-2 Alaska
Use Gold Streak - confirmed
3rd Copy - Origin Station
from air bill

Ground-Air
Freq. 122.7

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Lydon Air Cargo
← Charters
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Flight Ops.: 1-800-260-3386 | select #4
Charter 936

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Eric Schmidt. ~ Cook 23yr.

CONTENTS

PAGE	REFERENCE	DATE

"Rite in the Rain"®
ALL-WEATHER WRITING PAPER

ALL-WEATHER
HORIZONTAL LINE BOOK

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Project PHASE IV R1, NE CAPE
ST. LAWRENCE ISLAND, AK

This book is printed on "Rite in the Rain" All-Weather Writing Paper - A unique paper created to shed water and enhance the written image. It is widely used throughout the world for recording critical field data in all kinds of weather. For best results, use a pencil or an all-weather pen.

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NE CAPE PHASE IV RI T.O. 6
AUGUST 18, 2004. DACA 85-03-D-005

I ARRIVED YESTERDAY AFTERNOON (APPROX. 13:30) WITH COLE AND FRANK WININGER (~~[illegible]~~ DISCOVERY DRILLING) AT SITE ON BERING AIR CHARTER. MET CREW: RANDY HESSONG AND BEN HEAVNER (SHANNON & WILSON) AND ERIC SCHMIDT (AMES). INSTALLED LATRINE, UNPACKED GEAR, READ WORK PLAN.

WEATHER WAS PARTLY CLOUDY, 50'S °F BREEZY TO CALM, OCCASIONAL LT. RAIN. HAD SAFETY MEETING AND ORIENTATION. DISCUSSED PLAN FOR TOMORROW.

TODAY 8/18/04. ~60°F, PARTLY CDY TO SUNNY.

BREAKFAST. 0900 PREP TO SAMPLE 2 SOIL BORINGS (EVERY 2FT. TO 15FT) FOR GRO/BTEX, DRO/RRO, 3 SAMPLES PER BORING, PLUS 1 PAH SAMPLE PER BORING.

DRILLERS ARE INSTALLING ~~STAKES~~ TIE DOWNS FOR TENTS WITH DRILL RIG.

1130 WARMED UP TO ~70°F.

ALSO PREP TO COLLECT RINSATE AT

8/18/04

NE CAPE 2004
8-18-04 DACA85-03-D-003 TO6

SOIL BORINGS, WATER OR SEDIMENT FROM INTERMITTENT STREAM AT SITE 3-PUMP HOUSE.

FUELED 4-WHEELERS. LOADED GEAR. BEN AND I TOOK ATVS AND GEAR, LOOKED AT SITE 7 (LANDFILL), SITE 6 (DRUM FIELD), AND SITE 3.

AT SITE 3, MAY BE ABLE TO COLLECT WATER SAMPLE ~~BETWEEN~~ AT BOTH LOCATIONS.

FOUND LAST WELL POINT PIPE ON GD. SURFACE. LEAVE GEAR AT SITE 3.

1245 RETURN TO CAMP FOR LUNCH. WORK ON BRACING TENTS.

1345 RETURN TO SITE 3 WITH DRILL RIG AND DRILLERS. CHECK OUT BORING LOCATIONS.

1410 SET UP ON BORING 03B-2 AT SOUTHWEST SIDE OF FORMER PUMP HOUSE. DRILL RIG IS ~~AIR ROTARY~~ MOBILE 53 WITH DOWN HOLE HAMMER. DRILL/DRIVE SPLIT SPOON 0 TO 8FT BGS. 0-2FT WAS PS SAMPLE ONLY (POOR RECOVERY). POTENTIAL ANALYTICAL SAMPLES AT 2-8FT BGS, ENC. WATER IN BORING AT 6FT. AND FROZEN SOIL (SILT) AT 5FT BGS. DONE DRILLING AT 1605, OFF HOLE AT 1630. DRILLERS LEFT TO GET CLEAN AUGER FOR NEXT BORING 03B1.

8/18/04

8/18/04 DACA 85-03-D-003 T06

AIR COMPRESSOR IS STUCK IN MUSKEG. RANDY AND BEN INSTALLED 2 WELL POINTS AT SITE 3 BY HAND. DRILLERS GOT

1720 COMPRESSOR OUT. MOVE TO BORING 03B1. DRILL RIG TIRES SUNK IN SOFT PEAT. 65°F MOSTLY CLOUDY

1750 ON BORING 03B1. SOIL IS DK BROWN coarse GRAVELLY SILTY SAND, WEATHERED HYDROCARBON (W.HC) ODOR USING AUGERS (INSTEAD OF AIR ROTARY) ON 03B1

* FINISH 03B1, DUMP DECON WATER INTO DRUM

* LOAD GEAR, SAMPLES ETC.

2020 LEAVE SITE 3. DINNER

UNLOAD GEAR. MORE ICE ON SAMPLES. DISCUSS DECON PROCEDURE AND REQUIREMENTS FOR DRILL EQUIPMENT.

8/18/04

8/19/04 DACA85-03-D-003 T06

0930 SAFETY MEETING. ALL SEVEN PERSONNEL PRESENT. DISCUSS PLAN FOR DECON OF DRILL EQUIPMENT, SAFETY AT DRUM ~~DUMP SITE~~ 8/19/04 FIELD

PLAN TO DRILL SIX BORINGS AT SITE 6 - CARGO BEACH DRUM FIELD; SCREEN SAMPLES EVERY 5 FEET (DRILL UP TO 20 FEET BGS), SUBMIT 2 SAMPLES PER BORING FOR DRO/RRO, GRO/BTEX, PAH, PCBS, METALS (4 oz w/MeOH, 4oz, 8 oz JARS).

PLAN TO ALSO ~~BO~~ 8/19 COLLECT SOIL DUP/TRIPLICATE AND RINSATE SAMPLES HERE. MAY ALSO INSTALL WELL POINTS AT THIS SITE. CALIBRATE HNU PID.

PULL SUPPLIES FOR SAMPLING, DECON, WELL INSTALLATION TOGETHER.

65°F, CLOUDY, BREEZY.

HAD PROBLEMS WITH WATER PUMP WHILE FILLING DRUMS WITH DECON WATER. REPLACE FILTER.

1330 LUNCH.

1400 AT SITE 6 - DRUM FIELD WITH BEN, RANDY, DRILLERS. PLAN TO USE AIR ROTARY IN COBBLY SOIL

8/19/04

8-19-04 DACA85-03-D-003 T.O.6

1420 DRILLERS DECONNING AIR ROTARY EQUIPMENT IN DRUMS OF DECON WATER.

1440 SET UP ON SOIL BORING 06B2

1500 START DRILLING ON 06B2.

COLLECT FS SAMPLE FROM AIR ROTARY CUTTINGS AT TOP OF CASING AT ~2FT BGS. ENCOUNTERED ROCK (BOULDER) AT ~2.5FT BGS.

1535 BREAK OUT OF BOULDER AT ~4.5 FT BGS.

TRY TO COLLECT S.S SAMPLES AT 5 AND 6.5 FT BGS BUT ONLY RECOVERED A BROKEN ROCK IN EACH. AIR ROTARY FROM 8 TO 10. FT. TRY 2 SS SAMPLES AT 10 TO 11.5, ROCK/POOR RECOVERY IN EACH, BUT SAMPLED BOTH.

HEAVING SANDS, A.H. STUCK. FINALLY GOT UNSTUCK. AH TO 14.5 FT

DRIVE SPOON. COLLECTED SAMPLE AT 14.5 TO 16 FT BGS. FS: 0.2 PPM

1800 RANDY RETURNED TO CAMP.

FINISH BORING 06B2 DRILLERS LOADING RODS. DUMPED BUCKETS OF DECON WATER IN DRUMS ON DRILL RIG. LOAD GEAR

1830 I LEFT SITE 6

8-19-04

8-19-04 DACA85-03-D-003 T.O.6.

1845 BEN AND DRILLERS LEFT SITE 6.

1900 DINNER,

PREPARE SAMPLE COLLECTION LOG. SELECT SOIL SAMPLES, PREPARE SAMPLE LABELS.

PLAN TO CONTINUE DRILLING AT SITE 6 TOMORROW. BEN AND RANDY TO BE AT SITE 7 (LANDFILL) SAMPLING SURFACE AND NEAR SURFACE SOILS.

8-19-04

NE CAPE 2004

8-20-04 DACA 85-03D-003 T.O.6

BREAKFAST 65°F PARTLY CLDY.

0930 PREPARE TO CONTINUE DRILLING BORINGS AT SITE 6. BEN AND RANDY TO START COLLECTING SOIL SAMPLES AT LANDFILL. CALIBRATE HNU. SAFETY MEETING

1050 ARRIVE AT SITE 6.

1100 SET UP, DRILLING ON ~~03~~ 06B3

ROCK AT ~0.5FT BGS. I GRABBED FS

1107 SAMPLE FROM CUTTINGS AT ~0.5FT BGS.

BROWN MOIST SILT, NO ODOR

USE AIR HAMMER INSIDE AUGER 0.5 to ~ 3FT. AUGER WOULD NOT ADVANCE THROUGH THIS BROKEN ROCK. TRY AIR HAMMER TO BREAKUP THIS ROCK TO ~~ABOUT~~ 2.5FT. AUGERING - GRINDING ON BROKEN ROCKS.

WARM UP HNU, REZERO.

1150 FS SAMPLE 06B3 0.5' = 0.8 PPM

ATTEMPT SS SAMPLE AT 3FT. BGS, GOOD RECOVERY. SAMPLE AT 5FT, 10FT

AUGER IS MOVING LATERALLY IN BORING

1330 TRYING TO AUGER BACK DOWN TO 10FT FROM ~8FT. JOE HAD TO MOVE RIG TWICE TO GET AUGER VERTICAL. 1335 - TRY TO AUGER TO 15FT. (~~FLOYD AND 2 OTHER~~ 3 LOCALS

Julie [illegible] 8-20-04

NE CAPE 2004

8/20/04 DACA 85-03-D-003 T.O.6

STOPPED BY SITE AND ASKED IF THEY COULD BUY ANY GAS. (TOLD THEM NO.)

1350 AUGERED DOWN TO 15FT.

RANDY AND BEN CAME OVER. WILL DRIVE SS. AFTER LUNCH.

1400 LEFT DRILL RIG AND GEAR AT SITE.

RETURN TO CAMP FOR LUNCH.

1450 BACK AT SITE 6. DRIVE 15 FT AND 20 FT SAMPLES, WATER IN HOLE AT ~3.5 FT BGS. (BOH = 21.5 FT BGS)

1600 MOVE TO 06B4. DECON AIR HAMMER

1625 START DRILLING WITH AIR HAMMER. ROCKS AT ~0.5 FT BGS. HAMMER TO ~4FT. 1640 - 1650 PUT AUGER IN BORING. AUGER TO ~3.5FT. DRIVE S.S. AT 3.5 FT. SAMPLE (PART MAY BE SLOUGH). AUGER TO 5FT AND SAMPLE (ALL SOIL MAY BE SLOUGH). SAMPLE AT 10FT. BEN AND RANDY ONSITE. 11.5 FT = B.O.H

DRILLERS DECONNING RODS.

PACK UP GEAR

1915 LEAVE SITE 6.

DINNER. LABEL AND PREP. SAMPLES.

Julie [illegible] 8/20/04

8/21/04 DACA 85-03-D-003 T.O6

0930 60°F CLOUDY. BREAKFAST.
MOB FOR REMAINING SOIL BORINGS
AT SITE 6. DRILLERS HAVE DECONNED
AUGER IN TROUGHS AT CAMP. SAFETY MEETING.
1020 AT SITE 6 WITH DRILLERS. SETUP
ON BORING 06B5. USING AIR HAMMER.
RANDY ONSITE. AIRHAMMER TO 3FT.
SS SAMPLES AT 3.5, AND 10 FT.
BOH = 11.5 FT.
1205 ON BORING 06B6
1220 AIRHAMMER 0 TO 4FT BGS
TRY TO DRIVE SS. AT 4 AND 5FT →
POOR RECOVERY. MOVE DRILL RIG ABOUT 2FT
1310 OVER. AUGER TO 2FT. DRIVE S.S. AT 2FT.
SAMPLES AT 2FT → APPEARS TO BE SOIL
UNDER ~5 IN. SURFACE VEGETATION THAT
HAS BEEN PUSHED DOWN.
~~SAMPLE NOT COLLECT~~ 8-21-04 DROVE S.S. AT
5FT → ROOTS AND ORGANICS STILL
SUGGEST NEAR SURFACE SOIL/SLOUGH
NOT SAMPLED
SAMPLED AT 6.5FT AND 10 FT BGS.
WATER AT 4.5 FT MAY BE PERCHED
ON SILT. BOH = 11.5FT.
8/21/04

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~~1285~~ 1430 MOVE TO BORING 06B1.
AIRHAMMER TO ~3.5 FT. DROVE
SS AT 5FT → BROKEN ROCK IN SHOE,
NOT SAMPLED.
SAMPLED AT 5 AND 10FT BGS.
BOH - 11.5FT.
1615 COLLECT EQUIPMENT RINSATE SAMPLE
FROM INSIDE AND OUTSIDE OF SPLIT SPOON
(WITH SHOE AND CATCHER)
04NE06~~[illegible]~~WQ201 FOR GRO/BTEX,
DRO/RRO, PAHS, PCBS, RCRA METALS.
~1630 DRILLERS INSTALLING WELL POINT
NEAR 06B1 = 06WP5
INSTALL WELL POINT 06WP6
START LABELING SAMPLES
1830 RETURN TO CAMP WITH SOIL
SAMPLES AND RINSATE. ONE
UNPRESERVED 1L BOTTLE BROKE
IN TRANSIT.
DINNER. FOG/SMOKE CAME IN THIS AFTERNOON.
LABEL SOIL SAMPLES

8-21-04

8/22/~~03~~04 DACA 85-03-D-003 T.O.6
65° FOGGY, SMOKY

0930 DRILLERS FINISHING DECONNING AUGERS AND GETTING MATERIALS TOGETHER FOR MONITORING WELL AT SITE 26. SAFETY MEETING.

PREPARE COOLERS OF SOIL AND WATER SAMPLES AND COCS.

1420 AT SITE 3 WITH BEN TO PURGE AND SAMPLE WELL POINTS WITH PERISTALTIC PUMP.

1430 AT 03WP05. (INSTALLED BY BEN AND RANDY ON 8/20/04). TOP OF CASING = 2.62 FT AGS. WATER ≤ 6" BGS.
WELL VOLUME ~ 0.05 GALLONS.

1503 START PUMPING, MEASURE FIELD PARAMETERS WITH YSI AND TURBIDITY METER: TEMP, COND, DO, PH, ORP. (SEE GW SAMPLING LOG).
WP DRY AFTER PUMPING < 1 l.

1523 MOVE TO 03WP06. MEASURE DEPTH TO WATER = 2.50' ABOVE T.O.C.

1540 START PURGING. WATER TURBID, GREY HAS "BURNT OIL" ODOR. PUMPED ~1 l FROM WP BEFORE GOING DRY.

1610 AT 03WP2. WATER AT 3.94 FT BELOW TOC. TOC 3.6 FT AGS. WP

Julie Reiner 8/22/04

8/22/~~03~~04 DACA 85-03-D-003. T.O.6
DEPTH = 6.12 FT BELOW TOC.

1617 START PUMPING, WATER BROWN, SL. SILTY
TEMP = 12°C. COND = 0.6 mS/cm², DO ~ 12.4, PH = 6, ORP = 32. PUMPED ~1 l BEFORE WP DRY.

1625 AT 03WP03. TOC = 2.93 FT AGS.
WATER AT 3.11 FT BELOW TOC,
WP DEPTH = 6.09 FT BELOW TOC,

1633 START PUMPING. TEMP = 9.9°C
0.436 mS/cm², DO = 1.85 mg/L. PH = 5.6
ORP = 21.8

1640 10.46°C, 0.413 mS/cm², 5.54 pH
33.3 ORP, DO = 1.2 mg/L

1642. WP DRY. WATER WAS SILTY, BROWN.

1648 AT 03WP05. WATER AT 3.04 FT BELOW TOC. 1657 TO 1700 PURGED, WATER LESS SILTY, STILL BROWN.

1700 AT 03WP06. WATER AT 3.4 FT BELOW TOC. NOT SUFFICIENTLY RECHARGED TO PURGE YET. PULLED OUT FIRST ATTEMPT AT 03WP06.

1738 WATER AT 2.92 FT BGS IN 03WP06.
PURGE 1740-1756

1800 AT 03 WP 02. WATER AT 5.56 FT BELOW TOC. NOT RECHARGED ENOUGH

1813 03WP03. WATER AT 3.33 FT. BELOW TOC

Julie Reiner 8/22/04

8/22/04 DACA85-03-D-003 T.O.6

1817 START PURGING 03WP03

TEMP = 9.74 °C → 10.64

COND = 0.378 → 0.350

DO = 5.7 → 3.49

PH = 5.67 → 5.52

ORP = 80 → 76.0

1823 END PUMPING → DRY. PUMPED <1 l.

1840 LEAVE SITE 3. RETURN TO CAMP.

PREPARE SAMPLES FOR SHIPPING.

Julie 8-22-04

8/23/04 65°F FOGGY

0920 SAFETY MEETING. PREPARE TO INSTALL 2 SOIL BORINGS AT SITE 10 TO 15 FT BGS, SAMPLE AT 5 FT INTERVALS. SAMPLE FOR GRO/BTEX, ~~AND DRO~~ DRO/RRO (3 PER BORING) AND 1 SAMPLE PER BORING FOR TOC AND PAH. WILL NEED 1×4OZ W/ MEOH AND 1×8 OZ. RANDY CALIBRATED PID.

PAPERWORK, LUNCH.

1240 AT SITE 10 - BURIED DRUMS.

SETUP ON 10B2. RANDY ON SITE ~ ½ HR. ATTEMPT SS AT SURFACE. → POOR RECOVERY. F.S. SAMPLE ONLY. DRIVE SPOON AT 4 FT. SOIL APPEARS TO BE SLOUGH → NOT SAMPLED. SS. SAMPLES AT 5, 10, 11, 15 FT BGS. AT 11 FT BGS, ALMOST REFUSAL, BUT MATERIAL IN SPOON APPEARS TO BE ~~MUD~~ WET SILT PUSHED UP INSIDE SPOON. GROUNDWATER AT 11 FT. BGS.

1425 MOVE TO BORING 10B1. SAMPLE AT ~~0,5~~ 0, 5, 10, 15 FT. BGS. SURFACE SAMPLE HAS SLIGHT MOTOR OIL ODOR. GROUNDWATER AT ABOUT 16.5 FT. BGS.

8/23/04 Julie

NE CAPE 2004

8/23/04. DACA85-03-D-003 T.O.6

1535 FINISH 10(B), BOTH BORINGS TODAY DRILLED WITH AUGER ONLY.

1620 LEAVE SITE 10.

AT CAMP. DRILLERS DECONNING AUGER. TEST FS SAMPLES. PAPERWORK. BERING AIR FLIGHT DID NOT COME THIS AFTERNOON BECAUSE OF FOG.

Julie Keener 8-23-04

8/24/04 NE CAPE 2004

DACA 85-03-D-003 T.O.6

0830 60° F FOGGY.

PREPARE TO SAMPLE/INSTALL 3 BORINGS/MWS AT MAIN OPERATIONS COMPLEX (SITE 88). SOIL SAMPLES TO BE ~~COLLECTED~~ ANALYZED AT ABOUT 2, 10, AND 20 FT BGS AND ANALYZED FOR GRO/BTEX, DRO/RRO, TOC, AND Cr, Pb, Zn, Hg. SAMPLE AT 5 FT. INTERVALS.

0930 SAFETY MEETING.

BEN COLLECTING WATER SAMPLES FROM WELL POINTS.

1040 AT SITE 88 WITH RANDY AND DRILLERS. 50°F THICK FOG.

1100 SETUP ON 18MW1. USE AIR HAMMER INSIDE STEEL CASING. SURFACE SOIL IS SILTY GRAVELLY (COARSE) SAND FILL MATERIAL, APPEARS RECENTLY PLACED, DOZED IN AREA. ATTEMPT SAMPLES AT 5, 10, 15, 20, 25 FT. RECOVERED SUFFICIENT SAMPLE AT 5, 15, AND 25 FT. BGS. GOT CASING STUCK AT 25 FT. [1400-1500 LUNCH]. GW AT 19 FT. INSTALL MONITORING WELL ~~AT~~ 18MW1 AT ~26 FT BGS. 10 FT SCREEN. (SEE BORING, MON. WELL LOG). BERING AIR CAME TO PICK UP

8-24-04 Julie Keener

8-24-04 DACA85-03-D-003 T.O.6

SAMPLE COOLERS. FOG HAS LIFTED. 65°F
FIND MONITORING WELLS 88-5 AND
88-6 AND LOCATE PCB SAMPLE AREAS
WITH RANDY.
1820 MOVE TO 20MW1 LOCATION
WITH DRILL RIG. CUTTINGS APPEAR TO
BE SILT UNDER THE COARSE GRAVEL AT
SURFACE. AT 5FT - POOR RECOVERY, NOT
SAMPLED. AT 10FT - REFUSAL. DECIDE
TO MOVE DRILL RIG OVER A FEW FEET. LEAVE
DRILL RIG AT SITE.
2000 LEAVE SITE.

8/24/04

8-25-04 DACA85-03-D-003 T.O.6.

0830 SAFETY MEETING. MOB FOR
SAMPLING/INSTALLING TWO MONITORING
WELLS AT MAIN OPS. COMPLEX (20MW1
AND 17MW1). 60°F FOGGY.
BEN CONTINUING TO PURGE/SAMPLE
WELL POINTS.
0930 AT 20MW1 LOCATION. DRILL RIG
HAS BEEN MOVED ABOUT 5FT TO ATTEMPT
20MW1 AGAIN.
0940 AIR HAMMER ATTEMPT SAMPLES AT
3.5, 10, 15, 20, AND 25 FT. POOR RECOVERY
AT 25 FT. DRILLER THOUGHT PF AT THAT
DEPTH. GW AT ~22.5FT BGS.
AIR HAMMER TO 30 FT. BGS.
1230-1330 LUNCH.
BACK AT SITE 88, MAIN OPS. COMPLEX, TO
INSTALL MONITORING WELL 20MW1 TO
29 FT BGS. (SEE SOIL BORING/MON. WELL
LOGS).
DRILLERS DECONNING RODS, CASING.
1530 MOVE OFF 20MW1 TO SOIL BORING
19B1.
SOIL HAS MODERATE WEATHERED
DIESEL ODOR AT 10FT BGS. PID READ
8-25-04

8-25-04 NE CAPE 2004

IN BREATHING ZONE = 1 ppm.
TOLD RANDY. HE MEASURED 7ppm
AT PIPE WHILE DRIVING TO 15 FT. BGS.
GROUNDWATER AT ABOUT 17 FT
BGS. OBVIOUS HC CONT. IN BORING.
DROVE SPOON AT 21 AND 21.5
FT BGS → ONLY CRUSHED GRANITE.
COLLECT FS SAMPLE FROM 21 FT.
~~DECONNED SPOON~~*. LEFT DECON.
SETUP AT SITE.
1830 LEAVE SITE.
*LABEL SOIL SAMPLES. COMPLETE
SOIL SAMPLE COLLECTION LOG. TO ~1900.

Julie Keener 8-25-04

8-26-04 NECAPE 2004
0830 60°F CLEAR, BREEZY
SAFETY MEETING. MOB TO FINISH
SAMPLING 1981. RANDY FINISHED 1981 HELP RANDY LABEL
SAMPLES, FINISH COCs, PACK 3 COOLERS.
1200-1300 LUNCH
1300 ASSIST RANDY SAMPLING BORING
13B1. APPARENT HC CONTAMINATION.
1450 LOCATE MONITORING WELL
MW 88-2. WAS UNDER FEW INCHES
OF SAND. CONCRETE AROUND STEEL
MONUMENT IS CRACKED. CONCRETE HAD
TO BE CHIPPED OUT ~~OF~~ AROUND THE
LID. NO LOCK ON J-PLUG. DEPTH TO
GW (DTW) = (11.57 -4.00') = 7.57 FT FT BELOW TOP OF CASING (TOC)
TOC ~0.4 FT BGS.
DEPTH OF WELL BELOW TOC = 23.45 -
4.00 FT = 19.45 FT.
FOUND MW IN 4-IN. STEEL (PIPE) ABOVEGRD.
MONUMENT IS NORTHEASTERN MOST WELL
AT 3 FORMER TANKS (FUEL ASTS) AT SITE 88.
CALL IT "MW 88-A" FOR NOW. NO LOCK ON COVER.
WELL CAP IS MARKED "11-3(?)" AND IS
JAMMED BESIDE CASING IN MONUMENT. CONCRETE
AT BASE OF MON. HAS JACKED ~0.2 FT.
TOP OF PVC CASING ~2.7 FT AGS. DEPTH

Julie Keener 8-26-04

8/26/04 NE CAPE 2004

TO GW BELOW TOC = 13.88-4 = 9.88 Ft.

WELL DEPTH BELOW TOC = 20.2 Ft.

LIKELY WILL HAVE TO GET WELL CAP UNSTUCK TO SAMPLE WITH SUBMERSIBLE PUMP

WELL ~40 Ft. SW OF "88-A". STEEL MONUMENT IS AT 45° ANGLE TO GROUND. 5 Ft OF WELL CASING IS ON GROUND AT MONUMENT. WELL CAP MARKED "11-2".

SOUTHEAST WELL AT SITE 10. TOP OF STEEL ~~CAS~~ MONUMENT 2 Ft AGS. NO COVER ON MON. WELL CAP STUCK ON CASING - MAY NEED WRENCH TO OPEN. CASING JACKED (OR MON. SUNK) 0.55 Ft. ABOVE TOP OF MON. SPACE BETWEEN BROKEN CONCRETE AT BASE AND MON. CASING CAN BE TURNED.

NORTH WEST WELL AT SITE 10 IS INSIDE SECTION OF CORRUGATED METAL PIPE (TIPPED) STEEL COVER FOR PIPE (MON.) ON GROUND. WELL LABELED "10-4". CMP AND CONCRETE INSIDE HAS JACKED/TIPPED. SCREENED INTERVAL IS EXPOSED. WELL CASING BENT.

Julie [illegible] 8-26-04

8/~~24~~ 26/04 NE CAPE 2004

CAP IS STUCK ON CASING.

MW 88-3 FLUSHMOUNT. TOC ~0.35 Ft BGS. DTW = 15.18 Ft - 4 = 11.18 Ft

LOCATED MW 88-1. FLUSHMOUNT. TOC ~0.3 Ft BGS, DTW = 19.64-4 = 15.64 Ft (HAD TO CHIP CONCRETE OFF COVER).

1830 RETURN TO CAMP.

8-26-04

8-27-04 NECAPE 2004

50° HIGH CLOUDS. FRIDAY

~~0900~~ 0830 SAFETY MEETING.

PREPARE TO COLLECT PCB SOIL SAMPLES AT SITE 13 WITH BEN. RANDY TO INSTALL MONITORING WELL. COCS, ORGANIZE GEAR. PAPERWORK.

1150 AT SITE 13 FOR PCB SOIL SAMPLING. 65° CLEAR

1155 COLLECT ~~SS~~ SAMPLE 04NE13SS105 AT 1.5 FT BGS. MOIST BROWN ~~SILTY~~ GRAVELLY (F-C) SILTY SAND (F-M). MED-DENSE

1225 SAMPLE 04NE13SS106 AT 1.2 FT BGS. SOIL IS MED-DENSE BROWN SL GRAVELLY (F-C) SILTY SAND (F-M). SAMPLE SOIL ADJACENT TO APPARENT CONCRETE DEBRIS. FEW PIECES ~~FLO~~ TILE, WOOD AT ~0.9 FT BGS. FEW VOIDS, LOOSER SOIL BETWEEN ROCKS.

1235 SAMPLE 04NE13SS107 AT 1.2 FT BGS. DENSE, BROWN SL GRAVELLY SILTY SAND (F-M).

Julie [illegible] 8-27-04

8/27/04 NECAPE 2004

SCATTERED FINE ROOTS. THIS SOIL ~~[illegible]~~ MORE DENSE THAN PREVIOUS TWO SAMPLE LOCATIONS

1255 SAMPLE 04NE13SS108. AT 1.3 FT BGS. SOIL SAME AS SAMPLE 04NE13SS107, BUT NO ROOTS OBSERVED.

1300-1400 LUNCH SAMPLE FORMS

1500 CONINUE PCB SAMPLING AT SITE 13.

1530 SAMPLE 04NE13SS109 AT 1.4 FT BGS. SOIL IS MED-DENSE BROWN SL GRAVELLY, SILTY SAND (F-M). FEW SMALL PCS. BROKEN GLASS, PAINTED TILE (?).

1540 SAMPLE 04NE13SS110 AT 1.2 FT BGS. SOIL SAME AS PREV SAMPLE, BUT NO DEBRIS OBSERVED.

1545 SAMPLE 04NE13SS111

Julie [illegible] 8-27-04

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AT 1.1 FT BGS. SOIL IS MED-DENSE BROWN SILTY GRAVELLY (F-C) SAND (F-M) MOIST. TRACE FINE ROOTS.

1555 SAMPLE 04NE13SS 112 AT 1.1 FT BGS. DENSE SILTY GRAVELLY (F-C) SAND, (F-M) BROWN. MOIST.

1605 SAMPLE 04NE13SS 113 AT 1.1 FT BGS. SOIL IS DENSE BROWN SILTY SANDY (F-M) GRAVEL (F-C).

1620 SAMPLE 04NE13SS 114
1625 DUPLICATE 04NE13SS 214
1630 TRIPLICATE 04NE13SS 314
AT 1.0 FT BGS. DENSE BROWN SILTY ~~SAND~~ SANDY (F-M) GRAVEL (C), MOIST TRACE FINE ROOTS.

1720 MONITORING WELL MW 88-8 IS FLUSH MOUNTED. CONCRETE MONUMENT IS CRACKED, CONCRETE HARDENED OVER MONUMENT LID. NO LOCK ON J-PLUG. HC ODOR ON PLUG. TOP OF 2-IN PVC CASING ~ 0.2 FT BGS. DTW =

8-27-04

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15.92 -4 = 11.92 FT. TOP OF MON. ~0.1 FT ABOVE CONCRETE; MAY BE ABLE TO HAMMER IT DOWN.

MW 88-6 FLUSHMOUNT. NO LOCK ON J-PLUG. TOC = 0.3 FT BGS. DTW = 11.97 -4 = 7.97 FT BGS. HC ODOR ON J-PLUG.

MW 88-5 FLUSH MT. TOC 0.3 FT BGS. DTW = 11.15 -4 = 7.15 FT BGS. HC ODOR ON PLUG. NO LOCK

MW 88-4 FLUSHMT. TOC 0.2 FT BGS. DTW = 11.58 -4 = 7.58 FT BGS. HC ODOR ON PLUG. NO LOCK.

WAS NOT ABLE TO LOCATE MW 88-7.

MW 88-9: MONUMENT NEARBY. WELL NOT FOUND. DESTROYED?

MW 88-10. MONUMENT GONE. CASING OPEN TO AIR. SOME SURFACE GRAVEL FELL INSIDE.

8/27/04

8-28-04 2004 NE CAPE
50°F WINDY SATURDAY

0845 SAFETY MTG.
PLAN TO PROVIDE OVERSIGHT WHILE BEN LOGS/SAMPLES 22MW2 AT SITE 22-WATER STORAGE BLDG.
RANDY DOING ADMIN. TASKS THIS MORNING. MAY BE A PLANE THIS AFTERNOON WITH DRILL AIR HAMMER.
CALIBRATE PID.

1000 AT SITE 22.

1010 DRILLING. BEN LOGGING/SAMPLING BORING → PRIMARILY ROCK.
LABELING SAMPLES, TEST PID SAMPLES FOR BEN. DID NOT ENCOUNTER GW YET.

1230-1330 LUNCH.

RANDY WENT WITH BEN TO OVERSEE 22MW2.
SAMPLE LOGS AND COC FORMS.
SOIL BORING LOGS.

Julie Keener
8/28/04

8-29-04 DACA 85-03-D-003 T.O.6
50°F, LT. RAIN SUNDAY

0845 SAFETY MEETING
PLAN TO FINISH INSTALLATION OF WELL AT SITE 22 (BEN).
PACK COOLERS FOR AFTERNOON SHIPMENT. LOG, SELECT FOR ANALYSIS, LABEL, AND PACK SITE 22 SOIL SAMPLES.

NOTE: BORING DRILLED THE MORNING OF 8-28-04 WITH THE INTENT TO INSTALL 22MW2 WAS CHANGED TO BORING 22B1.
BORING DRILLED 8/28 PM WAS COMPLETED AS MONITORING WELL 22MW2.

LUNCH

1420 AT SITE 13 TO CONTINUE PCB SAMPLING.

DUG HOLES FOR 13 PCB SAMPLES, RANDY SAMPLED.

Julie Keener 8-29-04

8-29-04 2004 NE CAPE

WALK SITE 26 FOR WELL LOCATION.

LABEL 13SS AND 17MW1 SAMPLES. CHAINS OF CUSTODY.

8-29-04

8-30-04 DACA 85-03-D-003 T.O.6
55°F CLOUDY. BREEZY, MONDAY

0830 SAFETY MEETING

DRILLERS TO INSTALL 26MW1 (50').
NO SOIL SAMPLES TO BE COLLECTED.

PACK COOLERS

1200 LUNCH

1300 FINAL PACKING OF SAMPLE COOLERS 12-15.
MOB FOR PCB SOIL SAMPLING.
AT SITE 14-EMERGENCY POWER BLDG.
ADMIN. PAPERWORK

1500 AT SITE 14 WITH RANDY TO COLLECT PCB SAMPLES.

HAND DUG SHALLOW HOLES FOR SAMPLES 04NE14SS101 THROUGH 04NE14 304.

FIND PCB/FUEL SAMPLE LOCATIONS AT SITE 26.

8-30-04

TUESDAY
8-31-04 2004 NE CAPE
53° F CLOUDY.

0820 SAFETY MEETING
PREPARE TO SAMPLE AT WHITE ALICE.
FOR PCBS, FUELS.

0910 SET UP ON BORING 31B1
AT WHITE ALICE SITE.
(BEN DEVELOPING WELLPOINTS)
ONLY NEED TO SAMPLE AT 2-4
AND 4-6 FT BGS FOR DRO/RRO.
CUTTINGS BROWN SILTY GRAVEL COARSE
SAMPLE 2-4 FT B/C = 8/7/10

0935 SAMPLE 31B1S1 = 04NE31 SB101.
14" IN RECOVERY: MOIST LOOSE
BROWN SL. GRAVELLY (F) SAND (MEDIUM). MED-
COLLECT 1x8OZ (DRO/RRO) + FS SAMPLE.

DROVE S.S. 4 to 6 FT B/C = 9/8/16

0945 SAMPLE 31B1S2, IDENTICAL TO
LAST. 1x8OZ + FS. = 04NE31SB102.

0955 DRILL RIG ON 31B2.
DRIVE S.S. 2-4 FT. B/C = 13/13/7
(CUTTINGS HAVE MORE COARSE GRAVEL THAN 31B1.)

1010 SAMPLE 31B2S1 BROWN MOIST
GRAVELLY (C) SANDY (F-M) SILT.
LOOSE 12" = 04NE31SB103. 8-31-04

8-31-04 DACA 85-03-D-0003 T.O. 6

1020 SAMPLE 31B2S2 AT 4-6 FT
BGS. 19-19-35 = B/C = 04NE31SB104
12" ~~18"~~ RECOVERY: 8" MOIST BROWN
GRAVELLY (F-C) SILTY SAND (F-M) OVER
4" LT. GREY CRUSHED ROCK.
1 x 8OZ JAR FROM EACH INTERVAL
IN 31B2.

1035 DRILL RIG ON NEARBY PIPELINE
SAMPLE LOCATION. 1 SUBSURFACE SAMPLE
FOR GRO/BTEX, DRO/RRO, TOC, PAH.

1055 RANDY COLLECTED 04NE ~~33~~ 31 SB105
AT 2.7-3.1 FT BGS. 0.5 ppm Headspace
1x MeOH, 1x 8oz

1120 2.5 to 2.8 FT BGS. RANDY COLLECTED
SAMPLE 04NE31SB106 1x MeOH, 1x 8oz
MODERATE WEATHERED DIESEL ODOR

1125 DUPLICATE OF 04NE31SB ~~206~~ 106 =
04NE31SB206 1x MeOH, 1x 8oz
DARK BROWN SILTY GRAVELLY SAND, MOIST

1130 04NE31SB306 IS QA REPLICATE
OF 04NE31SB106. 1x MeOH, 1x 8oz
HEADSPACE ON 04NE31SB106 = 43 ppm

DRILLERS USING AUGER ON THESE
8-31-04

8-31-04 2004 N.E. CAPE

PIPELINE SAMPLES. COLLECTING SOIL SAMPLES OF ~~#~~ SOIL ON (NOT TOUCHING) FLIGHTS

1045 MOVE TO NEXT PIPELINE SAMPLE LOCATION. RH COLLECTED

1150 04NE 31SB 107 AT 3 TO 3.5 FT BGS. BROWN SL. SILTY SANDY GRAVEL. NO ODOR NOTED. 0.4 ppm = HEAD SPACE.

NEXT PIPELINE SAMPLE LOCATION, SOUTH SIDE OF WAC ANTENNA 3.

1215 04NE 31 SB 108, 3.5 TO 4 FT BGS BROWN GRAVELLY MEDIUM SAND. MOIST. EXTRA SOIL FOR MS/MSD.

LAST PIPELINE SAMPLE LOCATION SOUTH SIDE OF WAC ANTENNA 4.

1245 COLLECT PCB SAMPLE 04NE 31SS ~~118~~ 119 AT 0.8 TO 1.2 FT BGS. VERY ~~SL~~ DENSE SILTY SANDY (F-M) GRAVEL (FC) BROWN, MOIST. 1x4OZ.

1300 LUNCH

1400 BACK AT SITE 31 WITH DRILL RIG.

Julie Keene 8-31-04

8/31/04 . DACA 85-03-D-003 T.O.6

SET UP ON ONE OF THE TWO CO-LOCATED PCB SAMPLES. AUGER WITH DECONNED BIT.

1410 04NE 31SS ~~114~~ 115 AT 1.9 TO 2.1 BROWN MOIST SILTY SANDY (F-M) GRAVEL

AUGER TO 4 FT. BGS COLLECT

1416 04NE 31SB 116 AT 3.8 TO 4.0 FT BGS MOIST SOFT SANDY GRAVELLY SILT, TR. ORG.

MOVE RIG ~~TO~~ UPHILL.

1435 04NE 31 SS 112 AT 1.8 TO 2FT BGS. DK. BROWN SILTY SANDY GRAVEL MOIST TRACE ORG.

1445 04NE 31 SB113 AT 3.7 TO 4FT BGS. LIGHT BROWN (DRIER THAN 2FT) SILTY SL SANDY GRAVEL (F-C).

1500 04NE31SS ~~117~~ ~~116~~ 117 AT 1.9 FT. DARK BROWN SANDY GRAVELLY SILT

1515 SAMPLE 04NE 31SB ~~118~~ 118 AT. 4 FT.

Julie Keene 8-31-04

8/31/04 2004 NE CAPE

1520 DUPLICATE 04NE31SB218
1525 QA REPLICATE 04NE31SB318
(HOMOGENIZED IN PAN)

1530 RANDY SAMPLED 04NE31SS123 AT 2'
1538 04NE31SB124 AT 3.8 to 4.1

1534 SAMPLE 04NE31SS122 AT
1.2 FT BGS IN DK BROWN MOIST STIFF
SILT FROM HAND-DUG HOLE

1650 04NE31 SS126 AT 1.5 FT. SL. SILTY SAND (M-C)
POORLY GRADED.
1700 04NE31SB127 AT 3.5 FT. MOIST
SILT, TRACE GRAVEL
1715 04NE31 SS128 AT 1.8 FT. SANDY MOIST
SILT.
1720 04NE31 SB129 AT 3.7 FT. GRAVELLY SILT.
1725 04NE31SS130 AT 1.3 FT. BEDDED
LOOSE M-C SAND, TR. ORG W/ STIFF SILT.

SAMPLES 126 THROUGH 130 TO BE
ANALYZED FOR DRO/RRO, SOME FOR TOC:
THESE WERE COLLECTED OFF THE AUGER
Julie [illegible] 8-31-04

8/31/04 DACA 85-03-D-003 T.O.6
FLIGHTS.
BEN AND RANDY COLLECTED
NEAR SURFACE AND SHALLOW SUB
SURFACE SAMPLES (TO 4 FT) FOR PCBs
AT SITE 31. USED HAND TOOLS AND
ALSO SAMPLED OFF AUGER FLIGHTS.
1920 BACK AT CAMP
SEE SOIL SAMPLE COLLECTION
LOG FOR INFO.

LABEL SAMPLES.

Julie [illegible] 8-31-04

9-1-04 WEDNESDAY 2004 NE CAPE
45°F FOGGY, SLIGHT BREEZE.

0830 SAFETY MEETING.
MOB. TO SAMPLE FOR PCBS AT SITE 13 - ELECTRICAL POWER BLDG.

1000 ARRIVE SITE 13 (@ MAIN COMPOUND)
COLLECT SOIL SAMPLES AT SITE 13 WITH RANDY. SEE SOIL SAMPLE COLLECTION LOG. SAMPLES COLLECTED OFF AUGER FLIGHTS.
TRIED TO LOCATE MONITORING WELL 88-7. MAY BE DESTROYED? NO SIGN OF MONUMENT.

1200 LUNCH
1300 LABEL SAMPLES
PACK COOLERS TO ~1800.

BEN AND RANDY COLLECTED PCB SOIL SAMPLES AT SITE 7 - LANDFILL USING HAND TOOLS AND AUGER.

9-1-04

T.O.4
9-2-04 THURSDAY DACA85-03D-003
45°F CLOUDY, LIGHT WINDS.

0845 SAFETY MEETING DISCUSS ~~SCHEDULE~~ SCHEDULE.
MOB. FOR POSSIBLE GW SAMPLING AT SITE 11.

1150 COLLECT RINSATE SAMPLE FROM SPLIT SPOON: 04NE31SQ201 FOR GRO/BTEX, DRO/RRO. WITH RANDY.
LUNCH.
PREP TO COLLECT HEADSPACE SAMPLES AT SITE 1.
FINISH WRAPPING COOLERS.

WALK APPROXIMATE PERIMETER OF SITE 1 - "BURN AREA" SE OF AIRSTRIP. (LIGHT RAIN)
DID NOT OBSERVE AREAS OF DISTRESSED VEGETATION OR STAINING. AREA IS TUNDRA / MARSH AND SOME HIGHER AREAS. OBSERVED SOME SCATTERED DEBRIS OLD METAL, LUMBER, PIPES, WIRES. SOME SHALLOW DEPRESSIONS WITH MUD INSIDE. POSSIBLE BURIED DEBRIS SE OF "AIRPORT TERMINAL BLDG."

9-2-04

2004 NECAPE

9-2-04

SURVEYOR ARRIVED (WILLIAMS SHELLEY)
SENT TWO COOLERS TO SES ON
BERING AIR.

DINNER.

THIS AFTERNOON RANDY BROUGHT SOIL SAMPLE (FROM SPLIT SPOON) BACK FROM 26MW2 AT 19 to 21.5 FT. GREY FROZEN SLIGHTLY CLAYEY SILT.

1936 FIELD SCREENING AT SITE 1 FS1-1

1950 PHOTO 1, LOW AREA, FACING SW.
FS1-1 LOCATED NE OF FORMER TERMINAL, NEAR NORTHERN EXTENT OF STUDY AREA. OLD STEEL DRUM ON ONE SIDE OF ~20 x 25' FT AREA. MOSS/GRASS SPARSE IN SILTY MUD. LIKELY NATURAL FEATURE. COLLECT FS1-1 AT 0.3 FT BGS IN DARK BROWN SILTY ORGANICS.

FS1-2 ABOUT 75 FT SW OF FS1-1 AT NORTHWEST ~~E~~ SIDE OF GRAVEL PAD WITH CONCRETE SLAB. LOW AREA ~20 x 25 FT WITH METAL, PLASTIC, GLASS DEBRIS.

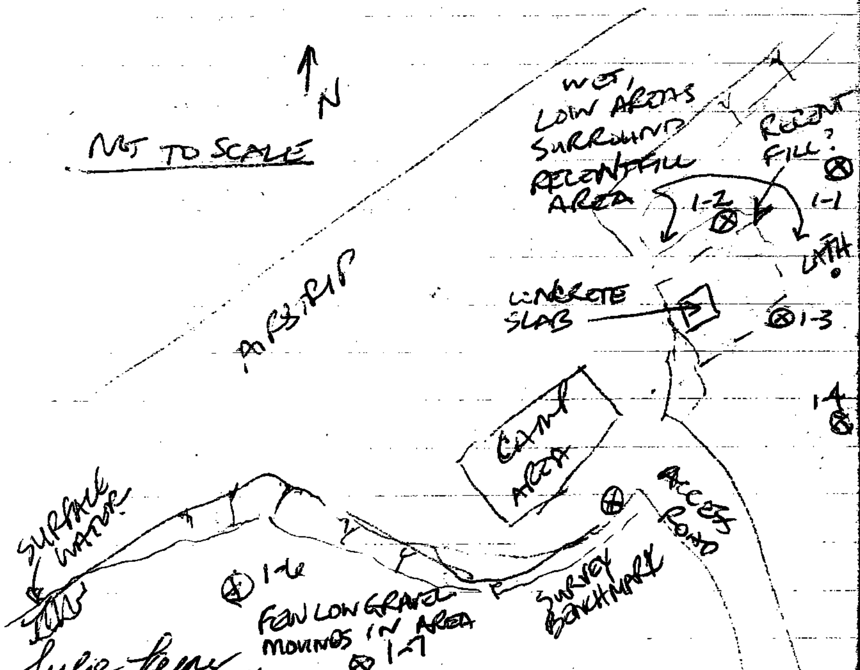
Julie [illegible] 9-2-04

9-2-04 DACA 85-03-D-003

2000 PHOTO 2 FS1-2, FACING CAMP.
FS1-2 IS SILTY ANGULAR GRAVEL 0.3 FT BGS

2015 FS1-3 IN LOOSE, MOIST DK BROWN SILTY ORGANICS, TRACE GRAVEL, SM. PCS. OLD LUMBER. 0.4 FT BGS. IN AREA OF PUSHED/HEAVED (?) IRREGULAR MOUND AT NE CORNER (?) FORMER TERMINAL. ~100 FT SE OF FS1-2. SOME SM. PCS. BURIED METAL IN AREA

PHOTO 3 = FS1-3 LOCATION FACING WEST



Julie [illegible] 9-2-04

9-2-04 2004 NE CAPE

2030 FS1-4 IN LOW GRASSY AREA ~ 100 FT FROM RIVER, ~ 300 FT. EAST OF TERMINAL. RANDOMLY SELECTED LOCATION.

PHOTO 4 = FS1-4, FACING WEST.

FS1-4 AT 0.3 FT IN SATURATED PEAT, SLIGHTLY SILTY.

2045 FS1-5 ~ 75 FT W OF LATH MARKED "SC-4 NORTH", ~ 200 FT WEST OF TERMINAL. 1/2" (GALV.) CONDUIT EMERGES FROM GROUND NEARBY. SAMPLE AT 0.3 FT IN WET PEAT, ~ 100 FT. NORTH OF BRIDGE.

CALIBRATE HNU PID. SPAN SETTING 0.2.

2130 TEST FS SAMPLES (COOL).

FS1-1 = 0.6 ppm
FS1-2 = 0.2 ppm
FS1-3 = 1.0 ppm
FS1-4 = 0.0 ppm STRONG METHANE(?) ODOR
FS1-5 = 0.0 ppm.

9-2-04

9-3-04 FRIDAY. DACA 85-03-D-003

55° CLOUDY, CALM

0820 SAFETY MEETING. DRILLERS ARE DONE WITH THEIR WORK AND ARE PACKING UP THEIR EQUIPMENT. BEN TO SHOW SHELLEY THE PROJECT AREA. I WILL CONTINUE FS AT SITE 1. ~~W/AT~~ BEN AND RANDY WILL COLLECT SEDIMENT SAMPLES FROM THE ESTUARY. THIS AFTERNOON, WE'LL GET INFO ON SAMPLING WITH THE GRUNDFOS PUMP.

0930 PHOTO ~~4~~ 5 - FS1-6 LOCATION, FACING NE.

FS1-6 AREA IS SW OF CAMP/TERMINAL, ~ 75' FROM AIRSTRIP, CAMP, ON 3' HIGH MOUND OF ORGANIC SOIL, WITH CRACKING ON SIDE. FROST-HEAVED SOIL? FS-6 IN DARK BROWN PEAT, TRACE SILT/GRAVEL AT 0.2 FT

0942 PHOTO ~~5~~ 6 - FS1-7 LOCATION (PIN FLAG) FACING NE.

FS1-7 AREA IS ANOTHER LOW MOUND ~ 75 FT SE OF FS1-6. FS1-7 AT 0.2 FT BGS IN SL. GRAVELLY (F) SILTY SAND (F-M) WITH ORG (ROOT HAIRS

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9-3-04 2004 NE CAPE

0952 PHOTO ~~6~~ 7 FS1-8 LOCATION, FACING N. FS1-8 IS SE OF FS1-7 ~125 FT, ~100 FT S OF SE CORNER OF GRAVEL PAD WITH CAMP AND TERMINAL. LOW MOUNDED AREA. FS1-8 AT 0.4 FT BGS IN MOIST BROWN SILTY PEAT.

1000 PHOTO ~~7~~ 8 FS1-9 LOCATION, FACING N. FS1-9 IS ~75' SW OF FS1-8, ON LOW MOUND. AT 0.2 FT BGS IN MOIST BROWN SL. GRAVELLY (F) SANDY (M) ORGANICS (ROOTS) / PEAT.

1010 PHOTO ~~8~~ 9 FS1-10 LOCATION, FACING NE. FS1-10 IS ON ~~NW~~ NORTH SIDE OF MOUND WITH DENSE GRASS ~150-200 FT - SOUTH OF FS1-6. AT 0.2 FT BGS, MOIST BROWN SILTY PEAT/ROOTS. 5FT-HIGH OLD WOODEN PLATFORM (ASSOCIATED WITH AIRSTRIP?) IS ~25 FT TO SOUTH.

1025 FS1-11 ~20 FT E. OF NE CORNER OF WIDE AREA IN AIRSTRIP SW OF TERMINAL, ~75' NW OF FS1-10, 100' SW FS1-6

9-3-04

T.O.6

9-3-04 DACA85-03-D-003

1032 PHOTO ~~9~~ 10 - FS1-11 FACING NORTH. FS1-11 IS ON LOW MOUND, AT 0.2 FT BGS IN MOIST BROWN SL. GRAVELLY (F) SILTY PEAT/ORGANICS. SMALL PONDED AREA IS ~~[illegible]~~ SW, DRY LOW AREA IS TO NW.

1041 PHOTO ~~10~~ 11 - FS1-12, FACING NORTH. FS1-12 IS SLIGHTLY ELEVATED AREA 15 FT FROM SURFACE WATER, OFF SE CORNER WIDE AREA OF AIR STRIP. ~75 FT SW OF FS1-11. FS1-12 AT ~~0.8~~ 0.7 FT BGS IN WET BROWN SILTY PEAT.

1050 PHOTO ~~11~~ 12 FS1-13 LOCATION, FACING NE. FS1-13 IS ~ WEST CORNER OF SITE 1 STUDY AREA. ~40 FT. FROM AIRSTRIP, 100 FT. SW OF FS1-12, ON ELEVATED AREA NEAR SURFACE WATER. FS1-13 AT ~0.6 FT BGS MOIST BROWN SILTY PEAT.

1107 PHOTO ~~12~~ 13 - FS1-14 FACING NNE. FS1-14 IS ~75 FT SW OF FS1-13, ALONG SW BORDER OF SITE 1 STUDY AREA. FS1-14 IN WET BROWN PEAT. AREA IS FLAT

9-3-04

9-3-04 2004 NE CAPE

1118 PHOTO ~~13th~~ 14 FS1-15 LOCATION FACING NNE. FS1-15 IS ~150 FT ESE OF FS1-14 IN FLAT AREA SLOPING TOWARD RIVER. AT 0.5 FT BGS, WET DK BROWN PEAT.

1126 PHOTO ~~14th~~ 15 FS1-16 LOCATION FACING N. FS1-16 IS ~20 FT NW OF RIVER, ~150 FT SE OF FS1-15. AT 0.5 FT BGS IN WET BROWN SILTY PEAT.

1135 PHOTO ~~15th~~ 16 FS1-17 FACING NORTH. FS1-17 ON LOW MOUND, ~200 FT NE OF FS1-16, ~50 FT NW OF RIVER. AT 0.5 FT BGS MOIST BROWN SILTY PEAT.

1140 PHOTO ~~16th~~ 17 - FS1-18, FACING NNW FS1-18 ~200' NE OF FS1-17, ~30 FT FROM RIVER, ON LINE WITH GRAVEL PAD FOR CAMP/ TERMINAL. SAMPLE AT 0.5 FT. WET BROWN SILTY PEAT.

60°F PARTLY CLOUDY

1148 PHOTO ~~17th~~ 18 - FS1-19, FACING WEST. FS1-19 IN RELATIVELY FLAT AREA

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9-3-04 DACA 85-03-D-003 T.O.6

~~AT the~~ OFF EAST SIDE OF GRAVEL PAD, ~100 FT FROM PAD, ~100 FT FROM ROAD. FS1-19 AT 0.5 FT BGS, WET BROWN SILTY PEAT.

1200 - RANDY CALIBRATED HNU, TESTING FS SAMPLES (SL. WARMED)

FS1-6 = 0.0 PPM
FS1-7 = 0.0
FS1-8 = 0.2
FS1-9 = 0.1
FS1-10 = 0.0
FS1-11 = 0.0
FS1-12 = 0.8
FS1-13 = 0.3

1300 FS1-14 = 0.0 PPM
FS1-15 = 0.0
FS1-16 = 0.0
FS1-17 = 0.4
FS1-18 = 0.0 METHANE(?) ODOR
FS1-19 = 0.2

Julie Keener
9-3-04

9-3-04 2004 NE CAPE

1415 COLLECT SAMPLE
04NE01SS101 AT 0.5 FT
BGS AT FS1-1 LOCATION. SOIL IS
MOIST MED-SOFT PEATY SILT.
1x4oz (MeOH), 1x8oz JARS

PHOTO ~~18~~ 19th = 04NE01SS101 LOCATION
(AT LATH) FACING SOUTHWEST.

1430 COLLECT SAMPLE
04NE01SS102 AT 0.7 TO 0.9
FT BGS AT FS1-3 LOCATION. SOIL
IS MOIST MEDIUM-STIFF PEATY
SILT, TRACE F GRAVEL. FEW SMALL
PCS. LUMBER. 4oz (MeOH), 8oz

1435 SAMPLE 04NE01SS202 IS
FIELD DUPLICATE OF 04NE01SS102.
4oz (MeOH), 8oz

1440 SAMPLE 04NE01SS302 IS
QA REPLICATE OF 04NE01SS102.
4oz (MeOH), 2x8oz
(ALL BUT GRO/BTEX SAMPLES HOM. IN PAN)
1440 PHOTO ~~19th~~ 20 = 04NE01SS102 LOCATION
Julie [illegible] 9-3-04

9-3-04. T.O.6
DACA 85-03-D-0003

FACING SW.
1505 PHOTO ~~20th~~ 21 RANDY NEAR AREA OF
DISTRESSED VEGETATION, FACING E
PHOTO ~~21st~~ 22 FS1-20, FACING WEST.
PHOTO ~~22nd~~ 23 FS1-20, CLOSEUP.
~~THIS AREA~~ TWO AREAS OF BURNED (?)
VEGETATION, ~10' DIAM AND 15 x 30'.
BLACKENED VEG/SOIL ONLY AT SURF.,
NO ODOR.
FS1-20 AT EASTERN CORNER OF
STUDY AREA, ~30 FT. FROM RIVER (SE
SIDE).
1515 FS1-20 AT 0 TO 0.2 FT. BLACK (SURF)
to DK BROWN WET, SL. SILTY ~~ORG~~ PEAT.
SOIL IS FAIRLY DRY AT SURFACE.
PHOTO ~~21st~~ 24 ~~23rd~~ SOIL ON END OF SHOVEL
(FS1-20) FACING NE.

PHOTO ~~24th~~ 25 BEN AND RANDY COLLECTING
SEDIMENT SAMPLE FROM RIVER.

1555 TEST FS1-20 = 1.7 ppm

1620 DRILLERS LEFT ON BERING AIR.
Julie [illegible] 9-3-04

9-3-04 2004 NE CAPE

1645 COLLECT 04NE01SS103
AT FS1-20 LOCATION, 0.5 to 0.7
FT BGS, WET SL. SILTY DK BROWN
PEAT, 8OZ + 4OZ W/MeOH

1650 04NE01SS203 DUPLICATE
OF 04NE01SS103. 4OZ W/MeOH, 8OZ.

1655 04NE01SS303 QA REPLICATE
OF 04NE01SS103. 2×8OZ, 4OZ W/MeOH.
ALL BUT GRO/BTEX SAMPLES WERE
HOMOGENIZED IN PAN. WATER IN HOLE
0.5 FT BGS, NO SHEEN.
NOTE: WILL NOT SUBMIT SAMPLES
04NE01SS202 AND 04NE01SS302
FOR ANALYSIS.

1710 PHOTO ~~25~~ 24 (LAST IN ROLL) - SAMPLE
04NE01SS103 LOCATION (AT LATH ON
RIGHT) TAKEN FROM BRIDGE, FACING E.

1735 PHOTO 1 (CAMERA 2) FROM EDGE
~~OF~~ OF GRAVEL PAD AT CAMP, FACING
SW, SHOVEL AND PACK AT FS1-12.
Julie Keener 9-3-04

9-3-04 DACA 85-03-D-003 T.O.6

1745 COLLECT 04NE01SS104
AT FS1-12 LOCATION, 0.5 FT BGS
MOIST BROWN SL. SILTY PEAT,
2×8OZ, 1×4OZ (MeOH) MS/MSD.

Julie Keener
9-3-04

NE CAPE 2004

9-4-04 DACA85-03-D-003

50°F GUSTY WINDS, CLOUDY
MORNING OFF
1000 BREAKFAST, BENTO PURGE WPS.
SHELLY TO SURVEY SITE 3, 6.
SAFETY MEETING
UPDATE SAMPLE SUMMARY /
SURVEY LOCATION TABLES, QA TABLES
SAMPLE SUMMARY TABLES

MOB. TO COLLECT SEDIMENT SAMPLES FROM RIVER (SITE 29) WITH RANDY.
1530 RANDY USING ECKMAN DREDGE TO COLLECT SEDIMENT SAMPLE ~~DOWN~~ UP-STREAM AND AT OPPOSITE BANK FROM THEIR LAST SEDIMENT SAMPLE.

1555 COLLECT SAMPLE 04NE29SD107
1600 DUPLICATE 04NE29SD207
1605 QA REPLICATE 04NE29SD307
LOCATED 6.5 FT FROM LATHE ~~A~~ TO SHORE, 63 FT FROM 04NE29SD106 LATHE TO SAMPLE LOCATION. BROWN / BLACK SILT / F. SAND WITH ~20% DECOMPOSING ORGANICS. COLLECTED 4oz + MeOH AND

Julie Cleaner 9-4-04

9-4-04 DACA85-03-D-003-T.O.6

2 × 8oz. FOR EACH.

APPROX. 300 FT. DOWNSTREAM FROM LAST SAMPLE LOCATION

1645 COLLECT 04NE29SD108, 51.5 FT FROM LATH. 2×8oz. 4oz + MeOH. SEDIMENT SIMILAR TO LAST SAMPLE.
1700 SAMPLE 04NE29SD109, 100 FT. FROM LATH ON BANK (FURTHER OUT IN RIVER). THIS MATERIAL SANDIER (RM) THAN OTHER SAMPLES TODAY. 63 FT FROM LATH ON NE SIDE OF RIVER.

1745 COLLECT RINSATE SAMPLE FROM ECKMAN DREDGE: POUR DI WATER OVER DREDGE INTO CLEANED BUCKET.
04NE29SQ201

Julie Cleaner 9-4-04

2004 NE CAPE

9-5-04 DACA85-03-D-003 T.O.6

50°F CLOUDY, RAIN OVERNIGHT

0930 SAFETY MEETING

PLAN TO SAMPLE MONITORING WELLS, DEVELOP NEW WELLS.

MOB.

1230 AT WELL 10-1 AT SITE 11. PURGE AND SAMPLE WITH GRUNDFOS.

1350 START SAMPLE 04NE11GW101

1353 FLOW STOPPED - WELL DRY. SHUT OFF PUMP.

LT. RAIN.

PHOTO 2 EXPOSED SCREEN, JACKED MONUMENT OF MW 10-4.

PHOTO 3 SOIL CAVING IN AT BASE OF MW 10-1.

COMPLETE COLLECTING SAMPLE 04NE11GW101. MEASURE TURBIDY. DISPLAY OF HACH DR/850 NOT WORKING - CANNOT MEASURE FERROUS IRON. ALKALINITY = 15 mg/L

Julie Clemer 9-5-04

9-5-04 DACA85-03-D-003 T.O.6

NOT ENOUGH WATER IN WELL TO FILL FLOW-THROUGH CELL TO MEASURE PARAMETERS AFTER SAMPLING.

MEASURE WATER LEVEL IN MW 11-3

1018 ~~COLLECT~~ MEASURE FINAL WATER QUALITY PARAMETERS AT MW10-1.

PURGE AND SAMPLE MW 11-3:

1725 04NE11GW102. SL. DIESEL ODOR IN WATER

1740 PHOTO 4 MW10-1 AND 10-4.

SHELLY MARKED APPROX LOCATION OF 88-7 (MW). DUG IN AREA BUT COULD NOT LOCATE.

LABEL SAMPLES. PACK COOLERS 1900-0200

Julie 9-5-04

9-6-04 MONDAY 2004 NE CAPE

1030 HELP BEN AND RANDY PACK COOLERS.

50°F WINDY, CLOUDY, OCCASIONAL LT. RAIN.

1500 SHIP 6 COOLERS (INCL. 1 TO NCA) ON BERING AIR

MOB. FOR SAMPLING MONITORING WELLS.

1640 AT MW88-1 WITH RANDY. PURGE WITH GRUNDFOS. START PUMPING 1715. COLLECT FIELD PARAMETERS. WATER CLEAR.

1742 WELL DRY. SHUT OFF PUMP.

1745 AT MW 88-10. TOP OF CASING EXPOSED/OPEN. MONUMENT CRUSHED. SOIL LIKELY HAS ENTERED. PUT PLUG ON CASING, REMOVED SURROUNDING SOIL.

1755 PHOTO 5. MW 88-10, WITH SURROUNDING SOIL REMOVED.

Julie - 9-6-04

9-6-04 DACA 85-03-D-003 T.O. 6

PHOTO 6:

1820 REMNANTS OF 88-9

G. WATER HAS RECHARGED IN MW88-1.

1830 COLLECT SAMPLE 04NE88GW101 FROM MW88-1. DRO/RRO, GRO/BTEX, Cr, Pb, Zn, Hg.

Julie 9-6-04

NE CAPE 2004

9-7-04 DACA 85-03-D-003 T.O.6

TUESDAY

PARTLY CLOUDY CALM ~~50°F~~ 60°F

SAFETY MEETING

MOB TO CONTINUE MW SAMPLING

CALIBRATE YSI FOR COND, 2PT. PH.

1130 AT MW 88-2 WITH RANDY

PHOTO 7 MONUMENT OF 88-2

PURGE AND SAMPLE MW88-2

1230 04NE88GW102 FOR GRO/BTEX, DRO/RRO, 4 METALS, PAH, N.A. PARAMS.

1310 AT MW88-3. PUMPED DRY WHILE PURGING. LET RECHARGE. ABLE TO PUMP ~1/2 GALLON BEFORE WELL DRY. PUMPED DRY 3 TIMES

1530 17MW-1 : DTW = 9.59 FT BTOC.

DEVELOP WITH "GEOSQUIRT" SUBM. PUMP.

DEPTH OF WELL BTOC = 17.1 FT.

1542-1555 PUMP ~1/3 55 GALLON DRUM

Julie

9-7-04

9-7-04 DACA 85-03-D-003

1615 SAMPLE 88MW-3: 04NE88GW103 FOR GRO/BTEX, DRO/RRO, 4 METALS.

1730 AT 22MW-3 : GW AT 32.

DEPTH OF WELL = 38'

22MW2 DTW = 27.87 FT BTOC

DEPTH OF WELL = 34.57 FT BTOC.

CORD ON "GEOSQUIRT" NOT LONG ENOUGH TO DEVELOP THESE WELLS. USE GRUNDFOS.

PACK COOLER OF WATER SAMPLES

Julie

9-7-04

9-8-04 2004 NE CAPE.
50°F LT. RAIN, CLOUDY

0930 SAFETY MEETING
BEN TO START BACKGROUND
SAMPLING. RANDY AND I TO CONTINUE
MON. WELL DEV. AND SAMPLING.
SHELLY MAY FINISH SURVEYING
TODAY.

1030 AT SITE 88, SETUP ON MW88-4
CALIBRATE YSI: CONDUCTIVITY AND
2 PT. pH. RANDY CALIBRATED TURBIDITY
METER. PURGED >5 GALLONS. WATER HAS
WEATHERED DIESEL ODOR

1125 SAMPLE 04NE88GW104
1130 DUPLICATE 04NE88GW204
1135 TRIPLICATE 04NE88GW304
FOR GRO/BTEX, DRO/RRO, 4 METALS.
MS/MSD FOR METALS ON 04NE88GW104.

1220 AT MW 88-5. PURGE AND SAMPLE
04NE88GW105 FOR GRO/~~RRO~~ BTEX, DRO/
RRO, 4 METALS, N.A.P.
SLIGHT SHEEN ON WATER, HC ODOR

Julie 9-8-04

9-8-04 DACA 85-03-D-003 T.O. 6

1530 SURVEYOR LEFT, SHIPPED 1 COOLER
WATER SAMPLES ON BERING AIR.

1700 BACK AT SITE 88. INTERMITTENT RAIN.

1720 AT MW88-6. PURGE AND SAMPLE
1835 04NE88GW106. HC ODOR

1900 18MW1. GW AT 19.61 FT. BTOC.

9-8-04

9-9-04 2004 NE CAPE

CLOUDY. INTERMITTENT RAIN, 50's
MOB to SAMPLE MWS, BEN COLLECTING
BACKGD. SAMPLES

1230 AT MW88-8. DTW = 12.01 FT.
TOTAL DEPTH = 18.61 FT. PURGE AND
SAMPLE 04NE88GW107 AT 1330.
HC ODOR. GRO/BTEX, DRO/RRO, 4
METALS, PAH. N.A. PARAMETERS.

1500 COLLECT RINSATE FROM GRUNDFOS:
04NE88WQ202 FOR GRO/BTEX,
DRO/RRO PAH, 4METALS. BY

MW 16-1. DTW = 15.73 FT BTOC
TOTAL DEPTH ~ 16.7 FT. BTOC.
~1 FT. WATER IN WELL.

MW 16-2 DTW = 15.48 FT BTOC
TOTAL DEPTH = 16.65 FT. ~1.1 FT WATER

MW 16-3 DTW = 15.81 FT
TOTAL DEPTH = 16.61 FT. 0.8 FT WATER

9-9-04

9-9-04 DACA85-03-D-003 T.O.C

1600 AT 17MW-1 DTW = 9.63 FT
TOTAL DEPTH = 17.1 FEET BTOC
SET PUMP AT 13 FT. PURGE
COLLECT SAMPLE 04NE88GW108
(SHOULD BE 04NE17GW104 ??) → YES
CORRECTED LABELS
1745 AT CAMP. RANDY LEFT TO
DEVELOP A WELL.
PACK COOLERS.

9-9-04

9-10-04 2004 NE CAPE

PTLY. CDY. 60'S LT. BREEZE

SAFETY MEETING

MOB FOR BACKGD. SAMPLING WITH BEN.

DROVE ATVS SE OF STUDY AREA. ALONG BEACH AND UP SMALL RIVER.

AT DRY STREAM CHANNEL ~6 FT WIDE WITH TUNDRA ~1 to 3FT HIGHER IN AREA. SOUTH-FACING SLOPE NEAR LOW MOUNTAINS.

13 04NEBGSS107 AT 0.2 to 0.3FT BGS, MOIST, LOOSE BROWN SL. SILTY. SAND(F-M) AND ORGANICS, LOAMY.

PHOTO 7 = 04NEBGSS 107

PHOTO 8 = ~~ERIC~~ BEN COLLECTING SAMPLE 04NEBGSS 108 FROM DRY CHANNEL

COLLECTED ADDITIONAL BACKGROUND SURFACE WATER, SEDIMENT, SOIL, AND SOIL DENSITY SAMPLES. BEN PERFORMED BALLOON ~~DENSI~~ VOLUMETER TESTING.

9-10-04

9-10-04 DACA 85-03-D-003

1640 PHOTO 9 - BEN COLLECTING SURFACE WATER SAMPLE 04NEBGSW09 FROM SMALL STREAM INCISED IN TUNDRA.

04NEBGSD109 MOIST TO WET DARK BROWN SAND~~Y~~ (F) SILT TYPICAL OF NEAR-PERMAFROST TUNDRA

~ 1800 ASSIST RANDY IN SAMPLING 18MW1:

1835 04NE18GW104.

RANDY DEVELOPED 20MW1, MW88-10. PACK COOLERS

TOMORROW → SAMPLE 20MW1, MW88-10. SITE 16 WELLS? DEVELOP REMAINING WELLS. PLAN TO SHIP SAMPLES ON SUNDAY.

9/10/04

9-11-04 2004 NE CAPE

SAFETY MEETING 50°F WINDY, CLDY.

1000 AT 20MW-1 PURGE AND

1105 SAMPLE 04NE20GW104 FOR GRO/BTEX, DRO/RRO, 4METALS, N.A. PARAMETERS.

1145 AT MW88-10. RANDY HAD DEVELOPED BY BAILING ~4 GALLONS WATER FROM IT YESTERDAY. PURGE AND

1300 SAMPLE ~~AT~~ 04NE88GW108 FOR GRO/~~BTEX~~ DRO/RRO, 4METALS, N.A.P.

1340 AT 22MW3. DEVELOP WITH GRUNDFOS. PUMP ~~X~~ ABOUT 55GALLONS. WATER INITIALLY VERY SILTY, THEN SLIGHTLY SILTY.

HELPED RANDY WITH GRANULAR ACTIVATED CARBON (GAC) SYSTEM

BACK TO 22MW3. DEVELOP ~ 80 GALLONS TOTAL

1600 AT 22MW2 28.1 FT BTOC WATER. DEVELOP WITH GEOSQUIRT. WATER MODERATELY TURBID → NEARLY CLEAR. PUMPED ~25 GALLONS.

9-11-04

9-11-04 DACA85-03-D-003

1630 PURGE 22MW-3

1705 COLLECT SAMPLE 04NE22GW114. FOR GRO, DRO/RRO, N.A. PARAMETERS

1745 PURGE 22MW-2. COLLECT

1845 SAMPLE 04NE22GW115 FOR GRO, DRO/RRO, NA. PARAMETERS

RETURN TO CAMP

SAMPLE HANDLING.

9-11-04

9-12-04 2004 NE CAPE
50'S PTLY CDY, OCCASIONAL SHOWERS
0630 START PACKING COOLERS

0930 SAFETY MEETING

PACK COOLERS. TIM (AMEC) ARRIVED ON BERING AIR. SHIPPED 6 COOLERS

MOB FOR DEVELOPING AND SAMPLING 26MW1.

1600 AT 26MW-1 ~~WELL DEPTH = 38 FT~~
DTW = 36.24 FT ~~→ 1.26 FT WATER IN WELL~~. MEASURE WELL DEPTH: 41.9 FT BTOC → 5.16 FT OF WATER IN WELL, OR 0.8 GALLONS. SET GRUNDFOS PUMP NEAR BOTTOM OF WELL TO DEVELOP.
PUMP 1643 TO 1725. WATER MODERATELY TURBID/SILTY. CLEARED UP SLIGHTLY. TURN UP PUMP SPEED. PUMP TOTAL OF 1 2/3 × 55 GALLON DRUMS OF WATER FROM 26MW-1. WATER NOW NEARLY CLEAR.

DEVELOP AND COLLECT SAMPLES:
9-12-04

9-12-04 DACA 85-03-D-003 T.O.6
1805 04NE26GW102
1810 04NE26GW202, DUPLICATE
1815 04NE26GW302, REPLICATE.
FOR GRO/BTEX, DRO/RRO, PAH, ALSO MS/MSD FOR GRO/BTEX AND DRO/RRO, AND NATURAL ATTENUATION PARAMETERS ON SAMPLE 04NE26GW102.

1830 FINISH SAMPLING.

MOVE TO SITE 13 FOR PCB SOIL SAMPLING. NEAR SURVEYOR'S MARKED LOCATION OF PREVIOUS SAMPLE LOCATION "13SS802".

1920 SAMPLE 04NE13SS132
1925 DUPLICATE 04NE13SS232
1930 TRIPLICATE 04NE13SS332
AT 1.0 to 1.1 FT BGS AT 5.1 FT ~NORTH FROM 13SS802 LOCATION: ~~LOOSE~~ LOOSE ROUNDED GRAVELLY (C) SAND (M). MOIST, OVER DENSE SILTY ANGULAR (F) GRAVEL, TRACE ~~WE~~
9-12-04

9-12-04 2004 NECAPE
SM. PCS. WOOD

1940 SAMPLE 04NE13SS133 AT 1.0 TO 1.1 FT BGS. 7FT ~ NW FROM 13SS802.

1955 SAMPLE 04NE13SS134 AT 1.0 to 1.1 FT BGS 7FT ~ W OF 13SS802.
THREE SAMPLE LOCATIONS HAD SAME TYPE SOIL
RANDY WAS NOT ABLE TO GET SUFFICIENT AMOUNT OF WATER FROM SITE 16 MWS TO PURGE OR SAMPLE, THEREFORE DUPLICATE AND REPLICATE SAMPLES FROM 26MW1 ARE NOT NEEDED.

Julie 9.12.04

9-13-04 DACA85-03-D-003

50°S, PARTLY CLOUDY.
PLAN TO DUMP UNNEEDED WATER SAMPLES FROM 26MW1 INTO DRUM TO BE TREATED, AND
FINISH COLLECTING PCB SOIL SAMPLES AT SITE 13, SITE 7.

BENTO FINISH BACKGROUND SAMPLING.
TIM AND ERIC BREAKING DOWN CAMP.

→ POUR UNNEEDED 26MW-1 WATER SAMPLES INTO DRUM.
PACK UP YSIMETER, ETC.
PACK PERSONAL GEAR.

AT MONITORING WELL 26MW1, WE WILL HAVE ANALYZED SAMPLE 04NE26GW102 FOR GRO/BTEX, DRO/RRO, PAH, NATURAL ATTENUATION PARAMETERS. DUPLICATE AND TRIPLICATE SAMPLES FOR PAH ONLY.

Julie 9.13.04

9-13-04 2004 NE CAPE

MEASURING [illegible] ELEVATIONS IN WELLS

TIME	WELL	DEPTH TO WATER (FT) BTOC	
[illegible]	26MW03	5.82	
1405	26MW1	3 10.15 ~~[illegible]~~.84	
1410	22MW3	32.08	
1420	22MW2	28.26	INSTALLED ~~[illegible]~~ PADLOCK
1425	18MW1	19.85	
14[illegible]	20MW[illegible]	22.76	NEEDS LOCK
[illegible]	88MW10	20.55	+ ~~[illegible]~~
[illegible]	88MW1	16.28	
[illegible]	88MW3	11.82	
[illegible]	11-3	9.80	
1508	10-1	9.27	
152[illegible]	88MW2	7.81	
1528	88MW4	7.71	
1537	88MW5	7.49	} SHEEN ON WATER
1543	88MW6	8.25	
1550	88MW8	12.21	
1555	16MW1	15.88	
1558	16MW2	15.63	
1601	16MW3	15.97	
1605	17MW1	9.81	

9-13-04

T.O.C

9-13-04 DACA85-03-D-0003

AT SITE 7 WITH RANDY TO COLLECT PCB SOIL SAMPLES

1745 COLLECT 04NE07SS113 AT 0.8 TO 0.9 FT BGS MOIST BROWN SL. GRAVELLY (F) SILT, TRACE ORGANICS (ROOTS) AND SM. PCS. DEBRIS

10.0' NNE of surveyed 01NE07SS127

17.7' NE of 04NE07SS101 (surveyed)

17:55 Collect 04NE07SS114; 0.7-0.9' bgs Lt. brown, dense sandy, gravelly silt; moist - angular gravel.

26' SE of 04NE07SS~~113~~ 101 (surveyed)

15.5 E of surveyed 01NE07SS127

18' S. of 04NE07SS113.

18:09 Collect 04NE07SS115; 0.8' bgs Lt. brown, dense sandy, gravelly silt; moist; angular gravel

13' SE of surveyed 01NE07SS127

18' E of 04NE07SS101 (surveyed)

9-13-04

9-13-04 2004 NECAPE

1810 AT SITE 6 TO MEASURE GW LEVELS
IN WELL POINTS

1815 04NE06WP7 WATER AT 9.59
FT BTOC

1817 06WP6 WATER AT 10.00 FT
BTOC

1820 06WP5 WATER 8.03FT BTOC

1825 06WP3 WATER AT 7.80 FT BTOC

PACK EQUIPMENT/GEAR
CAMP TEAR DOWN.
START SAMPLE PACKING

9-13-04

9-14-04 DACA 85-03-D-003 T.O.6

50'S WINDY, OCCASIONAL RAIN, CLOUDY

FINISH CAMP TEAR DOWN,
SAMPLE PACKING

PALLETS ONTO DC-6, INCL. 2
4WHEELERS.
ON BERING AIR CHARTER (NAVAJO):
RANDY, BEN, JULIE, ERIC, TIM. TO
NOME.
LEFT DRILL RIG AND PICKUP
TRUCK AT SITE FOR TRANSPORT LATER

9-14-04

9-15-04 2004 NECAPE

NOME.

TRY TO GET ON ALASKA AIRLINES STANDBY.

RANDY TOOK BERING AIR BACK TO ~~DEE~~ NE CAPE TO MEET HERC. AND LOAD UP DRILL RIG.

BEN AND I CHARTER CAPE SMYTHE AIR (WITH SEVERAL OTHER PEOPLE) TO FLY US TO ANCHORAGE.

9-15-04

9-16-04 2004 NE CAPE

ANCH. ARRIVE ~0200.

1130 - AK AIRLINES TO FAIRBANKS.

9-16-04

END OF FIELD NOTES FOR
DACA 85-03-D-003
T.O. 6

CONTENTS

PAGE	REFERENCE	DATE
	Emergency Phone #s	
	AK Air Force rescue Coord. Ctr.	
	1-800-420-7230	
	or 1-907-428-7230	
	Bering Air: 1-907-443-5464	
	Nome Hospital: 1-907-443-3311	

"Rite in the Rain"®

ALL-WEATHER WRITING PAPER

ALL-WEATHER

HORIZONTAL LINE BOOK

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Project Phase IV RI, NE Cape

St. Lawrence Island AK

Job 32-1-16821-003

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8/12/04 Sample 04 NE 29SW $\overset{1}{\underset{3}{2}}$ 01'

Down-gradient Surface H_2O from Sugitughaeq River

Example format:

11:47 04NE29 101 Surface H_2O 2.5' bgs, ≈42' down stream from airport bridge
2 x 1 l HCl - DRO/RRO, 2x1l PAH, 2x 1l PCB, 3x VOA HCl-AK101, 3x VOA HCl - BTEX 8260, Dipped from Sugi river w/job jar

11:52 04NE29 201 QC dup of 29101

11:57 04NE29301 QA replicate of 29101

25' downstream (N) of bridge.
Lat: 63° 19' 35.6" N
Long: 168° 57' 56.3" W

8/12/04
1300 04NE 29SW101 Surface H2O,
25' downstream (N) from airport bridge
2x 1L HCl: DRO/RRO
2x 1L: PAH
2x 1L: PCB
3x VOA HCl: AK101
3x VOA HCl: BTEX -8260
Dipped from Sugi river w/ job jar.

1310 04NE29SW201 QC dup of 29SW101

1320 04NE29SW301 QA rep of 29SW101

- - - - - - - - - - -

Stream running clear, lots of algae on surfaces- mats w/ some Iron discoloration. Cool, light mist. No sheen/odor noted. Places surveying stake on bank next to sampling location.

8/14/04 1700
04NE29SW102
Deep, swiftly flowing channel, vegitated sides, just below mixing zone of Sugi & Main Ops drainage basin

Lat: 63° 19' 01.1" N
Long: 168° 57' 33.7" W

Weather: overcast, rainy & wind previous 24 H - water flowing high

8/15/04 12:00

04NE29SW103

sampling Sugi R. ~300m downstream from lake, just above log bridging channel

Clear, flowing H_2O, grass & algae growth windy foggy/overcast/drizzle weather

lat: 63°18'50.8" N
long: 168°56'27.1" W

Pics: Sampling site w/lake
Sampling site w/landfill

Sampling location upstream of flow path from obvious landfill; however, other H_2O may flow from landfill to Sugi. There are other mounds that ~~look~~ look like landfill mound.

BA

1634 04NE ~~07~~ 08 SW101

Photo looking N from bank of Sugi, inc. spring sampled, boggy areas where sediment collected for pipeline spill sampling

Spring at 63°18'58.8" N
168°57'12.3" W

waypoint 004

Weather: blue sucker hole overhead, clouds up to ~1000', breezy, cool

Sampled spring b/c seems to drain basin, very slight sheen observed when disturbed sediment.

BH

08

1654 04NE ~~07~~ SD102

Sheen & odor - not sure if only
boggy or hint of H.C.
Saturated ground, rocky under,
lots of roots 6" BGS
Headspace: 4.2ppm
lat: 63° 18' 59.3" N
long: 168° 57' 11.5" W
Waypoint 005

08 BH

1712 04NE ~~07~~ SD 103 8"-10" BGS
sheen upon digging, fuel odor

lat: 63° 18' 59.7" N
long: 168° 57' 10.7" W
Waypt 006 Headspace: 5.3ppm

08 BH

1717 04 NE ~~07~~ SD 203 QC dup of
07SD103

~~08~~ BH

1722 04 NE ~~07~~ SD 303 QA Rep of
07SD 103

4/16

1620 replaced markers
mislabelled yesterday.
Sheen around 04NE08 SW101
much more apparent - perhaps
from yesterday's activities?

1632 Poking around site 7
SS125, 126 still flagged,
lots of barrells among exposed
waste.
Hand digging seems doable,
but 4' may be in to
trash.
Some sections covered? Observed
exposed plastic, geotextile.

Saw many barrels, Machinery
(inc. engines), batteries, household,
electrical...

Saw WP 7-3 on N side of
landfill

1800 Site 3: found 2 WP's
Eugene said previous company
BH ~~(Bristol?)~~ had dug down to
permafrost to drive in, showed
where pipeline was, said it was
metal painted yellow. Mentioned
diesel smell when pump house
had been dug around a few
years ago.

8/18/04 14:09 Site 3

Pic of rig setting up for boring
on S side of pile
2nd Pic (same as above) includes
01NE03WP102 in background

04NE03SB02
lat: 63°19' 40.5" N
long: 168°55' 44.5" W
Waypoint 3SB02

1721 04NE03 WP05
lat: 63° 19' 39.7" N
long: 168° 55' 45.8" W
Waypoint 3WP05

04 NE03 WP06
lat: 63° 19' 42.0" N
long: 168° 55' 41.8" W
Waypoint 3WP06

1442 pic of ice core of 03B153

3/19 14:25 Mob to site 6,
drillers, decon equip (White pic)

~~06B4~~ 06B2
Lat: 63°19' 12.9" N
Long: 168° 56' 22.4" W
Waypoint 06B2

1500 went to site 3 to cap
well points, empty 03B3S3 head-
space sample to boring area

1515 sheen (HC) observed where
wheels dug in near
035B03

1530 back to site 6, Randy getting
DTW for 01NE06WP103

Lat: 63°19' 13.6"
Long: 168° 56' 26.0"
Waypoint: 06 WP103

3/20 10:40 Mob to site 6, drop
trailer @ site 7 on way.
Labelled 06B2 w/ lathe,
GPS for other boring pts:

Pic of 06B2 looking NW (stain in back)
Pic of 06B2 looking SE -
mtns in background

06B3
Lat: 63°19'12.5" N
Long: 168° 56' 24.2" W
Waypoint 6B3

06B4
Lat: 63° 19' 12.9" N
Long: 168° 56' 25.4" W
Waypoint 6B4

11:00 Randy & I to site 7
11:52 after inspection, questions. Randy
calls office, Corps
-sample in fill/debris?
-heavy equip over 0155127

07SS127 approx location -
cleared last year?
lat 63°19'05.1" N
long 168° 56' 31.4" W
waypt: 7SS127

#14 Randy gets pic of me w/ GPS
looking SE, mts in bkgrd

#13 Pic of heavy equip. tracks

#12 Pic of debris Pile / "cut bank"
me on top, looking NW

#11 Pic of 125 07SS125 B4
lat 63° 19' 04.1" N
long 168° 56' 32.6" W
wapt 7SS125

#10 Pic showing base tundra to
top of slope w/ me GPSing

1604 Site 3 developing WP,
doing sed samples

04NE03SD107
lat 63° 19' 41.4" N
long 168° 55' 41.0" W
wp: 3SD107

04NE03SD108
lat 63° 19' 39.5" N
long 168° 55' 44.0" W
wp. 3SD108

pic #9 looking SW @ 3SD107
up drainage, mtns in back

pic # 8 looking N @ 3SD107
ocean in back

pic #7 looking NW @ 3SD108
Randy sampling, Pump bldg area
in back, seasonal homes
pic #6 looking N @ 3SD108
down drainage, pump bldg area in
back

8/21 10:15 @ site 3, developing
3WP05 & 3WP06
hazy sky, moist & dewy, but
looks like it will be another
nice day

11:00 returned 03SD108 & 03SD107.
headspace samples to collection
point.

11:27 DTW @ 03WP6 is 7.1 -
still not recharged. abandon?

13:24 Pic #5 heavy equip
scooped area ~25' NE of
03WP6 - stain at bottom has
HC odor. Seasonal dwellings
in bkground, looking W/SW

13:15 Driving new WP b/c 03WP6 is
not recharging. Drive head mushroomed
so drove to depth = 03WP6, will
develop tomorrow.

14:40 got saw, etc. finished
installation of new WP -
has water ☺!

16:13 developing new WP -
looks like 1hr to recharge
NOTE HC ODOR in purge
bucket

16:32 smoke came in thick
- to site 6 for GPS:

06B5
Lat: 63°19'13.6"
Long 168°56'26.8"
Waypt: 6B5

06B6
Lat: 63°19'14.0" N
Long 168°56'26.5" W
Waypt: 6B6

06B1
Lat: 63° 19' 14.4" N
Long: 168° 56' 24.4" W
Waypt: 6B1

After 93 development,

1754 Site 6 – More GPS in'

06 WP5
Lat: 63°19'14.6"N
Long: 168°56'25.8"W
WP: 6WP5

06 WP6
Lat: 63°19'13.8"N
Long: 168°56'27.0"W
WP 6WP6

06 WP7
Lat: 63°19'13.3"N
Long: 168°56'27.1"W
WP 6WP7

Measured DTW on WP5 @ 10'
decided to set them deeper.

gal/1' of 1.25" casing: 0.064

8/22 14:44

~~1.25~~
~~x 2~~
~~2.50~~
x

Circ, not area

2πr = πD = 3.14
~~.75~~
x 1.25
1570
6280
31400
3.9250

3.925
x 12
7850
39250
47.100

47.1 in³ $\left(\frac{0.0043\ g}{in^3}\right)$
=

0.0043
x 47.1
0043
3010
17200
.20253

πr² = .5625
.75
x 3.14
22500
56230
1687500
1766250

x .75
375
5250
.5625

1.76625
12
353250
176250
21.19500

21.195
.0043
63585
~~84780~~ 84780
~~.0911365~~
.0148365

whoops.
right
hmm...

1607
03 WP2 DTW: 3.94'
Casing top to ground: 3.6'
Total depth: 6.12'

1023
03 WP3 DTW: 3.11'
Casing - Ground: 2.93'
Total depth: 6.09'

1853 **Site 6**
06 WP7 DTW: 8.13'
Total depth: 9.76'

1859 **06 WP6K** ? DTW: 4.94'

1903 **06WP5** DTW: 7.06'

8/23
1530 @ site 6 for well development
start @ 06WP7
smoke clearing, can see mountains

1725 @ site 3; finished 1 well vol from each new w.P. @ 6, will return rejected soil samples, set params on last w.p. here.

1854 **26MW3**
Lat: 63° 18' 54.2" N
Long: 168° 57' 17.1" W
WP: 26MW3

1859 **10B1**
Lat: 63° 18' 44.8" N
Long: 168° 57' 26.5" W
WP: 10B1

10B2
Lat: 63° 18' 43.7" N
Long: 168° 57' 27.5" W
WP: 10B2

4/24 10:21 Today's goal: Develop/purge 3 WPs at site 6, Sampling @ site 3. Foggy, lt. breeze, cool (low 50's?) Start @ 06 WP 5.

11:16 04NE03WP05 sampling
just set up, still same weather.
hope to get few voas for now
very low flow rate, sampling in screened area (not point)
DTW: 3.13

1135 Got all 6 Voas! try 1L.

11:47 Got 1L unpreserved, per pump @ 1/4 on, seem to have more bubbles, so will let recharge & go to next WP.

1157 03 WP103
Fog's lifted a bit, but otherwise same weather.
DTW 3.10

12:04 start voas.
1219 finish voas - lots of trouble w/getting bubbles out
1220 start 1L
12:30 finish, no air sucked, will try another
1234 start
1237 wp dry at a little > 1/4 L

Site 3

	6 VoA	1L	1L	1L HcL	1L HCL
WP 5	✓	✓	✓	✓	✓
WP 3	✓	✓	✓	✓	✓
WP 6	✓	✓	✓	✓	✓
WP 2	✓	✓	✓	✓	✓

1428 Overcast, little warmer, breezy
@ 03WP06

DTW: 2.75' foam on probe when brought up.

1433 ~~start~~ voas
1441 Finish, start 1L HCL
1452 1L HCL done
1453 start 1L HCL
1501 done
1506 start 1L
1511 little less than ½ full, well dry

1535 03WP2
DTW: 5.06 (!)
1538 Start voas
1549 finish voas, well dry.

1604 back at site 6 for more development.

Site 6

	Develop	2	3	Purge	2
WP5	✓	✓	✓	✓	✓
WP6	✓	✓	✓	✓	✓
WP7	✓	✓	✓	✓	✓
WP	–	–	–	✓	✓

1724 03 WP05
DTW 3.13

1732 start 1L HcL
1740 done, to next wp.

1824 0306
DTW: 2,81' ← tidal?

1829 start 1L (finishing partially filled one)

1834 done start 1L
1844 done - 03WP06 samples have strong HC odor

1849 03WP03
DTW. 3.11

1857 start. 1L HCL
1905 done
1909 start finishing previous 1L
1911 got up to ~½, well dry

8/25
10:00 03WP102 DTW: 5.79'
Not yet recovered, not sampled

10:12 03WP103 DTW: 3.13'

10:16 start 1L HCL
10:25 done
10:27 add to previous ½ full 1L
10:28 Stop - not much H_2O left in well, will just do full 1L this p.m.

10:37 03WP05 DTW: 3.18'

10 40 Start 1L HCL
10 48 finish

10 51 noted apparent biogenic sheen in small amount of H_2O in bucket - from 0305?

1312 Setting up to develop 261MW3 w/Ready, using Grundfos.

1721 03 WP05 DTW: 3,15

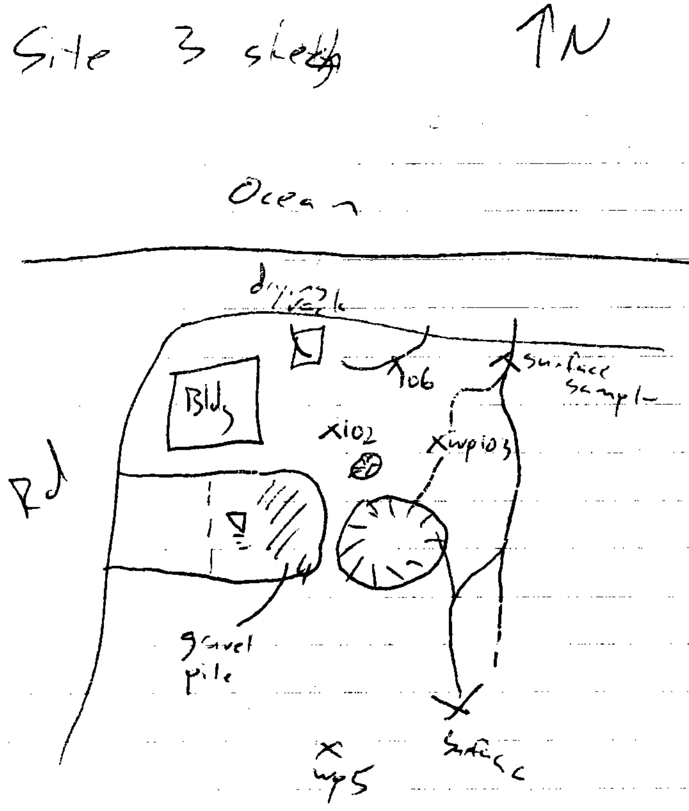
1724 Start 1L
1730 done

1743 03wp103 DTW: 3.08

1745 Start 1L
1754 done

1756 sheen observed, apparently HC, in 03 03 partially filled sample poured in purge H_2O

Site 3 sketch



lines are possible drainages, surface H_2O near wp103 not clearly to wp106

8/26

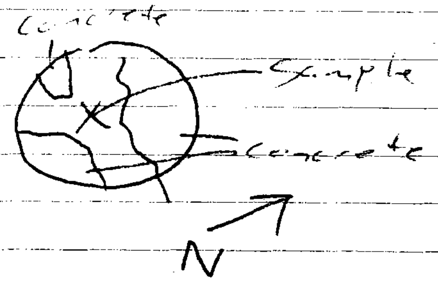
15:55 03WP2 DTW 5.43'
not sampled

16:18 06WP6 DTW 6.70'
not drawn down

1621 06WP7 DTW 8.78'

8/27/04

10 30 A • 04NE13SS106
when digging, hit gray-painted concrete slab at ~ 8" bgs. has 2 large cracks, so can sample:



1420 04NE13SS 105 deep
hit rebar concrete chunks
~~at 2.5' dug around~~ JB 7/2
at ~2.3'

1130 04NE13SS115
soft, loose sand. Observe
moist stain at ~ 0.5' bgs
stop digging to sample.

1440 04NE1335S117 observe moist/stain similar to 1335 115. Dig past into harder area below

1540 04NE1335S115 sampled 0.65' bgs. Sample taken from clearly stained area (stain not apparent on surface), sand,

1551 1335S116 sampled 0.95' bgs harder soil than 115 some roots observed

1605 1335S117 sampled 1.15' bgs

1627 1335 118 sampled 1' bgs

1634 1335 119 sampled 1.1' bgs

8/25

10:13 on-site, unpacking for

~~22 MW2~~

~~Lat 63° 18' 38.3" N~~ 03

~~Lon 168° 7' 43.1" W~~

~~WP: 22 MW2~~

Good weather, warm, sunny, calm; but front obvious coming in from south.

Goal: install MW to 45', sampling @ 5' intervals.

5/29

9:40 A <u>22MW2</u>

Joe had blown out hole on arrival, called ∇ at 25' for yesterday.

DTW: 33.36' − 4'

Bottom of hole: 43.6' − 4'

13:20 **17MW1** setting up

Goal: well set to 10' below good water sampling every 5' max 30', with sample at bottom Natl atten. from 1st sample also grain size if possible.

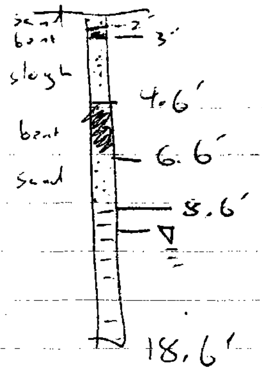
Dupe/trip.

15:03 DTW: 13.6' − 4'

Bottom of hole: 27.16 − 4'

measured to top of casing

Sand: want well bottom @ 18.6



1630: More GPS in' !

19B1

Lat 63° 18' 42.7" N

Long 168° 57' 38.4" W

WP: 19B1

20MW1

Lat 63° 18' 40.5" N

Long 168° 57' 40.5" W

WP: 20 MW1

22MW3

Lat 63° 18' 37.4" N

Long 168° 57' 40.9" W

WP 22MW3

22MW2

Lat 63° 18' 37.9" N

Long 168° 57' 43.3" W

WP: 22MW2

22B1

Lat 63° 18' 38,2" N

Long 168° 57' 43,5" W

WP 22B1

18MW1

Lat 63° 18' 39.9" N

Long 168° 57' 49.0" W

WP 18MW1

17MW1

Lat 63° 18' 43.5" N

Long 168° 57' 52.5" W

WP 17MW1

13B1

Lat 63° 18' 44,7" N

Long 168° 57' 45.5" W

WP 13B1

MW 88-5

Lat 63° 18' 44.9" N

Long 168° 57' 40.7" W

WP: MW885

MW 88-6

Lat 63° 18' 44.7" N

Long 168° 57' 42.4" W

WP MW886

MW 88-8

Lat 63° 18' 43.9" N

Long 168° 57' 43.6" W

WP: MW888

8/30/07

12:04 @ site 3 to drive WP 2 deeper, so screen not above surface, more water

Before: Monument stickup: 3.97'
DTW: 5.00'

After: Monument stickup: 2.20'
DTW: 4.82'

16:55 03WP2
DTW: 4.13
Total well depth: 6.13
pumped dry - very turbid
H_2O, no odor noted, sheen
- possibly from bucket
~1/2 L.

8/31/07

9:05 03WP2
DTW: 4.18'
pumped dry 9:14
much less turbid. will attempt sample this afternoon.

1052 04NE31 SS 111
1.2' bgs
~~04 NE~~

1058 04NE31 SS 114
0.9' bgs

11:19 pic - Randy #4 -
tar from embankment below
04NE31 SS 110 boot for scale

pic #3: pic of tar w/ shovels at SS110 in background

1441 <u>04NE31SS110</u>
1.65' BGS
headspace 0.7 HNu (PID)

1757 <u>04NE31SS131</u>
2.1' BGS, perhaps into
top of native soil, below
site fill

1846 <u>04NE31 SB134</u>
2.9' BGS

2141 <u>03WP02</u>
DTW: 4.55'
pumped dry

9/1/04
9:27 <u>03WP02</u>
DTW: 4.60'
9:30 Attempt to get 1L
9:35 well dry - obtained ½L

1458 pic Randy / #2
arrangement of 5 sampling
locations around <u>01NE07SS127</u>

2059 <u>03WP02</u>
DTW: 4.73'
2100 Continue 1st L
2106 well dry - <u>just</u> at 1L

9/2/04

1017 03WP2
DTW: 4.59'

1020 begin 1L HCL
1027 well dry: ~½L

1045 redeveloping 06WP6

1945 03WP2
DTW: 5.02'
not sampled.

2033 WP6-3
DTW: 7.66'
Total depth: 9.24'
2043 purged dry 2045
started rust colored, not too turbid
pretty low volume. (~¼L)

9/3/04 · Beautiful, warm, sunny day after wind & rain last night.
Spent AM orienting surveyor to site, now at

1104 03WP2
DTW: 3.78' (!)
brought wrong 1L in back to camp

1122 continue ½ HCL
1129 finish. Well not dry, start another HCL

1132 well dry ~¼L

1227 06WP5
DTW: 7.99

1229 pumped dry 1234 <1L

1241 WP6-3
DTW: 7.73'

9/4/04

2:20 **O3 WP2**
DTW: 3.72'

2:27 continue ½ HCL
2:35 finish 1L HCL

2:37 start 1L unpreserved
2:38 well dry, got <⅛L

9/5/04

12:34 **O3 WP2**
DTW: 3.99'

1242 continue ⅛L U.P
1250 well dry at ~¾L

---

2 ✓s = sent.

Site 6:

	6 VOA	1L	1L	1L HCL	1 HCL	250 mL
WP5	✓✓	✓✓	✓	✓✓	✓	✓✓
WP6 W2	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
WP6-3	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
WP7	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
DUPE	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
TRIP	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓

13:14 **6WP7** DTW: 9.50

1327 start VOAs
1345 finish 18 VOAs

1346 start HCL 1L
1429 finish 6x 1L HCL

1430 start U.P. 1L
1509 finish 6x 1L UP

1511 start U.P. 250 mL
1516 finish 3x 250mL UP

1332 Dupe time
1337 Trip time

6WP6
1528 DTW: 9.76'

1535 Start VoAs
1541 finish

1543 Start 1L HCL
1551 finish 1LHCL

1552 start 1L U.P.
1601 finish; well dry

1609 6WP5 DTW: 8.00'

1612 Start VOAs
1620 finish

1621 start 1L HCL
1626 finish 1LHCL

start 1L U.P.
1629 well dry. Transfer ~$\frac{1}{8}$L
to HCL

1649 WP6-3 DTW: 7.77'

1654 Start VOAs
1700 finish
1701 start 1L HCL
1707 done

1708 start 1L UP
1714 finish

1715 Start 250mL Poly UP
1716 done

1717 start 1 L HCL
1723 finish

1723 start 1 L U.P.
1730 finish

1743 03WP02 DTW: 5.53'

try for last ¼ L:
1746 Done (Yay!)

9/6
11:00 06 WP6 DTW: 9.73

11:02 start 250 mL UP poly
11:04 finish

11:05 start 1L HCL
11:12 finish
11:13 start 1L UP
11:22 finish

1130 06 WP5 DTW: 8,02

1134 start 250 mL UP poly
1136 finish

1136 start 1L UP
1143 finish

1145 continue ⅛ HCL 1L
1148 well dry. Total collected
little > ½ L

9/7
11:52 06WPS DTW 8.02'

11:56 Start 1L UP
12:03 Finish

12:04 continue ½L HCL
12:07 finish

Mb

Background sampling

10 x Tundra Soils 4oz MeOH, 8oz,
GRO, RRO, DRO, TOC grain size bags

10 x Gravel Surface: 4oz MeOH, 8oz,
DRO, RRO, GRO, TOC grain size

10 x sediment: 4oz MeOH, 8oz,
DRO, RRO, GRO, PAH, BTEX, TOC grain size

10 x surface H_2O: 2x1L UP, 2x1L HCL,
DRO, RRO, GRO, PAH, BTEX 6x VOA

So, 5 sets require:
10 x 1L UP
10 x 1L HCL
30 x VOA
15 x 4oz pre-weighed
15 x MeOH
15 x 8 oz
15 x grain size bags

9/18

10:54 @ Background SW 102

Lat: 63°18'45.1" N

Long 169°01'10.6" W

WP: BG102

Overcast, mid 50's light wind from North, Goal: Background surface water, tundra soil, sediment from grassy bank of large lake, Area similar to Suqi basin

11:04 begin <u>04NEBGSW102</u>
6x HCL VOA, 2x 1L HCL, 2x1LUP

11:21 <u>04NEBGSS102</u>
from higher ground near lake
~0.7' bgs

Picture <u>Ben A 24</u>: water body - BGSW102

<u>Ben A 23</u> Eric @ location of BGSS 102, Main ops area in far background

<u>04NE BGSD102</u>

Lat 63° 18' 46.2" N

Long 169°01 16.0" W

WP. BGSD 102

11:58 <u>04NEBGSW103</u>, <u>SD103 SS10</u>

Lat 63°18'49.1" N

Long 169° 01' 26.3" W

WP BGSW 13

13:32 <u>04NEBGSW104</u>, <u>SD104 SS1</u>

Lat Ea: 63°19'09.7" N

Long 169° 01' 06.1" W

WP: BGSW 14

sampled on small river/stream

17:34 04NEBGSW101; SD101
Lat 63° 18' 25.6" N
Long 168° 59' 36.4" W
WP: BGSW11

17:39 04NEBGSW201 dup SD201

17:45 04NEBGSW301 Rep SD301

Above from small lake on shoulder in drainage S of site

1849 04NEBGSS101 SS201
Bulk density stuff: SS301

Zero point: 2.4 ft^3
After soil removed 2.9 ft.^{3}

9/9 11:58 working on 04NEBGXX105
- Drove to beach N of airstrip, around W towards Eugene's place (not site 3) found area with eroded tundra & drainage w/small stream. Will take pic. Beach gravel on surface then clay/silt/fines below for many feet. Gray.

no camera ;) no pic

Water sample location drains from tundra, S of site, may be some hydraulic link to site, hard to guess. trash - plastic detergent & soda bottles - evident below sampling location. Evidence of 4-wheeler & reindeer activity in tundra ~ 100m inland.

12:13 04NEBGSW105 & SD105
Lat 63° 20' 33.1" N
Long 169° 01' 58.4" W
WP: BGSW15

weather: 50°, cloudy/Rainy
sampled from deeper pod in
shallow seep.

SD 105 co-located, from br to gray, ~~brown~~ BK
silty soil w/organics in mid-channel,
not submerged

1315 set up balloon volumeter
at 04NEBGSS105
~dug through ~.3' of moss
to soil; Grassy, berry, typical
unsaturated tundra,

Squeezed H_2O from soil during
~~bulk~~ balloon inflation; standing
H_2O @ bottom of hole after
removing Volumeter for
sampling.

1337 Sample 04NEBGSS105
lat 63° 20' 33.0" N
long 164° 02' 00.5" W
WP BGSS105
BK

1734: 04NEBGSW106
large, quickly flowing stream
from drainage W of site
sunny, intermitted clouds, observed
salmon spawning sampled from
middle of stream, sediment
17:45 04NEBGSD106 from E
bank

Lat 63° 18' 16.7" N
Long 168° 51' 35.0" W
WP: BGSW16

1820 04NEBGSS106

from sandy floodplain over
grown w/tundra. Br, gravelly
SAND. Got Volume, bulk density,
grain size bag, 4oz, 8oz.

Lat 63° 18' 15.8" N
Long 168° 51' 38.8" W
WP BGSS16

Pic Ben A #22
sample location 04NEB6SS106
looking East, river, 04NEB6SW106
site, Ben in background

9/10
13:12 04NEB6SS1Ø7
~~B~~ In drier valley E
of site area like clay
creek S of White Alice
road. Sample in grassy,
mossy area beside rocky
dry river. Loam.

Lat 63° 17' 33.3" N
Long 168° 52' 13.3" W
WP: B6SS17

13:21 04NEB6SS108
on rocky river bottom
adjacent to above;
grain size obtained

1400 04NEB6SS109
rocky area like site 6

Lat 63° 17' 36.8" N
Long 168° 51' 42.7" W
WP B6SS19

Brown, gravelly, silty SAND
w/ organics
+ grain size

Pic Ben A 21 Julie w/
sampled drainage in bkgrnd

1444 04NEB6SW107
from shallow estuary near outlet
of river, perhaps like Suki estuary,
but much less organic on bottom.

1453 04NEB6SD107
near SW107, ~~sandy~~ sl. silty SAND

Lat 63° 19' 02.9" N
Long 168° 51' 01.9" W
WP B6SW17

1531 O4NEBGSS110

Lat 63° 19' 05.5" N
Long 168° 51' 16.7" W
WP BGSS10

Gravelly sand, brown
on low-level, gravelly tundra
material
BK ~~grain size~~ + Bulk density obtained

1601 O4NEBGSW108
different river outlet,
similar to sugi estuary
Lat 63° 19' 34.9" N
Long 168° 52' 20.9" W
WP BGSW18

1610 O4NEBGSD108

16:40 O4NEBGSW109
flowing stream in grassy
tundra, a bit drier than
mid-sugi upstream from
SW 108.

16:50 O4NEBGSD109 co-located,
from bank next to above
Dk. br., sandy silt, trace organics,
similar material to what seen
sloughing on beach - near permafrost
material, like all over.

Lat 63° 19' 25.7" N
Long 168° 52' 27.4" W
WP BGSW19

9/11 13:53 Mobing for site
6 WP7 Voa redo.

14:39 purging 06WP7

1452 finis purging
~1 gallon,
begin VOAs

1459 start Dup.

1505 Rep

1520 to main ops

1703 at site for
04NEBGSS111

-apparent quary area on hillside
S of main ops complex. Sandy
Gravel/Cobbles/boulders. Originally
talus slope. Dug in to area
w/ evidence of bulldozer activity.

Lat 63°18'19.3"N
Long 168°57'53.6"W
WP BGSS51

1717 hit large rock as attempting
bulk density try again

1736 Failed - too rocky.
No NCA MeOH so no
dupe/rep today. Just sample

1741 sample 04NEBGSS111
brown sandy gravel w/cobbles,
some organics.

1817 collected grain size
sample for 04NEBGSS112
from quarry area E of
Main Ops complex soil
similar to fill material -
brown sandy gravel

Lat 63° 18' 02.8" N
Long 168° 56' 58.0" W
WP BGSS52

1830 sample 04NEBGSS112
Sandy Gravel from formerly
graded/quarry/fill source
area

9/12

17:12 at location for 04NEBGSW110
& sediment. Near hillside NE of
Sugi lake. Cloudy, cool. Sampling
from grassy lake among tundra
mounds, similar to site 8.

Lat 63° 18' 45.2" N
Long 168° 55' 37.2" W
WP BGSW51

1727 Begin 04NEBGSW110

1748 done

1757 Begin 04NEBGSD110

18:05 done - brown, lots of organics/
root ball, much like site 8
sediment sample.

18:19 set up for balloon volume on tundra berry (as opposed to grassy) area. Dug through ~.3' organics to soil to sample

18:36 04NEBGSS113
Dk brn, sandy silt w/organics
used 2x MeOH

Lat 63°18'45.4" N
Long 168°55'38.7" W
WP BGSS53

9/13 Text on benchmark
by airport:
4469-S
98-2
GPS
1998

11:10 In gravel quarry area above (E) of white alice, below location of 04NEBGSS112 to attempt bulk density, DRO/RRO Dupe/Rep, MS/MSD + 4 metals sampling in obviously excavated area - fill source material

Lat 63°18'10.8" N
Long 168°56'59.9" W
WP BGSS54

11:41 Sample 04NEBGSS114

11:55 Finish - 4x8oz, 1x4oz MeOH
sandy gravel - reminds me of sandy area on W side main cps.

1235 at location W.C site 7.
Fine organics directly below talus slope.

Lat 63° 18' 44.4" N
Long 168° 55' 29.9" W
WP BGSS55

Looking over at location of BGSW110, possible that H_2O from white alice site could drain to there (?)

1313 sample 04NEBG SS115
dk brwn organics, overlying talus ~ 0.5' bgs. in shallow depression observe telephone insulators wires - maybe old phone system out here?

1345 found spot among talus with some fines to sample!
04NEBG SS116
Brown, sandy Gravel

Lat 63° 18' 42.7" N
Long 168° 55' 25.7" W
WP BGSS56

1420 as heading back, gravel in old track

04NEBGSS117
Brown, sandy gravel - below talus slope, ~ .1' bgs of track, but ~ .5' bgs of surrounding terrain.

Lat 63° 18' 41.6" N
Long 168° 55' 44.3" W
WP BGSS57

16:05 @ location for next sample - beach/Tundra interface E of site 3. Mix of sand, silt, ~~tundra/beach.~~

Lat 63° 19' 49.8" N
Long 168° 53' 15.7" W
WP BGSS58

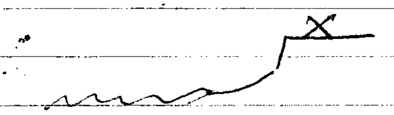
16:30 while doing bulk density, hit wood. just collect grain size now.

16 40 sample 04NEBGSS118

Under sand layer, as sampling hit layer of peat/sphagnum moss, soft, high organics, not gravel. ☹

Abandoned grain size sample

118 located on point overlooking ocean, ~8' above sea level, although there is driftwood



9/20/04
Note: All GPS Coordinates in field book used NAD27 Alaska Datum.

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FAX COVER SHEET

RE: Review comments

TO: Mr. Carrey Cossaboom CEPOA-PM-C

COMPANY: USACE, Alaska District

FAX#: 907-753-5626

TELEPHONE#: 907-753-2689

DATE: March 21, 2005

NUMBER OF PAGES: 2

NOTES: Enclosed, please find my review and comments on the Phase IV Remedial Investigation; Northeast Cape: St. Lawrence Island, Alaska. January 2005.

REVIEW COMMENTS
Phase IV Remedial Investigation
Northeast Cape
St. Lawrence Island, Alaska
January 2005

REVIEWER
Morgan Apatiki
RESIDENT
Gambell, Alaska

ITEM	REF	COMMENTS
1.	Page i PARA 2	The overall Phase IV RI objectives to implement the field investigations and sample analysis program specified in this documents were definitely prominant and practicable, as further described in my previous review comments dated July 12, 2004. The data gaps identified in previous investigations, Data Collections, still do not have the appropriate analytical protocol results.
	PARA 3	The constituents of potential concern (COPC) still remains prominant contaminant level at Site 28 at which normally have not been proposed for remedial action.
General:		The intense odor that applied as the inhalent volatile that was associated with the military contaminant debris in every area of the installation Sites are still in effect and that will continued to impact the environment and natural habitat of the land species and migrant marine mammals. Specifically, the people of the St. Larence Island.

REVIEW COMMENTS **PROJECT: Northeast Cape** **DOCUMENT: Phase IV Remedial Investigation Report**
LOCATION: St. Lawrence Island, Alaska

DATE: 03/10/05 **REVIEWER: Lisa Geist** **PHONE: (907) 753-5742**

Item/ Code.	Page/Para	COMMENTS	REVIEW CONFERENCE	S&W RESPONSE 3/30/05	USACE RESPONSE
1.	Page i, Exec Summary Page 1, Section 1	The Northeast Cape site operated from the 1950's to 1972. ↓ also Page 1, Sect 1 The "unspecified data uses" include recommending site-specific cleanup goals, determine possible remedial alternatives and move forward with a Feasibility Study for the site.		Accepted. Change to match Section 2, which includes the proper dates. Unsure of comment. The term "unspecified data uses" is not in the Executive Summary. 2nd sent., 2nd para. should be "…investigations and refine estimates…."	OK
2.	Page ii, Exec Summary	ARARs are typically identified, not developed. Add citation for state of Alaska cleanup criteria (18 AAC 75).		Accepted. Change "developing" to "identifying", and add citation.	OK
3.	Table ES-2	Add complete citation for ADEC cleanup criteria to Key, e.g 18 AAC 75 (updated May 26, 2004), Under 40 Inch Zone, Migration to Groundwater. Consider adding column with actual cleanup level, for comparison.		Accept fleshing out citation. Discuss removing table from report. This table suggests a level of data interpretation that doesn't exist. Biogenics are not considered, and the depth intervals are misleading. How will data qualifiers be incorporated? etc.	Could [illegible]
4.	Figure 2-3	Antenna pole line should not be same color as shoreline.		Accepted. We were having trouble making that line go away. It seems to be attached to the shoreline on the base map.	OK
5.	Page 9, Line 4	Correct spelling of *recorded*		Accepted. Add "r"	OK
6.	Page 16, Section 4.2	Clarify that some locID's include 2 different depths of sampling		Accepted. Only the background water and sediment share a LOCID. Depths are incorporated into the other LOC IDs. "Each Sample" in 2nd para. is misleading. it should be "Sample locations were…."	?

[illegible] Thumbs – ALL
[illegible] ppm for orthophosph[illegible]
[illegible] [illegible] to TX[illegible]
[illegible] on [illegible]

Julie has [illegible]
[illegible] TICs
[illegible] hard copy?
only in [illegible]
[illegible] for POLs would need it

1360 qualified samples

[illegible] back in Tables [illegible]
[illegible] extensive [illegible]
[illegible] alternatives?

REVIEW COMMENTS **PROJECT: Northeast Cape** **DOCUMENT: Phase IV Remedial Investigation Report**
LOCATION: St. Lawrence Island, Alaska

DATE: 03/10/05 **REVIEWER: Lisa Geist** **PHONE: (907) 753-5742**

Item/ Code.	Page/Para	COMMENTS	REVIEW CONFERENCE	S&W RESPONSE 3/30/05	USACE RESPONSE
7.	Page 24, Section 5.1.3.2	The text states that photographs were taken at each sample location. However, the Appendix only includes selected photographs to show general site conditions. some are scanned photos ~60 1/3 already scanned		Correct. Only select photos are incorporated in the report. "…photographs were taken at each sample location." could be eliminated to avoid confusion. Add reference Photograph 9. Discuss: Photo archiving.	✓ CD Rom ?
8.	Page 25, Section 5.1.3.4	2nd paragraph – correct spelling: …two sampling locations *were* adjacent to the former air terminal.		Accepted. Add "er"	OK
9.	Table 5-1b	Please provide an explanation for the high detection limits for arsenic. GRO detection of 2.05 mg/kg at 04NE01SS303 should not be bold. Many of the SVOC detection limits also much higher than the ADEC cleanup levels.		Hopefully the CQAR will prove some insight. Accepted. Likely due to biogenic interference – samples were mostly poorly decomposed peat. Also see Julie S-D comment 2a.	
10.	Figure 5-1	Where are samples SS101 and SS102 (only 1 purple circle shown). Is the label indicating Camp Pad correctly placed?		Accepted. Add dot for SS102, move Camp Pad label to Camp Pad	OK
11.	Page 26, Section 5.2.1	Perhaps include an explanation for why deep subsurface samples were not gathered at this location – not scoped or because encountered ice at 5 feet.		Discuss. This sentence was intended to reinforce the fact that the geology is inferred. It may be best to delete the sentence. Section 5.2.3 discusses boring depths.	yes
12.	Page 29, Section 5.2.5	Were the sediment samples evaluated for biogenic influences?		Yes. See Table 5-2b. Make a separate paragraph for the sediment results and note the biogenic influence.	OK
13.	Table 5-2b	Why did benzene have such sigh PQLs? Toluene detection of 677 at 03SD108 should not be bolded.		Discussions of PQLs will be developed from the CQAR for the final report. Likely causes: matrix interference and dilution. See Julie S-D comment 2a. Accepted – Data Stream cling-on	OK

DATE: 03/10/05 **REVIEWER: Lisa Geist** **PHONE: (907) 753-5742**

Item/ Code.	Page/Para	COMMENTS	REVIEW CONFERENCE	S&W RESPONSE 3/30/05	USACE RESPONSE
14.	Table 5-2d	Why no lab classification for biogenics on all groundwater samples? Why are the toluene detections highlighted?		One (03GW104) does have the assessment. We failed to request the library search on the COC for the other three samples. The laboratory did review the chromatograms, and found a biogenic pattern. This should be incorporated into tables and report. Data Stream (automated EDD to Excel translation) cling-on. Fix.	OK
15.	Figure 5-3	Missing from my copy of the document, but found in another copy. According to the text, Boring 06B2 was placed as close as practicable to the western slope of a soil stockpile to characterize the northeastern portion of the site. However, the figure seems to indicate that 06B2 is at the eastern or south-eastern edge of the site. The figure does not show the estimated location of the aforementioned excavation and stockpile.		The text and figure are correct. The text could be expanded to describe the site better. The area of apparent site activities narrows to the southeast and becomes the access road. The 06B2 location is on the north side of the eastern part of the site, but is generally toward the southeast. Boring 06B3 characterizes the southeast extent of apparent site activities. As you know the base maps are odd mixes of approximate data and difficult to work with. We looked at adding the piles and correcting boundaries, but had difficulties with the base map. We don't have the budget to make each figure look like what we saw in the field.	OK
16.	Page 35, Section 5.4.5	1st paragraph is a bit hard to follow. Perhaps state the range of PCB detections which exceeded 1 ppm (2.18 – 50.8 mg/kg), instead of jumping from a 50 ppm value to a 0.998 value. For comparison, perhaps include the PCB values in the second paragraph as well.		Accepted. It looks like some editing lost bits and pieces and the 1st. para. should be re-written.	OK
17.	Figure 5-4	Include labels for other two historical samples SS125 and SS126. Yellow squares along landfill boundary do not represent historical samples and should be deleted.		Accepted. Add labels for 01NE07SS125, 126, and add 01NE to 07SS127 so it is apparent it is an historic sample. We will try to delete the yellow squares from the red boundary. The red boundary would not delete for Figure 5.3.	OK

REVIEW COMMENTS **PROJECT: Northeast Cape** **DOCUMENT: Phase IV Remedial Investigation Report**
LOCATION: St. Lawrence Island, Alaska

DATE: 03/10/05 **REVIEWER: Lisa Geist** **PHONE: (907) 753-5742**

Item/ Code.	Page/Para	COMMENTS	REVIEW CONFERENCE	S&W RESPONSE 3/30/05	USACE RESPONSE
18.	Page 36, Section 5.5.3	Unclear word – "raveled".		See Item 24, Julie S-D comments.	OK
19.	Page 37, Section 5.5.5.3 and Figure 5-5	If Figure 5-5 does not accurately represent field conditions, provide a notation on the figure and/or draw in the newly estimated location of the drainage.		See 2nd paragraph of Item 15 response above.	OK
20.	Table 5.5b	Provide an explanation for the high benzene detection limits.		See Item 13 and Julie S-D Comments Item 2a.	
21.	Page 47	Provide an explanation for why boring 19B1 only advanced to 29.5 feet bgs – rocks, drill rig limits, no recovery, other?		Accepted. The Field Observations Section contains the explanation. Add reference to Section 5.9.4.4.	OK
22.	Page 47, 3rd paragraph	Last sentence doesn't flow from previous text.		Accepted. Add "…and one was damaged." to the second sentence. Replace last sentence with "The monument for MW88-10 was found to be damaged, but was repaired.	OK
23.	Page 48, Section 5.9.4.2	Monitoring well *MW88-10* was redeveloped…		Accepted. Add "88" to text.	OK
24.	Page 48, Section 5.9.4.4	Previous monitoring wells were installed in *2002*. my chemical database has ID's that start with	02 NE …	Accepted. Why are the IDs for the samples collected from the wells all 01NE if they were collected in 2002?	good question
25.	Page 52, Section 5.11.2	Elevated diesel was detected during groundwater sampling conducted in *2002*. only MWs were delayed from 2001 Phase III RI		As above	OK
26.	Page 53	Delete duplicate word *collected* in 1st paragraph. Correct syntax in 4th para.		Accepted. Delete "Colleted". Correct paragraph (see Item 42, Julie S-D comments).	OK

REVIEW COMMENTS **PROJECT: Northeast Cape** **DOCUMENT: Phase IV Remedial Investigation Report**
LOCATION: St. Lawrence Island, Alaska

DATE: 03/10/05 **REVIEWER: Lisa Geist** **PHONE: (907) 753-5742**

Item/ Code.	Page/Para	COMMENTS	REVIEW CONFERENCE	S&W RESPONSE 3/30/05	USACE RESPONSE
27.	Page 52, Section 5.11.3	Add explanation that the wells were not sampled because collection of a representative or adequate groundwater sample was *not possible.*		Accepted. Add 4th sentence "The insufficient water column precluded collecting samples that would be representative of the groundwater formation."	OK
28.	Page 55, Section 5.12.4.2	What about the water bearing zone at 28 feet? Previous page mentions two depths where water was encountered. Maybe discuss intervals for all 5 samples recovered.		Discuss. The question is not clear. If it is why the next soil sample was at 31 feet, rather than 28 feet, there are a number of reasons. As noted, we had to select intervals based more on drill action than 5-foot intervals to get sample recovery. The drilling was likely difficult because we started to suspect frozen ground at 30 feet. We had already sampled a water interface that could have been the static water level (you are not sure until the well sits for a while). It is difficult to tell if water blowing out the casing is from something shallower that has a good flow rate or a new water bearing zone.	
29.	Page 57, 1st paragraph	Clarify that the deep well boring refers to near the Suqi River bridge.		Accepted. Add "The boring for the deep well near the Mid-Suqi Bridge (26MW2) was attempted…."	OK
30.	Page 57	Are the subsections labeled with the correct MW identifiers? I think the reference to *deep 26MW3* in subsection 5.13.4.2 is incorrect. Well 26MW3 appears to be a shallow test well that was completed to determine groundwater quality prior to attempting to drill the planned deeper well.		Accepted. Modify section 5.13.4.2 1st sent. to: "Shallow groundwater monitoring well 26MW3 was drilled before the deep (26MW2) well…."	OK
31.	Page 58, Section 5.13.5	Should the corresponding data table 5-13b be qualified based on the text which stated the sample 26SB103 likely lost moisture while awaiting analysis?		Accepted. Improve material testing table format, add qualifiers.	OK
32.	Page 61	Please clarify that the sediment samples contained DRO at concentrations greater than the ADEC *soil* cleanup criterion.		Accepted. Add the word "soil". Also see July S-D comments Item 51.	OK

REVIEW COMMENTS	PROJECT: Northeast Cape LOCATION: St. Lawrence Island, Alaska	DOCUMENT: Phase IV Remedial Investigation Report

DATE: 03/10/05 **REVIEWER: Lisa Geist** **PHONE: (907) 753-5742**

Item/ Code.	Page/Para	COMMENTS	REVIEW CONFERENCE	S&W RESPONSE 3/30/05	USACE RESPONSE
33.	Table 5-14b	Provide an explanation for the high benzene detection limits.		Accepted. See Item 13 and Julie S-D comment Item 2a	OK
34.	Page 62, Sec. 5.15 1st Sent.	Note that the text on Page 62, Section 5.15 of the draft Phase IV Report states that 10 samples were analzed for fuel impacts and 29 were analyzed for PCBs. This contradicts Table 5-15b and the more detailed text in this section. The Summary of Soil Analytical Results table 5-15b for Site 31, lists 15 primary (17 total) samples analyzed for fuels, and 24 primary (26 total) for PCBs. I think the text on Page 62, Section 5.15 needs to be revised...		Accepted. Correct to "Fifteen of the…, and 24 were…."	OK

S&W has

PDF of level I electronically

don't need instr. calibrations

before J flags added

✓ COELT/EDDs have + hard copies have

don't incl chromatograms elect

+ have J flags

S+W can send PDF level I to USACE + ADEC

grading at MOC some of it was fill

whole site was recontoured

Keep in mind for FS

delete references to soil background metals

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
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WASILLA

May 4, 2004

U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Attn: Mr. Carey Cossaboom

RE: PROGRESS REPORT - PHASE IV REMEDIAL INVESTIGATION, NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA, HTRW CONTRACT DACA85-03-D-0003, DELIVERY ORDER #0006

Shannon & Wilson is pleased to provide you with our progress report describing activities conducted for the project referenced above. This delivery order was issued on March 31, 2004. Work performed during April 2004 consisted of the development of a Project Schedule and the draft Work Plans. The Project Schedule was submitted to the U.S. Army Corps of Engineers – Alaska District (USACE-Alaska District) on April 6, 2004. Based on my discussion with you on April 29, 2004, the draft Work Plans are delayed one week and are now scheduled to be delivered to USACE-Alaska District on May 7, 2004. A Revised Project Schedule is attached to this letter.

We appreciate this opportunity to be of service and trust this information is sufficient for your needs at this time. If you have questions or comments, please contact Matt Hemry or the undersigned at (907) 561-2120.

Sincerely,

SHANNON & WILSON, INC.

John Spielman

John Spielman, C.P.G.
Principal Hydrogeologist

Enc: Revised Project Schedule

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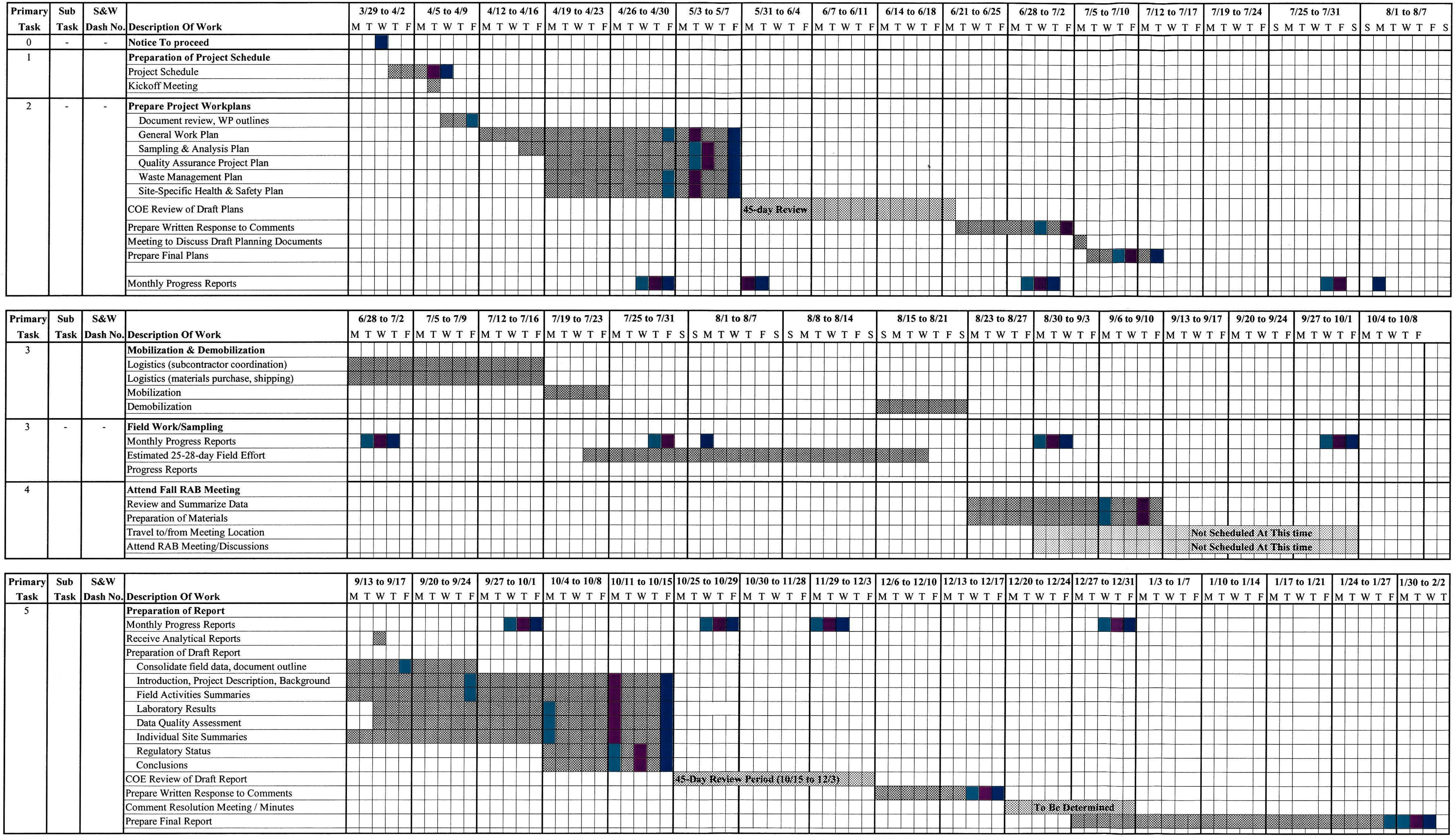
907·561·2120 FAX 907·561·4483

32-2-16821

REVISED PROJECT SCHEDULE

SHANNON & WILSON, INC.



Primary Task	Sub Task	S&W Dash No.	Description Of Work	3/29 to 4/2	4/5 to 4/9	4/12 to 4/16	4/19 to 4/23	4/26 to 4/30	5/3 to 5/7	5/31 to 6/4	6/7 to 6/11	6/14 to 6/18	6/21 to 6/25	6/28 to 7/2	7/5 to 7/10	7/12 to 7/17	7/19 to 7/24	7/25 to 7/31	8/1 to 8/7
				M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	S M T W T F S	S M T W T F S
0	-	-	**Notice To proceed**																
1			**Preparation of Project Schedule**																
			Project Schedule																
			Kickoff Meeting																
2	-	-	**Prepare Project Workplans**																
			Document review, WP outlines																
			General Work Plan																
			Sampling & Analysis Plan																
			Quality Assurance Project Plan																
			Waste Management Plan																
			Site-Specific Health & Safety Plan																
			COE Review of Draft Plans							45-day Review									
			Prepare Written Response to Comments																
			Meeting to Discuss Draft Planning Documents																
			Prepare Final Plans																
			Monthly Progress Reports																

Primary Task	Sub Task	S&W Dash No.	Description Of Work	6/28 to 7/2	7/5 to 7/9	7/12 to 7/16	7/19 to 7/23	7/25 to 7/31	8/1 to 8/7	8/8 to 8/14	8/15 to 8/21	8/23 to 8/27	8/30 to 9/3	9/6 to 9/10	9/13 to 9/17	9/20 to 9/24	9/27 to 10/1	10/4 to 10/8
				M T W T F	M T W T F	M T W T F	M T W T F	M T W T F S	S M T W T F S	S M T W T F S	S M T W T F S	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F
3			**Mobilization & Demobilization**															
			Logistics (subcontractor coordination)															
			Logistics (materials purchase, shipping)															
			Mobilization															
			Demobilization															
3	-	-	**Field Work/Sampling**															
			Monthly Progress Reports															
			Estimated 25-28-day Field Effort															
			Progress Reports															
4			**Attend Fall RAB Meeting**															
			Review and Summarize Data															
			Preparation of Materials															
			Travel to/from Meeting Location												Not Scheduled At This time			
			Attend RAB Meeting/Discussions												Not Scheduled At This time			

Primary Task	Sub Task	S&W Dash No.	Description Of Work	9/13 to 9/17	9/20 to 9/24	9/27 to 10/1	10/4 to 10/8	10/11 to 10/15	10/25 to 10/29	10/30 to 11/28	11/29 to 12/3	12/6 to 12/10	12/13 to 12/17	12/20 to 12/24	12/27 to 12/31	1/3 to 1/7	1/10 to 1/14	1/17 to 1/21	1/24 to 1/27	1/30 to 2/2
				M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T F	M T W T
5			**Preparation of Report**																	
			Monthly Progress Reports																	
			Receive Analytical Reports																	
			Preparation of Draft Report																	
			Consolidate field data, document outline																	
			Introduction, Project Description, Background																	
			Field Activities Summaries																	
			Laboratory Results																	
			Data Quality Assessment																	
			Individual Site Summaries																	
			Regulatory Status																	
			Conclusions																	
			COE Review of Draft Report						45-Day Review Period (10/15 to 12/3)											
			Prepare Written Response to Comments																	
			Comment Resolution Meeting / Minutes											To Be Determined						
			Prepare Final Report																	

🟦 document submittal to S&W PM

🟪 document submittal to S&W Sr Review

■ document submittal to USACE

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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WASILLA

June 4, 2004

U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Attn: Mr. Carey Cossaboom

RE: PROGRESS REPORT - PHASE IV REMEDIAL INVESTIGATION, NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA, HTRW CONTRACT DACA85-03-D-0003, DELIVERY ORDER #0006

Shannon & Wilson is pleased to provide you with our progress report describing activities conducted for the project referenced above. This progress report covers the period of May 4 to June 4, 2004. Work performed during this period consisted principally of completing the draft Work Plans. The draft Work Plans were delivered to you on May 7, 2004. Additional work performed during this period has consisted of contacts with subcontractors and a "Bear Watch" person in Savoonga. We have fielded some questions and comments regarding our draft Work Plans from Ms. Lisa Geist and Ms. Julie Sharp-Dahl.

We appreciate this opportunity to be of service and trust this information is sufficient for your needs at this time. If you have questions or comments, please contact Matt Hemry or the undersigned at (907) 561-2120.

Sincerely,

SHANNON & WILSON, INC.

John Spielman

John Spielman, C.P.G.
Principal Hydrogeologist

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file and return to me

SHANNON & WILSON, INC.
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SAINT LOUIS
WASILLA

August 27, 2004

U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Attn: Mr. Carey Cossaboom

RE: PROGRESS REPORT - PHASE IV REMEDIAL INVESTIGATION, NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA, HTRW CONTRACT DACA85-03-D-0003, DELIVERY ORDER #0006

Shannon & Wilson is pleased to provide you with a progress report of field activities. As referenced in a previous report, mobilization began on Monday August 9 with the delivery of camp materials, field supplies, and four persons to the site. A second Hercules aircraft trip, carrying the drill rig and additional equipment, was completed on August 16. Additional field crew members (environmental professional from Shannon & Wilson, and two driller's helpers) arrived at the site on August 17.

Surface water samples from Site 29-Suquitughniq River and Site 8-POL Spill Site were submitted to SGS on 8/16/04. A cooler of QA samples went on to North Creek Analytical in the same timeframe. Soil and sediment samples from Site 3-Fuel Line Corridor and Pumphouse and Site 6- Cargo Beach Drum Field were received by SGS on August 25. The shipment appears to also include a decontamination rinsate sample from the drilling at Site 6. A water sample from the shallow well at Site 26 was received by SGS on August 27. A water sample from Site 3 was also included in the shipment. The water sample from Site 26 will analyzed on a rush basis, so we can determine if the shallow aquifer is contaminated prior to drilling the deeper well.

Based on correspondence with Randy Hessong, field work is progressing smoothly. Subsurface conditions at Site 3 suggest that permafrost is present beneath the site at a depth of 5 to 6 feet, instead of bedrock. The shallow well (preceding the deep well) at site 26 encountered rock with sand and gravel from about 5 to 22 feet. The shallow aquifer at this location is highly productive. A gray silt was encountered at 22 feet and is inferred to be the potential aquitard/aquiclude. As indicated above, the well was set and samples are into the lab today. In general, drilling conditions have encountered lots of cobbles and boulders, somewhat as expected. The downhole hammer is able to advance the boring, but we are not getting sample recovery in some intervals. This is apparently due to coarse rock and cobbles with little fine-grained matrix. Every now and again, some soil is blown from the hole with the rock chips. This is intermittent and at unknown intervals. A diverter can be used with the down-hole hammer that will allow for the collection of the material coming out of the hole. The sample may not be appropriate for volatile analysis due to the method of collection, but may provide acceptable measurements of DRO/RRO results. This method of sample recovery may be better than no recovery. We can discuss this further over the phone.

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We have not received Daily Field Reports since about August 16 and have reminded Randy to send them in with the sample coolers. These will be included in subsequent progress reports, when received. I trust this information is sufficient for your needs at this time. If you have questions or comments, please contact Matt Hemry or the undersigned at (907) 561-2120.

Sincerely,

SHANNON & WILSON, INC.

John Spielman

John Spielman, C.P.G.
Delivery Order Manager

Encl: Copies of Daily Field Activity Reports (August 9 through 14, 2004)

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
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WASILLA

September 3, 2004

U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Attn: Mr. Carey Cossaboom

RE: PROGRESS REPORT - PHASE IV REMEDIAL INVESTIGATION, NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA, HTRW CONTRACT DACA85-03-D-0003, DELIVERY ORDER #0006

Shannon & Wilson is pleased to provide you with a progress report of field activities. Field work has been proceeding. Analytical test results from the water sample from the shallow well for Site 26 were received and indicated no reported contamination. The deep well was initiated yesterday, at a location approximately 60 feet from the shallow well. The deep well encountered frozen silt with gravels at a depth of about 18 feet. The material is assumed to be similar to the silt encountered at the shallow well, but with the abundant water encountered in the shallow well, it was not apparent that the silt was frozen. The presence of frozen silt precluded the advancement of the deeper well. The degradation of permafrost around the borehole and seal would compromise the seal and separation of the shallow and potential deep aquifer. To this end, the drilling program is complete and the drillers are returning to Anchorage today.

Randy has indicated that two or three wells (2001 wells) at the Main Operations Complex (MOC) are not able to be sampled (uncertain at this time if they are damaged or not found). They will look for substitutes at Site 10/11. The water within the Suqui estuary is apparently fairly deep with no visible bars for easy sediment sampling. We sent an Eckman dredge (hand-held sediment sampler, kind of a spring-loaded clam shell) and waders to the site to perform the sediment sampling in the Suqui estuary. Because we had anticipated collecting the sediment samples with disposable spoons, we will now use the Eckman dredge and require a decontamination rinsate sample. This rinsate sample will be substituted for one of the groundwater samples from the wells at the MOC which are not able to be sampled.

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32-2-16821

I have included a copy of the Daily Reports, which cover the period of August 16 through August 29, 2004. I trust this information is sufficient for your needs at this time. If you have questions or comments, please contact Matt Hemry or the undersigned at (907) 561-2120.

Sincerely,

SHANNON & WILSON, INC.

John Spielman

John Spielman, C.P.G.
Delivery Order Manager

Encl: Copies of Daily Field Activity Reports (August 16 through 29, 2004)

SHANNON & WILSON, INC. **Report No. _08__**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/16/04 Weather: Fairly calm overnight, light (5-10kt?) winds from SE. Overcast at 1500' rising to 2300' and slight breeze in afternoon.
Temperature: Upper 50s F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Ben Heavner	Field Sampler	9.6	Sample packing, recon, water treatment
Tim Dugenia	AMES Camp installer	Daily Rate	Off load plane, depart
Jo Wininger	Lead driller	12	Travel and setup
Eric Schmidt	AMES Chef	Daily Rate	Cooking, off loading
Randy Hessong	Field Team Leader	10.1	Sample packing, camp work

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
				Prep for cargo flight
				Package samples
				Recon Cargo Beach Road

PROJECT TOTAL SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Quality Samples	Total Samples
2 (sed)			4	3	9

REMARKS (Safety Issues, Areas of Concern/Quality Issues, Deviations Etc.)

C-130 with drill rig and driller arrives.
5 coolers of samples out with C-130

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays _x Yes __ No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? _x Yes __ No

Comments: Plane delays combined with equipment problems have slowed final camp setup, start of drilling.

Submitted By: ____________________**(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. _09__**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/17/04 Weather: Overcast, 1500' to 1800' ceiling, light SE wind, misty rain in afternoon.
Temperature: Upper 50s to 60 F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	8	Travel, camp setup
Ben Heavner	Field Sampler	9.5	Camp latrine, tent anchors
Joe Wininger	Lead driller	9.5	Camp latrine, tent anchors
Cole Wininger		8	Travel, camp setup
Frank Wininger		8	Travel, camp setup
Eric Schmidt	AMES Chef	Daily Rate	Cooking, off loading
Randy Hessong	Field Team Leader	9.5	Carbon filter install, latrine tent, prep for drilling

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Latrine hole	5'	0		Frozen ground at 2.5'
3 Tent anchors	9'	0		Drive in 2x4 after rotary

PROJECT TOTAL SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Quality Samples	Total Samples
2 (sed)			4	3	9

REMARKS (Safety Issues, Areas of Concern/Quality Issues, Deviations Etc.)

Camp indoctrination safety meeting, Health and safety plan review.

Bering Air Navaho in with Julie, Cole, Frank, project plans, perishable food, and parts.

Instructions given by the USACE to S&W: ___ Verbal _X_ Written

Received copy of E-mail verifying modification to contract with North Creek Analytical to incorporate scope modification, and that no field selected MS/MSD samples need to be submitted to North Creek. E-mail included QA Lab sample count table.

Work Progress:

Are there any contractor caused delays _x Yes __ No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments: Plane delays combined with equipment problems have slowed final camp setup, start of drilling.

Submitted By: __________ **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. _10__**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/18/04 Weather: Mostly Clear, mild E. wind. 10 to 15 kt. wind overnight.
Temperature: Upper 50s to lower 60s F

PERSONNEL ACTIVITY SUMMARY

Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	10.8	Borings at Site 6
Ben Heavner	Field Sampler	10.8	Borings at Site 6
Joe Wininger	Lead driller	10.8	Borings at Site 6
Cole Wininger		10.8	Borings at Site 6
Frank Wininger		10.8	Borings at Site 6
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	10.8	Borings at Site 6

FIELD ACTIVITY SUMMARY

Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Soil boring 03B2	8'	2	NE06	Permafrost encountered
Soil boring 03B1	6'	2	NE06	Permafrost encountered
Soil boring 03B3	7'	2	NE06	Permafrost encountered

PROJECT TOTAL SUMMARY

Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Quality Samples	Total Samples
2 (sed)	6		4	3	15

REMARKS (Safety Issues, Areas of Concern/Quality Issues, Deviations Etc.)

Completed driving tent anchors.

Must remind drill crew to use safety glasses, gloves, hearing protection.

Three shallow bore holes were advanced at Site 3 rather than 2 deeper borings due to the presence of hard, nearly pure water ice, which would inhibit vertical migration. Used available footage to investigate vertical extent where petroleum odor was noted near the surface. Ice-rich soil samples were collected, which may affect analytical results.

Corn oil used in air system for lubrication. Pam spray used to lubricate threads.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments: Slow start because of hand fueling.

Submitted By: ______________ **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. _11__**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/19/04 Weather: Mostly Clear, mild E. wind. 10 to 15 kt. wind overnight.
Temperature: Upper 50s to lower 60s F

PERSONNEL ACTIVITY SUMMARY

Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	12.5	Borings at Site 6
Ben Heavner	Field Sampler	10.3	Borings at Site 6
Joe Wininger	Lead driller	10.2	Borings at Site 6
Cole Wininger		10.2	Borings at Site 6
Frank Wininger		10.2	Borings at Site 6
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	12.5	Borings at Site 6

FIELD ACTIVITY SUMMARY

Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Soil boring 06B2	8'	2	NE07	Poor recoveries, moving sand

PROJECT TOTAL SUMMARY

Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Quality Samples	Total Samples
2 (sed)	8		4	3	17

REMARKS (Safety Issues, Areas of Concern/Quality Issues, Deviations Etc.)

Cobbles, not bed rock, is present at 5 to 6 feet below ground surface.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments: Slow drilling with boulders and pseudo-heaving sand.

Submitted By: ____________________**(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. _12__**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/20/04 Weather: Hazy, mostly sunny, mild breeze variable but primarily from west.
Temperature: 50s F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	12.5	Borings at Site 6
Ben Heavner	Field Sampler	12.5	Site 3 well develop, sediment, Site 6
Joe Wininger	Lead driller	9.8	Borings at Site 6
Cole Wininger		9.8	Borings at Site 6
Frank Wininger		9.8	Borings at Site 6
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	12.5	Site 3 well develop, sediment, Site 6

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Soil boring 06B3	20'	2	NE07	Auger/downhole hammer
Soil boring 06B4	11.5'	2	NE07	Auger/downhole hammer

PROJECT TOTAL SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Quality Samples	Total Samples
2 (sed)	12		4	3	21

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)

Sample 02NE07SS127 appears to have been disturbed last year. Location is on soil covering debris. Sample 02NE07SS125 is located within the fill slope of debris and soil. Leave phone message with Carey Cossaboom to start decision process for Site 7.

One boring to 20 feet at Site 6 found no aquaclude or other formation change. Groundwater is at roughly 5'bgs, and the aquifer is quite permeable and cobbly. No strong reason for drilling beyond 10 feet bgs has been noted.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x_ No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x_ No

Are there any USACE caused delays __ Yes _x_ No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x_ No

Are there any foreseeable or weather related delays? __ Yes _x_ No

Comments: Slow, cobbly drilling. Site 7 sample locations not as presented.

Submitted By: **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. _13__**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/21/04 Weather: Hazy, mostly sunny in morning, smoky fog descending in afternoon and staying, mild breeze primarily from east.
Temperature: 50s F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	12.2	Borings at Site 6
Ben Heavner	Field Sampler	10.5	Sites 3 & 6 well points
Joe Wininger	Lead driller	10.5	Borings at Site 6
Cole Wininger		10.5	Borings at Site 6
Frank Wininger		10.5	Borings at Site 6
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	11.7	Site 6 borings

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Well Point 03WP06	7.5’	0		Replacement for 8/18 “03WP06”
Soil boring 06B5	11.5’	2	NE07	Several feet into groundwater
Soil boring 06B6	11.5’	2	NE07	Several feet into groundwater
Soil boring 06B1	11.5’	2	NE07	Several feet into groundwater
Well point 06WP5	8.5’	0		Driven w/ drill rig air hammer
Well point 06WP6	9.5’	0		Driven w/ drill rig air hammer
Well point 06WP7	9’	0		Driven w/ drill rig air hammer

PROJECT SAMPLE SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
	20		3	2	25

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)
3 borings, 3 well points installed at Site 6.
Sample count in Project Sample Summary, above, modified to represent only PROJECT samples.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments:

Submitted By: ____________________**(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. _14__**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/22/04 Weather: Misty, smoky haze, clear above, mild breeze from east, increasing.
Temperature: 60s F

PERSONNEL ACTIVITY SUMMARY

Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	10	Site 3 well points
Ben Heavner	Field Sampler	10	Site 3 well points
Joe Wininger	Lead driller	10	Site 26 shallow well
Cole Wininger		10	Site 26 shallow well
Frank Wininger		10	Decon drill auger, rod
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	10	Site 26 shallow well

FIELD ACTIVITY SUMMARY

Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Well point 03WP102				Develop
Well point 03WP103				Develop
Well point 03WP104				Screen gone, riser on ground
Well point 03WP05				Develop
Well point 03WP06				Develop
Monitoring Well 26MW3	25			Install

PROJECT SAMPLE SUMMARY

Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
	20		3	2	25

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)

Gray silt encountered at 22.5'bgs in 26MW3. Rocky formation above silt has high yield.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments: Well point development and sampling slow. Well points in peaty tundra mat above permafrost. 03WP06 may be close enough to beach not to have permafrost.

Submitted By: ____________________ **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. 15**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/23/04 Weather: Clear, but smoky. Mild E. breeze,
Temperature: 60s F

PERSONNEL ACTIVITY SUMMARY

Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	12	Site 10 borings
Ben Heavner	Field Sampler	9.8	Sites 3&6 well points
Joe Wininger	Lead driller	9.8	Site 10 borings
Cole Wininger		9.8	Site 10 borings
Frank Wininger		9.8	Site 10 borings
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	12	Sample packing, boring setup

FIELD ACTIVITY SUMMARY

Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Well point 03WP102				Develop
Well point 03WP103				Develop
Well point 03WP05				Develop
Well point 03WP06				Develop
Soil boring 10B1	15	3	NE9	
Soil boring 10B2	15	3	NE9	

PROJECT SAMPLE SUMMARY

Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
	26		3	2	31

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments: Bering Air delayed flying during several hours of acceptable weather today. Fog moved in to NE Cape shortly after they committed to fly.

Submitted By: ______________________ **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. 16**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/24/04 Weather: Low fog, less than ¼ mi. visibility, mild N breeze in AM. Fog lifting mid day, clear in evening. Temperature: 50s F.

PERSONNEL ACTIVITY SUMMARY

Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	10.4	MOC wells 18MW1, 20MW1
Ben Heavner	Field Sampler	10.4	Sites 3&6 well points
Joe Wininger	Lead driller	10.4	MOC wells 18MW1, 20MW1
Cole Wininger		10.4	MOC wells 18MW1, 20MW1
Frank Wininger		10.4	MOC wells 18MW1, 20MW1
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	11	MOC Well, boring & PCB location identification.

FIELD ACTIVITY SUMMARY

Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Well point 03WP102				Sampling (6 VOAs took all day)
Well point 03WP103		1	NE10	Sampling (partial)
Well point 03WP5		1	NE10	Sampling
Well point 03WP6			NE11	Sampling (partial)
MOC 18MW1		3	NE9	
MOC 20MW1		0		

PROJECT SAMPLE SUMMARY

Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
	29	2	3	2	36

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)
Coolers 6, 7, 8 out on Bering Air.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments: List of drilling remaining prepared for Wininger's reference. Most recent removal action work has graded over and/or altered several sites, and damaged or destroyed several wells. Site 22 has been completely altered, and the perimeter road re-routed. Physical evidence of Pad 13-2 and associated sampling gone.

Submitted By: ________________ **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. 17**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/25/04 Weather: Foggy, smoky odor, NE breeze. Clearing with beautiful afternoon
Temperature: mid 50s to 60s F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	12.2	MOC well 20MW1, boring 19B1
Ben Heavner	Field Sampler	14.6	Site 26 monitoring well, Sites 3&6 well points
Joe Wininger	Lead driller	10	MOC well 20MW1, boring 19B1
Cole Wininger		10	MOC well 20MW1, boring 19B1
Frank Wininger		10	MOC well 20MW1, boring 19B1
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	14.6	Site 26 well, MOC boring & PCB location identification.

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Well point 03WP102				Sampling (partial)
Well point 03WP103		1	NE10	Sample completed
Well point 03WP6		1	NE11	Sample completed
MOC 20MW1		3	NE9	
Monitoring well 26MW3		1	NE11	3-day Rush

PROJECT SAMPLE SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
	32	5	3	2	42

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)

Phone conversation with John Spielman. Discuss status/progress, needs, potential problems that may need direction.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes x No

Are there any USACE caused delays __ Yes x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes x No

Are there any foreseeable or weather related delays? __ Yes x No

Comments:

Submitted By: (Signature)
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. 18**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/26/04 Weather: Gusty to 15 kt. out of E overnight, high 40's F. Fog on mountain, clear overhead.
Temperature: 50s F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	13	Sample prep., find old wells
Ben Heavner	Field Sampler	13	Treat decon water, Site 3&6 wells
Joe Wininger	Lead driller	9.6	Borings 19B1, 13B1
Cole Wininger		9.6	Borings 19B1, 13B1
Frank Wininger		9.6	Borings 19B1, 13B1
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	13	Sample prep, Borings 19B1, 13B1

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Boring 13B1	41.5	4	NE12?	Sampling (partial)

PROJECT SAMPLE SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
	36	5	3	2	46

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)

3 coolers of samples out on Bering Air, including 3-day rush for 26MW3. Chest waders in with Eckmann dredge to assist in sampling Suqi. estuary (freshwater lake). Wells 88-MW9 and 88-MW10 missing/damaged.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes x No

Are there any USACE caused delays __ Yes x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes x No

Are there any foreseeable or weather related delays? __ Yes x No

Comments:

Submitted By: **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. 19**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/27/04 Weather: Gusty to 15 kt. out of E overnight, high 40's F. Fog on mountain, clear overhead.
Temperature: 50s F

PERSONNEL ACTIVITY SUMMARY

Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	9.7	Site 13 PCB sampling, measure old wells
Ben Heavner	Field Sampler	9	Site 13 PCB sampling
Joe Wininger	Lead driller	9.2	Well 22MW3
Cole Wininger		9.2	Well 22MW3
Frank Wininger		9.2	Well 22MW3
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	10.7	Well 22MW3

FIELD ACTIVITY SUMMARY

Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Monitoring well 22MW3	40.5	5	NE12	In frozen ground
Site 13 PCB sampling	1 to 1.5'	15	NE13	Pick and shovel in rocky ground

PROJECT SAMPLE SUMMARY

Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
15	41	5	3	2	66

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)

Precise location of 98NEC13SS802 and Pad 13-2 not clear. 15 near-surface PCB samples dug show different types/eras of fill.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments:

Submitted By: (Signature)
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. 20**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/28/04 Weather: Chilly overnight, ground fog, winds to 10kt from WSW. Warming, 800' overcast, continued breezy in afternoon.
Temperature: high 40's to mid 50s F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	9.7	22MW2 oversight, sample labeling
Ben Heavner	Field Sampler	9	Site 22 drilling
Joe Wininger	Lead driller	9.2	Well 22MW
Cole Wininger		9.2	Well 22MW
Frank Wininger		9.2	Well 22MW
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	10.7	Camp and document admin,

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Monitoring well 22MW2	42	5	NE	Location was 22B1
Boring 22B1	27	3	NE	Location was 22MW2 – Hit rock

PROJECT SAMPLE SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
15	49	5	3	2	74

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)

What is now called 22B1 was to be 22MW2. A rock was encountered that was drilled into for 9 feet. Drilling shifted to the original boring location, and encountered moist to wet soil at 22 feet, as expected, so a well was installed in the 38 foot hole. A glacial erratic boulder is a possible explanation. Frozen ground was suspected at 30 feet and confirmed at 35 feet in new 22MW2

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments:

Submitted By: ______________________________ **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC. **Report No. 21**
DAILY FIELD ACTIVITY REPORT **Page 1**
Phase IV Remedial Investigation, Northeast Cape, St. Lawrence Island, Alaska
Date: 8/29/04 Weather: Light rain in early AM, overcast with 800-1,000' ceiling, light WSW wind.
Temperature: 50s F

PERSONNEL ACTIVITY SUMMARY			
Personnel	Position	Hours	Miscellaneous
Julie Keener	Senior Field Sampler	10	Sample labeling, logging, COCs, Site 13 PCB sampling
Ben Heavner	Field Sampler	9.3	Wells 22MW2, 17MW1
Joe Wininger	Lead driller	8.9	Wells 22MW2, 17MW1
Cole Wininger		8.9	Wells 22MW2, 17MW1
Frank Wininger		8.9	Wells 22MW2, 17MW1
Eric Schmidt	AMES Chef	Daily Rate	Cooking
Randy Hessong	Field Team Leader	10	Camp and document admin, Site 13 PCB sampling

FIELD ACTIVITY SUMMARY				
Activity	Total Depth	No. Samples	COC No.	Miscellaneous
Monitoring well 22MW2				Install well in hole drilled yesterday
Monitoring well 17MW1	21.5	3		Good water below 10 ft.
Pad 13-2 PCB sampling	1 to 3	4		Hand dug

PROJECT SAMPLE SUMMARY					
Surface Soil Samples	Subsurface Samples	Groundwater Samples	Surface Water Samples	Sediment Samples	Total Samples
19	52	5	3	4	83

REMARKS (Safety Issues, Areas of Concern/Quality issues, Deviations Etc.)
Surface soil and sediment numbers in table above adjusted after re-count.

Instructions given by the USACE to S&W: ___ Verbal ___ Written

Work Progress:

Are there any contractor caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any USACE caused delays __ Yes _x No
or potential finding of fact (i.e. excessive contam. or change in site conditions) __ Yes _x No

Are there any foreseeable or weather related delays? __ Yes _x No

Comments:

Submitted By: ______________________________ **(Signature)**
Randy Hessong **(Printed Name)**

Attached: ___ Field Notebook
___ Chain-of-Custody Forms

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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FAX TRANSMISSION

Attn	Carey Cossaboom	Fax	753-5626
Company	USACE	Phone	753-2689
Location		Date	Sept. 7, 2004
From	John Spielman	Time	
Subject	NE Cape Update		

TOTAL NUMBER OF PAGES (including cover sheet) 6

MESSAGE: Carey, following is a summary I received from Randy. This will give you a summary of the work completed. In general, Work has been completed at Sites 1, 3, 6, 7, 8, 10, 11, 13, 14, 29, and 31. Based upon my interpretation of this summary and discussions with Randy, they have "Background" sampling to perform, and groundwater sampling at Site 26, Main Operations Complex, and Site 16. Hope this helps.

John

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- 0003 - P.pdf.

The original of this fax ____ *will* X *will not* be mailed.

TABLE F3 - Sample and Survey Locations

Site and Task	Survey Location ID	Associated Analytical Sample ID	Depth	Sample Date	Notes & Remaining Items
SITE 1 - BURN SITE SE OF AIRSTRIP					
Near surface soils in area of distressed vegetation	04NE01SS101	04NE01SS101	0.5	9/3	Location of burn area not apparent
	04NE01SS102	04NE01SS102	0.7	9/3	
	04NE01SS103	04NE01SS103, 203, 303	0.5	9/3	
	04NE01SS104	04NE01SS104	0.5	9/3	
SITE 3 - FUEL LINE CORRIDOR AND PUMPHOUSE					
Sample 3 existing well points	01NE03WP102	04NE03GW104		8/24	WP104 non-existent WP 102 sample collected over several days
	01NE03WP103	04NE03GW102			
Collect surface water samples from intermittent stream	04NE03SD107	04NE03SD107	0.8	8/20	Stream not flowing. Collected sediment
	04NE03SD108	04NE03SD108	0.8	8/20	
Install 2 additional well points - sample	03WP5	04NE03GW101		8/24	WP5 uphill WP6 near beach,
	03WP6	04NE03GW103		8/24	
Drill 2 soil borings, screen every 2 ft., select 3 samples per boring for analysis	03B1	04NE03SB103 04NE03SB104	2-4 2-6	8/18	Drilled 3 into permafrost (about 6 ft)
	03B2	04NE03SB101 04NE03SB102	2-4 6-8	8/18	
	03B3	04NE03SB105 04NE03SB106	1-3 3-5	8/18	
SITE 6 - CARGO BEACH ROAD DRUM FIELD					
Sample existing well point	01NE06WP103	04NE06GW104		9/5	
Install 3 additional well points, sample	06WP5	04NE06GW103		9/5	
	06WP6	04NE06GW102		9/5	
	06WP7	04NE06GW101,201, 301		9/5	
Drill 6 soil borings, screen every 5 ft., select 2 samples per boring for analysis	06B1	04NE06SB111 04NE06SB112	6.5-7.5 10-11.5	8/21	
	06B2	O4NE06SB101 04NE06SB102	10-11.5 14.5-16	8/19	
	06B3	04NE06SB103 04NE06SB104	3-4.5 5-6.5	8/20	
	06B4	04NE06SB105 04NE06SB106	3.5-5 10-11.5	8/20	
	06B5	04NE06SB107, 207, 307 04NE06SB100	5-6.5 10-11.5	8/21	
	06B6	04NE06SB109 04NE06SB110	2-3.5 6.5-8	8/21	
SITE 7 - CARGO BEACH ROAD LANDFILL					
Collect 10 surface soil samples for PCB analysis. Co-locate 2 shallow subsurface samples (2-4 ft.) with surface samples adjacent to 01NE07SS127	04NE07SS101	04NE07SS101 04NE07SB102, 202, 302	1.1 4-4.5	9/1	auger
	04NE07SS103	04NE07SS103 04NE07SB104	1.4-1.8 2.8-3	9/1	auger
	04NE07SS105	04NE07SS105	1.8-2.1	9/1	auger
	04NE07SS106	04NE07SS106	1.1-1.2	9/1	
	04NE07SS107	04NE07SS107	0.7-0.9	9/1	
	04NE07SS108	04NE07SS108	0.5-0.6	9/1	
	04NE07SS109	04NE07SS109	0.7-0.8	9/1	
	04NE07SS110	04NE07SS110	0.8-0.9	9/1	
	04NE07SS111	04NE07SS111	0.5-0.6	9/1	
	04NE07SS112	04NE07SS112	0.6-0.8	9/1	

TABLE F3 - Sample and Survey Locations

Site and Task	Survey Location ID	Associated Analytical Sample ID	Depth	Sample Date	Notes & Remaining Items
SITE 8 - POL SPILL SITE					
Collect 1 surface water sample from the drainage area of pipeline break, look for sheen	04NE08SW101	04NE08SW101		8/15	
Collect 2 sediment samples from wetlands area	04NE08SD102	04NE08SD102		8/15	
	04NE08SD103	04NE08SD103		8/15	
SITE 10 - BURIED DRUMS					
Drill 2 soil borings to 15 ft. Screen and sample at 5 ft.intervals, Analyze highest screening depth for PAH, TOC	10B1	04NE10SB104 04NE10SB105 04NE10SB106	5-6.5 10-11.5 15-16.5	8/23	
	10B2	04NE10SB101 04NE10SB102 04NE10SB103	5-6.5 10-11.5 15-16.5	8/23	
SITE 11 - FUEL STORAGE TANKS					
Sample 2 of 4 existing wells (MW 10-1, 10-4, 11-2, 11-3)	MW 10-1	04NE11GW101			
	MW 11-3	04NE11GW102			
SITE 13 - ELECTRICAL POWER BUILDING					Hand dig shallow, auger deep with drill rig
Collect 10 samples (1 foot) and 5 co-located (3ft) samples at west transformer pad (13-1) of Bldg 110	04NE13SS105	04NE13SS105 04NE13SB128, 228, 328	1.5 3.6-3.9	8/27 9/1	
	04NE13SS106	04NE13SS106	1.2	8/27	
	04NE13SS107	04NE13SS107 04NE13SB124, 224, 324	1.2 3.5-4	8/27 9/1	
	04NE13SS108	04NE13SS108	1.3	8/27	
	04NE13SS109	04NE13SS109	1.4	8/27	
	04NE13SS110	04NE13SS110 04NE13SB125	1.2 3.8-4	8/27 9/1	
	04NE13SS111	04NE13SS111	1.1	8/27	
	04NE13SS112	04NE13SS112 04NE13SB127	1.1 3.5-3.8	8/27 9/1	
	04NE13SS113	04NE13SS113 04NE13SB126	1.1 2.5-2.8	8/27 9/1	
	04NE13SS114	04NE13SS114, 214, 314	1	8/27	
Collect 3 surface soil samples west of transformer #13-2 of Bldg 110 ~ 5-7 ft from 98NE13SS002, Collect 1 subsurface sample (3 ft) from the ~ location of 98NE13SS802	04NE13SS120	04NE13SS120	1.2-1.3	8/29	
	04NE13SS121	04NE13SS121, 221, 321	1-1.3	8/29	
	04NE13SS122	04NE13SS122	1.3-1.4	8/29	
	04NE13SS123	04NE13SS123	3-3.2	8/29	Hand
Collect 5 surface samples (0-2 or 1-3 ft) and 3 co-located subsurface samples (2-4 or 3-5 ft.)north of Bldg 110, out 10-15 ft from 98NE13SS108 and 98NE13SS107.	04NE13SS115	04NE13SS115 04NE13SB131	0.65 3-3.2	8/27 9/1	
	04NE13SS116	04NE13SS116 04NE13SB130	0.95 3.3-3.5	8/27 9/1	
	04NE13SS117	04NE13SS117	1.15	8/27	
	04NE13SS118	04NE13SS118	1	8/27	
	04NE13SS119	04NE13SS119 04NE13SB129	1.1 3.4-3.6	8/27 9/1	

TABLE F3 - Sample and Survey Locations

Site and Task	Survey Location ID	Associated Analytical Sample ID	Depth	Sample Date	Notes & Remaining Items
MAIN OPERATIONS COMPLEX					
Install 3 GW monitoring wells (avg depth 30 ft), collect soil samples from near surface, mid-depth, and GW interface based on PID. Sample 3 new GW monitoring wells	17MW1	04NE17SB101 04NE17SB102 04NE17SB103	6-7.5 10-11.5 20-21.5	8/29	
	18MW1	04NE18SB101 04NE18SB102 04NE18SB103	5-6.5 15-16.5 25-26.5	8/24	
	20MW1	04NE20SB101 04NE20SB102 04NE20SB103	3-4.5 10-11.5 20-21.5	8/25	
Sample 10 existing GW monitoring wells (MW 88-1 through MW 88-10)	MW 88-1 MW 88-2 MW 88-3 MW 88-4 MW 88-5 MW 88-6 MW 88-8				Wells MW 88-7, and 88-9 not found, appear to have been graded over. Well 88 MW-10 PVC intact, monument and plug gone.
Drill 2 soil borings to bedrock, screen at 5 ft. intervals. Select 2 samples per boring to represent subsurface soil types	13B1	04NE13SB101	5-6.5	8/26	
		04NE13SB102, 202, 302	15-18	8/26	
		04NE13SB103	18-19.5	8/26	Grainsize only
		04NE13SB104	40-41.5	8/26	
	19B1	04NE19SB101	5-6.5	8/25	Missing 2 grainsize due to poor recoveries
		04NE19SB102	12-13.5	8/25	
		04NE19SB103	17.5-19	8/25	
Collect 1 bulk soil sample to represent the structural fill of the complex area					The area is complex, with different materials
SITE 14 - EMERGENCY POWER/ OPERATIONS BUILDING					Hand dug
Collect 2 surface (0-2 ft) and 2 co-located (2-4 ft) subsurface samples approximately 10 ft SE and 10 ft SW of 01NE14SS102	04NE14SS101	04NE14SS101 04NE14SS104, 204, 304	1.4-1.6 2.0-2.2	8/30	
	04NE14SS102	04NE14SS102 04NE14SB103	1.6 2.0-2,2	8/30	
SITE 16 - PAINT AND DOPE STORAGE BLDG.					
Sample 3 existing wells (MW 16-1, -2, -3), select 1 PAH. Assess the biogenic influence on DRO/RRO results	MW 16-1 MW 16-2 MW 16-3				Partly jacked
SITE 22 - WATER STORAGE BUILDING					
Install 1 GW monitoring well adjacent to former water well PW-2, screen soil every 5 ft., select 5 samples between surface and groundwater for analysis, one sample for BTEX, PAH, TOC	22MW2	04NE22SB109	6-7.5	8/28	Planned location encountered a large rock, became 22B1. New location is near planned 22B1
		04NE22SB110	13-14.5	8/28	
		04NE22SB111	17-18.5	8/28	
		04NE22SB112, 212, 312	22-25	8/28	
		04NE22SB113	31-32.5	8/28	
		GW			

TABLE F3 - Sample and Survey Locations

Site and Task	Survey Location ID	Associated Analytical Sample ID	Depth	Sample Date	Notes & Remaining Items
✓ Install 1 GW monitoring well upgradient of PW-2, screen soil every 5 ft., select 5 samples between surface and groundwater for analysis, one sample for BTEX, PAH, TOC	22MW3	04NE22SB101	5.5-7	8/27	Planned location moved N to be out of re-routed road location
		04NE22SB102	12.5-14	8/27	
		04NE22SB103	17-18.5	8/27	
		04NE22SB104	27-28.5	8/27	
		04NE22SB105, 205, 305	38-39.5	8/27	
Sample GW in two new wells		GW			
✓ Drill 1 boring due east of former UST, screen and sample soil at 5 ft. intervals to 20 ft.	22B1	04NE22SB106	6-7.5	8/28	Originally intended to be 22MW2
		04NE22SB107	12.5-14	8/28	
		04NE22SB108	17-18	8/28	
SITE 26 - FORMER CONSTRUCTION CAMP					
✓ Install 1 GW monitoring well near former location of PW-4, sample	26MW1				8/30
1 GW monitoring well in water table aquifer, sample. Prep for well in deeper aquifer.	26MW3	04NE26GW101		8/24	Shallow well only. Permafrost encountered.
SITE 29 - SUQITUGHNEQ RIVER & ESTUARY					
✓ Sample river water up-, mid-, and down gradient	04NE29SW101	04NE29SW101, 201, 301		8/12	At bridge
	04NE29SW102	04NE29SW102		8/14	Below drainage basin
	04NE29SW103	04NE29SW103		8/15	Upper reach
Collect 6 sediment samples from depositional areas of estuary	04NE29SD104	04NE20SD104	3-4.5 feet below water surface	9/3	Sampled with Eckman Dredge while wading.
	04NE29SD105	04NE29SD105		9/3	
	04NE29SD106	04NE29SD106		9/3	
	04NE29SD107	04NE20SD107, 207, 307		9/4	
	04NE29SD108	04NE20SD108		9/4	
	04NE29SD109	04NE29SD109		9/4	
SITE 31 - WHITE ALICE SITE					
6/3 Collect 6 surface and 2 co-located subsurface (2-4 ft.) soil samples downgradient of septic tank outfall and 01NE31SS123	04NE31SS131	04NE31SS131 04NE31SB134	2-2.1 2.9-3	8/31	Single shallow samples by hand, co-located with drill auger.
	04NE31SS132	04NE31SS132 04NE31SB133	1.4-1.6 3.5-4	8/31	
	04NE31SS135	04NE31SS135	1.1-1.2	8/31	
	04NE31SS136	04NE31SS136 04NE31SB137	1.3-1.5 4.2-4.5	8/31	
	04NE31SS138	04NE31SS138	1+	8/31	
	04NE31SS139	04NE31SS139	1.4-1.6	8/31	
4/2 Collect 4 surface and 2 co-located (2-4 ft.) subsurface soil samples downgradient of 01NE31SS124	04NE31SS111	04NE31SS111	1.2	8/31	Single shallow samples by hand, co-located with drill auger.
	04NE31SS112	04NE31SS112 04NE31SB113	1,8-2 3.7-4	8/31	
	04NE31SS114	04NE31SS114	0.9	8/31	
	04NE31SS115	04NE31SS115 04NE31SB116	1.9-2 3.8-4.1	8/31	
6/3 Collect 6 surface and 3 co-located subsurface (2-4 ft.) soil samples around eastern portion of former PCB sampling grid at the M.E.C. Bldg 1001.	04NE31SS117	04NE31SS117 04NE31SB118, 218, 318	1.9 4	8/31	Single shallow samples by hand, co-located with drill auger.
	04NE31SS119	04NE31SS119	0.8-2	8/31	
	04NE31SS120	04NE31SS120 04NE31SB121	1.9-2.1 4-4.2	8/31	
	04NE31SS122	04NE31SS122	1.2	8/31	
	04NE31SS123	04NE31SS123 04NE31SB124	2 3.8-4.1	8/31	
	04NE31SS125	04NE31SS125	1.2	8/31	

TABLE F3 - Sample and Survey Locations

Site and Task	Survey Location ID	Associated Analytical Sample ID	Depth	Sample Date	Notes & Remaining Items
Collect 1 surface (0-2 ft) soil sample 20 ft downgradient of 01NE31SS119/120	31SS110	31SS110	1.65	8/31	Hand
Drill 1 boring adjacent to former tank berm. Sample at 2-4 and 4-6 ft ②	31B1	04NE31SB101	2.0-4	8/31	
		04NE31SB102	4.0-6		
Drill 1 boring ~10 ft SE of 01NE31SS113/114, sample at 2-4 and 4-6 ft	31B2	04NE31SB103	2.0-4	8/31	
		04NE31SB104, 204, 304	4.0-6		
Collect 3 surface and 2 co-located subsurface soil samples in radius of 10-15 ft from 01NE31SS105/106 3/2	04NE31SS126	04NE31SS126	1.5-2	8/31	Single shallow samples by hand, co-located with drill auger.
		04NE31SB127	3.5-3.8		
	04NE31SS128	04NE31SS128	1.8-2		
		04NE31SB129	3.7-3.8	8/31	
	04NE31SS130	04NE31SS130	1.3	8/31	
Collect 5 subsurface soil samples from locations along former buried tank pipelines at Site 31, locations based on 2003 removal action campling /5	04NE31SB105	04NE31SB105	2.7-3.1	8/31	Drill auger
	04NE31SB106	04NE31SB106, 206, 306	2.5-2.8	8/31	
	04NE31SB107	04NE31SB107	3-3.5	8/31	
	04NE31SB108	04NE31SB108	3.5-4	8/31	
	04NE31SB109	04NE31SB109	3.5-4	8/31	
BACKGROUND Collect 10 tundra surface soil samples Collect 10 gravel surface soil samples Collect 10 sediment samples from background locations Assess the biogenic influence on DRO/RRO Collect 10 surface water samples from background locations					

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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September 13, 2004

U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Attn: Mr. Carey Cossaboom

RE: PROGRESS REPORT - PHASE IV REMEDIAL INVESTIGATION, NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA, HTRW CONTRACT DACA85-03-D-0003, DELIVERY ORDER #0006

Shannon & Wilson is pleased to provide you with a progress report of field activities. Field work has been proceeding at a steady pace. A few minor issues have cropped up. On September 8, the Project Laboratory, SGS, notified us that the VOA vials for Sample 04NE06GW101 and 04NE06GW201 (duplicate) froze and broke in their refrigerator. This was a QA/QC sample set, so North Creek Analytical was notified and the volatile analyses (BTEX and GRO) were canceled. The field crew will recollect the volatile samples. One sample (SGS Work Order #1045711) was labeled incorrectly (04NE31SQ201 instead of 04NE31SQ202). This was corrected. Sample 04NE03GW104 was erroneously submitted to SGS for PCB analysis instead of PAHs. This was also corrected. Additionally, samples collected from the vicinity of former Sample 98NE13SS802 were subsequently canceled at the laboratory because later survey data showed the samples to not have been located as close to Sample 98NE13SS802 as desired. This sample set will be recollected.

As discussed with you this morning, the wells at Site 16 (three) have been observed to contain less than 1 foot of water. Purging of these wells has not been possible with pumps (well dries up before water can be pumped to the surface). Bailing has resulted in little recovery and turbid water. We understand that a sample from these wells should not be collected unless the well can be purged and a non-turbid sample obtained.

We are making preparations to demobilize from the site this week and hope to be off of the island by Wednesday. I have included a copy of the Daily Reports, which cover the period of August 30 through September 5, 2004.

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I trust this information is sufficient for your needs at this time. If you have questions or comments, please contact Matt Hemry or the undersigned at (907) 561-2120.

Sincerely,

SHANNON & WILSON, INC.

John Spielman

John Spielman, C.P.G.
Delivery Order Manager

Encl: Copies of Daily Field Activity Reports (August 30 through September 5, 2004)

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

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DENVER
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Demob Sept. 14, 2004

October 5, 2004

U.S. Army Engineer District, Alaska
P.O. Box 6898
Elmendorf AFB, Alaska 99506-6898

Attn: Mr. Carey Cossaboom

RE: PROGRESS REPORT - PHASE IV REMEDIAL INVESTIGATION, NORTHEAST CAPE, ST. LAWRENCE ISLAND, ALASKA, HTRW CONTRACT DACA85-03-D-0003, DELIVERY ORDER #0006

Shannon & Wilson is pleased to provide you with a progress report for the project referenced above. As mentioned in the previous progress report (September 13, 2004), the field crew and equipment were demobilized from the site on September 14 and 15, 2004. Over the last two weeks, we have been unpacking equipment, submitting samples for physical testing (moisture content, grain size, etc), coordinating with the project laboratory, and preparing a Site Observations and Variance Report. A copy of the variance report is included as an attachment to this letter. In addition, I have attached a copy of the Daily Field Reports for the period of September 5, 2004 through September 14, 2004.

Analytical test results are coming in and we hope to have all of the results within the next couple of weeks. I trust this information is sufficient for your needs at this time. If you have questions or comments, please contact Matt Hemry or the undersigned at (907) 561-2120.

Sincerely,

SHANNON & WILSON, INC.

John Spielman

John Spielman, C.P.G.
Delivery Order Manager

Encl: Site Observations and Variance Report
Copies of Daily Field Activity Reports (September 5 through 14, 2004)

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FIELD OBSERVATIONS AND VARIANCE REPORT
REMEDIAL INVESTIGATION (PHASE IV)
NORTHEAST CAPE
ST. LAWRENCE ISLAND, ALASKA

OCTOBER 2004

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FIELD OBSERVATIONS AND VARIANCE REPORT
REMEDIAL INVESTIGATION (PHASE IV)
NORTHEAST CAPE
ST. LAWRENCE ISLAND, ALASKA

This report presents field observations that suggest physical differences in the project area from those presented in the scope of work (SOW) and variations in execution of the work plan.

1.0 AIRSTRIP AND SUQITUGHNEQ RIVER AREAS

1.1 Site 1 – Burn Site SE of Airstrip

The SOW states "The area where Site 1 was presumed to be located is mostly bedrock outcrop. No samples have been collected based on the lack of evidence of contamination."

The area around the airstrip is depositional, with permafrost within a few feet of ground surface. Our latrine was placed on fill, and encountered frozen ground before reaching the elevation of the surrounding tundra. No bedrock outcrops were observed in the vicinity of the airstrip. The airstrip appears to have been constructed by plowing back the active layer of peaty soil to frozen ground, then placing cobbly fill. The windrows of peaty soil are visible as mounds around the airstrip, and the areas between the mounds and the airstrip have become ponds. The removal of the insulative vegetation mat and organic soil has caused differential permafrost melting. The airport terminal area shows the greatest degree of disturbance (grading, debris, etc.), presumably because initial construction and investigation/demolition activities were staged from this location.

We also did not find evidence of a burn pit or fire training area. Eugene Toolie is a local resident since before the presence of the military. He was an equipment operator and plowed the runway for the Air Force. He could not think of any fire-related activities performed around the airstrip, except for recent contractors burning trash.

1.2 Site 29 – Suqitughneq River and Estuary

The SOW states "This estuary, however, is periodically blocked off from the Bering Sea due to a gravel berm that develops at the outlet." "Collect 6 surface sediment samples from depositional areas within the Suqitughneq River estuary."

During Shannon & Wilson's field effort the estuary was a fresh water lake, and shoreline processes were maintaining a coarse sand berm, keeping the water elevation above high tide. No significant tidal influence was noted. From our discussions with Eugene Toolie, the estuary is cut off from the sea more often than not. The vegetation and shape of the shoreline support that statement.

Depositional areas of sediment were not observed near the surface of the water. Along much of the shoreline, the water level was at the level of the surrounding surface tundra, and a submerged vertical drop of two to three feet was present. Where the water was not as deep, the lake bed consisted of boulders and coarse sand and gravel, likely due to ice scouring when the body of water is frozen. Depositional sediment was found to be three or more feet below the water surface. Because a small boat was not available, sediment samples were collected by wearing chest waders and using a stick to probe for depositional areas. An Eckman dredge was dropped on the upcurrent side of the sampler to bring sediment to the surface. The contents of the dredge was released into a new disposable aluminum pan for sampling. Aquatic vegetation was often present, and could foul the closure of the dredge.

2.0 CARGO BEACH ROAD AREA

2.1 Site 3 – Fuel Line Corridor and Pumphouse

2.1.1 Borings

The SOW states "Conduct 2 soil borings to delineate the depth of the fuel source area within and beneath the gravel pad to bedrock. The gravel pad is approximately 5 feet thick. Assume the soil boring extends an additional 10 feet to bedrock."

A large portion of the gravel pad had been excavated and placed in a pile, presumable by the contractor removing the pipeline. The excavation exposed the underlying dark peat, leading to melting of the frozen ground, and forming a pond with areas of petroleum sheen and biogenic sheen. The gravel pile and excavation restricted drill rig access. The boring locations were placed as close to the locations indicated in the SOW as possible, leading to stuck equipment in the softened ground.

The gravel pad was less than two feet thick at the boring locations and frozen ground was encountered between 3 and 4 feet below ground surface (bgs). In Boring 03B2, ¼" to 1/2" lenses of clear ice were present (in silt) between 4 and 8 feet bgs. Solid ice with traces of silt was encountered at 5 to 6 feet bgs in Boring 03B1. The borings were stopped at 6 to 8 ft bgs because the long-term permafrost precludes vertical migration, and further disturbance can lead to rapid melting. Two soil samples were collected from each boring. Strong petroleum odors were not encountered in 03B1 or 03B2. Since up to 30 feet of drilling and 6 samples were planned, a third boring was advanced. A strong weathered diesel odor was noted where the drill rig's rear tire sank accessing 03B1. Boring 03B3 was advanced near the tire rut, and encountered nearly pure ice at about 5 feet bgs.

2.1.2 Well Points

The SOW states "Sample the 3 existing well points ....The well points installed in 2001 encountered refusal (e.g. bedrock or permafrost) and were installed between 3 and 6 feet below ground surface."

The riser pipe and location stake for Well point 01NE03WP104 were found laying on the ground surface, but the screened section was not found. It is likely that the well point was frost-jacked out of the ground and someone took the stainless steel screen for another use. No sample was collected.

The borings confirmed the presence of permafrost, and the springy nature of the soil encountered at 3 feet bgs (refusal) while driving 03WP05 suggested frozen peat. The top of the screened section of 01NE03WP102 was exposed at ground surface. The point had likely been frost-jacked. After finding that the well point did not produce sufficient groundwater to sample, it was driven down to hard ground (presumably permafrost). Well points 102, 103, and 05 are all in the active layer of wet tundra vegetation and peat.

While looking for a suitable location to install 03WP06, a shallow excavation at the boundary between the beach and tundra was observed. The excavation appeared to have been created by a loader in the last year or two. Sandy soil in the bottom of the excavation was stained and had a weathered diesel odor. The first location for 03WP06 did not produce sufficient groundwater to sample, so the well point was removed. At the new location, 03WP06 was driven to a depth of 7.5 ft bgs without encountering frozen ground. Well point 03WP06 is located near the beach, an estimated 25 feet from the stained excavation.

2.1.3 Intermittent Stream

The "intermittent stream" appears to be a series of linked low spots in the tundra rather than an active channel. The stream "bed" consists of dense grassy vegetation with deep roots in saturated peat. Mineral soils were not encountered within 1 foot of the surface. The topography and vegetation are similar to that at Well Points 103 and 05. Surface water was not flowing, so sediment samples were collected. According to Eugene Toolie, the location for the upgradient sample marked in the SOW is in the trench created when the construction contractor for the NE Cape facility plowed the vegetation off to create a "permafrost road." The road was used to access the talus quarry so construction of a gravel road could begin. Water from this trench does not flow past Site 3, but turns to flow to the beach further east. The sample location selected to represent the upgradient surface drainage was a little upgradient of the former 03WP104.

2.2 Site 6 – Cargo Beach Drum Field

The SOW suggests that the drum field is a constructed gravel pad. Observations suggest that the native materials were graded to level the site. An excavation and stockpile were present between the site and the road, likely created by the contractor that drained the fuel pipeline, since the pipeline was visible in the excavation. The stockpile restricted drill rig access to the eastern portion of the site. Boring 06B2 was placed as close as practicable to the western slope of the stockpile.

The 2001/2002 RI report states "Two test pits were excavated to bedrock within the stained soil area at Site 6 to evaluate the depth of contamination in the soil (Figure 2-3).... One soil sample was collected from the soil/bedrock interface at the bottom each test pit.... DRO concentrations were 2,000 mg/kg at 5.3 feet bgs in Test Pit 6-1 and 3,000 mg/kg at 5 feet bgs in Test Pit 6-2...." Based on our borings and observations, bedrock is at a depth greater than 21.5 feet bgs in the vicinity of Site 6. Based on the log of 1950 Boring DH-53, and the fact that glacial till was not encountered at 20 feet bgs (in our boring 06B3), bedrock may be over 40 feet bgs (near sea level). Water was encountered between 4 and 8 feet bgs in all 6 borings, and frozen ground was suspected at 12 to 15 feet bgs, but not confirmed due to the difficult drilling. Because determining depth and extent of contamination was our objective, and deeper drilling may have spread contamination, the final four borings were completed to 11.5 feet bgs, well into the groundwater, but above suspected frozen ground.

Site 6 is located on the trailing edge of a glacial drumlin, and contains the large particles (cobbles and boulders in this case) often associated with lodgement till. The rocky ground allows less vegetation growth, and conducts heat better than vegetation and peat, creating a deep active layer. This active layer is subject to the forces of frost patterning, resulting in areas of uplifted fines and areas of rock. The central/west central area of soil staining is in an area with fines, while only rocks are present just to the south and west of the site. This suggests that smaller particles with adhered contaminants may tend to be lifted toward the surface. The first location for Well Point 06WP7 was in an area of fines, and yielded insufficient groundwater. The final location is at the boundary between fines and rock, and has excellent yield. Frost jacking of all the well points is likely.

2.3 Site 7 – Cargo Beach Road Landfill

The landfill appears to have been created by dumping debris off the sides of the drumlin discussed above. The debris appear to have been covered by frequent grading of soil from the top of the drumlin. Debris are visible around the perimeter of the drumlin, except where the road crosses.

The stake marking the location of sample 01NE07SS127 was not found. The area had been re-graded in the last year or two based on the heavy equipment tracks and lack of vegetation. Sample locations were selected based on the relationship between physical features and the sample location shown on the site plan. Unfortunately there are scaling discrepancies and inaccuracies on the site plans from the various years of work at the site. The surveyed location of 01NESS127 was found to be about 30 feet northeast of the estimated location. The samples intended to be east and south of Sample 01NESS127 now represent the west/southwest area. Analysis of the three original samples to the north and west (04NE07SS105-107) was cancelled, and three new samples (04NE07SS113-115) were collected to represent the north and east areas.

2.4 Site 8 – POL Spill Site

A stringy (possibly petroleum) sheen was released from the sediment in the upwelling of water adjacent to the Suqitughneq River where Sample 04NE08SW101 was collected.

3.0 MAIN COMPLEX AREA

3.1 Sites 10 and 11 – Buried Drums and Fuel Storage Tanks

The modified SOW included sampling two of the four existing monitoring wells. Wells MW 10-1 and MW 11-3 were sampled. MW 10-1 had some frost damage. The PVC casing extended a few inches above the 4-inch-diameter stick-up monument, and the concrete holding the monument was broken up, leaving a void at ground surface. MW 11-3 was intact. Monitoring Well MW 10-4 was frost-jacked to the point the well screen was exposed above ground. Well MW 11-2 had been broken off near ground surface.

Crushed (presumably empty) rusting drums were observed in the fill slope at Site 10, but none were encountered in the borings.

3.2 Site 13 – Electrical Power Building

Some of the difficulties selecting sample locations were similar to those experienced at Site 7. Physical features shown on the plans didn't necessarily line up with the surveyed sample locations. Four soil samples were collected based on an estimated sample location, which was later found to be 24 feet from its surveyed location. Analysis of the original four samples (04NE13SS120-123) was cancelled, and replacement samples (04NE13SS132-134 and SB135) were collected. Sample 04NE13SS120 had already been analyzed at the time the error was discovered.

The southwest corner of the west transformer pad was partially exposed in the rocks from the recent fill, allowing measurements to be made to select locations for the ten west transformer near-surface samples. Chunks of concrete and re-bar were often encountered when digging to collect the near-surface samples. Co-located subsurface soil samples were collected using the drill rig to bring up soil on the auger flights. The rocky nature of the surface soil made it difficult to keep a hole open or drive a splitspoon without the support of more auger or a deeper hole. By watching the auger as it pushed rocks aside, a sample representative of the desired depth interval could be selected.

3.3 Site 88 - Main Operations Complex

3.3.1 Existing Monitoring Wells

The modified SOW called for sampling the ten monitoring wells installed in 2001. The central portion of the main complex was re-graded in 2003, and some well monuments were covered with soil. The steel monuments for wells MW 88-9 and MW 88-10 were found crushed and torn out of the concrete. The concrete around MW 88-8 had been cracked by heavy equipment, and the steel monument was partially lifted out of the concrete. The monument was driven back down, nearly flush with the ground surface. The MW 88-8 PVC casing and expansion plug were intact.

A portion of the concrete for the MW 88-10 monument remained in its original location, and the PVC casing was found buried, but intact. The expansion plug was in the crushed steel monument, undamaged. MW 88-10 was redeveloped using a bailer. The outside of the bailer was wiped off between immersions to help remove soil from the sidewalls of the casing, and 4.5 gallons of water with a diesel odor were purged in an effort to remove soil particles from the bottom of the well. A new steel monument was set in concrete over the casing using a leftover bag of concrete mix. The turbidity in MW 88-10 decreased with a nominal amount of purging, and sample collection proceeded.

Bits of the concrete from the MW 88-9 monument were found scattered near the re-graded surface. Hand digging in likely spots, including the location identified by the surveyor, did not reveal the PVC casing or expansion plug for MW 88-9. Evidence of Monitoring Well MW 88-7 was not found. Witching rods were used to identify several possible locations, and the surveyor marked a location based on previous data. Hand digging in the hard, rocky soil to depths of 1 foot bgs at four possible locations did not reveal MW 88-7.

3.3.2 Soil Borings

The SOW states "Complete 2 soil borings to determine the maximum depth of fuel contamination above bedrock. Assume an average depth of 40 feet....Collect 8 laboratory samples....Collect 4 sieve samples (2 per boring) from representative soil types (SP, SM) underlying the Main Complex."

The soil underlying the main complex was observed to be a complex mix of glacial and fluvial deposits. The main complex is located in the zone where a glacier would transition from a steep valley glacier to a piedmont glacier. The deposited material contains a large percentage of cobbles and boulders, and poorly graded sand (SP) and silty sand (SM) are some of the soil types found in the spaces between the cobbles. The majority of the subsurface materials encountered were thought to be from moraines and melt-out rubble due to the low percentages of silt commonly associated with till. Poor soil recovery, and fractured cobbles in the split spoon, were the norm. The analytical sample depths were often determined by where adequate recovery was achieved. Seven analytical samples were collected from the two borings.

The location of Boring 19B1 was particularly rocky. No soil was recovered below 19 feet bgs. Drilling was stopped at 29.5 feet due to the lack of sample recovery and to avoid carrying the obvious petroleum impacts observed at 12 to 19 feet further downward. Bedrock was suspected at 29 feet bgs, but after more experience drilling in the area, the material was likely frozen sandy cobbles beyond 21 feet bgs.

Boring 13B1 is located at a lower elevation than 19B1. Drill action in 13B1 suggested frozen ground around 23 feet, where contaminant levels reduced significantly (based on field screening). Boring 13B1 was extended to 41.5 feet bgs, and glacial till (anaerobic silt in gravels and cobbles) was suspected at 38 feet (no recovery) and observed at 40 feet bgs. The drillers expressed concern about carrying the obvious impacts encountered above 20 feet bgs downward, and did not want to drill beyond 25 feet bgs.

There was seldom enough volume to collect analytical samples and grainsize samples from the split spoons advanced at the main complex. Analytical samples were given priority, and after the first boring (19B1), the source of subsurface grainsize samples was expanded to include any of the new wells in the area. Three grainsize samples were recovered: one each from Boring 13B1, Well 20MW1, and Well 22MW3.

3.3.3 Bulk Soil Samples

The SOW states "Collect 1 bulk soil sample from the overlying gravel fill comprising the Main Operations Complex pad, analyze for grain size and moisture content."

As noted above, the area had been re-graded. The Main Operations Complex soil is a complex mix of old fill, native soil, debris from building demolition, and new fill from the talus slope quarry. A single, monolithic pad with a consistent soil type was not observed.

The Building 19 concrete pad is set on fill at the north end, and it was possible to move a piece of concrete from the corner of the pad to access the fill beneath. Sample 04NE88SS101 consisted of sand and coarse gravel in angular cobbles, and was collected from this location. During our explorations, fill with a much higher silt content was also encountered beneath the obviously re-graded soil and debris. Sample 04NE88SS102 was collected and submitted for analysis to represent this material. A third type of soil was also noted that may have been military-era fill. This material consisted of rounded to sub-rounded gravelly sand that was thought to have come from the beach. The aggregate in the old concrete appeared to be the same material. Because this material was not encountered in the subsurface while drilling, a sample was not collected.

3.4 Site 16 – Paint and Dope Storage Building

The three existing monitoring wells at Site 16 were observed to contain between 0.8 and 1.1 feet of water on September 9, 2004. The volume of water in the wells was found to be approximately the same as the volume of the tubing available to pump the wells. Pumped water would either reach the top of the casing or release a few milliliters of water before the well went dry. Bailing resulted in little recovery and turbid water. John Spielman discussed this issue with Carey Cossaboom and decided that samples from these wells should not be collected unless the wells could be purged and non-turbid samples obtained. Water levels were observed to drop during our field effort.

3.5 Site 22 – Water Storage Building

3.5.1 Geography and Geology

The southern leg of the main complex perimeter road has been relocated to loop around the south side of Site 22. The proposed location for Monitoring Well 22MW3 is in the center of the active travel-way. The 22MW3 location was shifted north-northeast toward the former water supply well PW-1. The ground elevation at 22MW3 is a few feet lower than the ground elevation at former PW-1.

The SOW states that "Well #1 encountered overburden to a depth of 39 feet and bedrock granite or granodiorite below this depth. The aquifers are fracture zones in bedrock at depths of 51 to 56 feet and 62 to 65 feet. No visible frozen formations were reported during the drilling. Water in limited amounts occurred in the overburden at a depth of 30.5 feet." These observations from a 1963 USAED report provide some insight into the difficulty of characterizing the subsurface at the former installation.

Overburden was observed for the full 42 foot depth while drilling 22MW3 in 2004. The drilling was through cobbly ground. Sample intervals were selected based on drill action, and soil recoveries in 2-inch split spoon samplers were better than average for the main complex. A zone of limited water was encountered between 22 and 23.5 feet bgs. Drill action suggested frozen ground around 27 to 28 feet bgs. Recovering a sample of coarse granular material from frozen ground without the sample thawing was difficult due to the heat generated from drilling and the relatively low moisture content. The 33 to 34.5 foot interval recovered a few inches of ground rock, rock slough, and a fractured rock. At about 38 feet bgs, drill action suggested that a larger rock was just passed. A split spoon was driven and recovered from 38 to 39.5 feet as quickly as possible. Frozen, silty, sandy gravel, with parts of a fractured cobble, were recovered. The material transformed (melted) from dry-looking, stiff, and somewhat flakey to wet and runny shortly after the split spoon was opened. The drill bit was advanced to 40.5 feet to remove disturbance from the previous sample, and a split spoon was driven to 42 feet. The split spoon was again recovered quickly, pulling 10 feet of casing at a time, and frozen granular soil was confirmed.

The gray silt typical of till beneath an active glacier was not encountered at depth in 22MW3, suggesting that the boring had not fully penetrated the moraine, and that bedrock is considerably deeper than 40 feet. Glacial till was encountered at 40 feet bgs in Boring 13B1, which has a surface elevation roughly 25 feet lower than 22MW3. We suspect that frozen granitic cobbles and boulders have been interpreted as bedrock in the past. This stuff is difficult to drill!

3.5.2 Boring 22MW1 / Monitoring Well 22MW2

The location selected for 22MW2 was particularly rocky. The location is more east than north of former PW-2 due to the presence of partially buried concrete and rebar. The drillers commented that the ground felt frozen at 15 feet bgs. A split spoon was driven to refusal from 17 to 18 feet. An adequate amount of soil was recovered for an analytical sample. The drill cuttings blowing out of the casing were freshly fractured rock chips from 18 to 27 feet bgs, and drill action suggested rock. A split spoon was driven at 25 feet to determine if the material was frozen soil. Only rock chips (slough) with a coating of corn oil (hammer lubricant) were recovered. The location was abandoned, and drilling moved to the proposed location of Boring 22B1, 20 to 25 feet away.

The drilling was easier and sample recovery better at the 22B1 location. Petroleum-stained soil was encountered at roughly 6 to 8 feet bgs. A minor water bearing zone was encountered around 22 to 23 feet bgs, and split spoons were driven from 22 to 23.5 and 23.5 to 25 feet bgs. The two split spoons were combined in order to have adequate soil volume for a QC/QA replicate sample. Because the boring was advancing well and the location is within 25 feet of the proposed 22MW2 location, the boring was completed as a monitoring well and re-named 22MW2. Frozen ground was suspected at 30 feet bgs and confirmed at 35 feet bgs. The original 22MW2 location was re-named 22B1.

4.0 SITE 26 – FORMER CONSTRUCTION CAMP

4.1 Monitoring Well 26MW-1

The proposed location of Monitoring Well 26MW1 was located just off an old embankment, and the nearest flat location for the drill rig had three partially full supersacks on it.

A location with good drill rig access was selected to the southwest, closer to former PW-4. Drill action and cuttings suggested groundwater, sand, and then frozen ground at 35 to 36 feet bgs and rocks from 37.5 to 42 feet. Bedrock is not suspected because similar drill action and cuttings were encountered between 22 and 28 feet. Based on the difference in surface elevations between PW-4 and 26MW1, the new well was probably completed in the same water bearing zone as the former well.

4.2 Monitoring Well 26MW2

The SOW states "To determine if shallow groundwater located in the overburden has connectivity to the fractured bedrock aquifer presumed beneath the site, one deep groundwater monitoring well shall be installed downgradient of the most contaminated zone."

This well was not completed. Pieces of clear water ice were observed coming up the casing with the cuttings at 18 to 19 feet bgs, and a split spoon was driven to 21.5 feet. The split spoon contained solidly frozen, gray clayey silt with lenses of gravel/fractured rock. The silt began to flow from the split spoon as it thawed. The resources and technology were not available (we are unaware of a well researched and established procedure) to seal a conductor casing in heterogeneous frozen material without the risk of thawing the soil. The boring was backfilled with cuttings. A sample of the frozen silt from 20 feet bgs was collected and submitted for grainsize and moisture content analysis and optional tests for liquid and plastic limits. The clay content of the sample from the hydrometer portion of the grainsize analysis may give some insight into whether the material was deposited through water or from a grounded glacier. The moisture content compared to the plastic limit may suggest whether the frozen silt would be stable if thawed in-situ.

Monitoring Well 26MW3 was installed in the watertable aquifer and tested for petroleum constituents before attempting to install the deeper well. The area selected for these wells is a relatively dry rise west of the road to the main complex, and south of the upper Suqitughneq River bridge. The ground surface here had evidence of frost patterning similar to the vicinity of Site 6. The subsurface material at 26MW3 was sandy gravel in cobbles with an iron-brown color and very few fines. Gray silt suggesting glacial till was encountered at 22 feet bgs and the drill action suggested hard material. The hammer would get choked off because air couldn't exit through the sticky silt. In retrospect the unusual drill action occurred because the silt was frozen and was thawing in the casing. The deep well location (26MW2) was selected 78 feet from the shallow well to avoid problems with compressed air short-circuiting to the shallow well. At the deep well location the soil had more silt and gravel, with fewer cobbles. At 10 feet bgs, the silt in the coarse soil become gray. The deep well location was apparently the up-welling portion of a frost pattern cell.

5.0 SITE 31 – WHITE ALICE SITE

The surface of the While Alice site had been recently re-graded, removing the markings of previous sampling locations. The scales and orientations of the various features on the site figure were often inconsistent with features in the field. Witching rods were used to determine the boundaries of former excavations and piping, and spray paint marks remaining on the main building slab were used to estimate the boundaries of the PCB sampling grid. The location of the former septic tank outfall on the figure deviated from the physical and geophysical observations the most. Surface samples with co-located subsurface samples were all collected from the flights of the drill rig augers using the technique described for Site 13 above.

6.0 BACKGROUND SAMPLES

The objective of collecting background samples with "similar characteristics to site-impacted areas at Northeast Cape, but be located within a reasonable distance from the site" was difficult to achieve. There is no other area of massive deposition from a steep valley glacier within a reasonable distance of the site. Gravel surface soil similar to the site was particularly difficult to find, and three "background" samples were collected from the gravel quarries used to construct the site.

6.1 Background Soil Samples

Although 20 background soil samples were scoped, only eighteen samples were collected. Of the 18 samples, 9 could be considered "gravelly" and 4 were primarily organic peat. Bulk density tests were difficult to complete because many of the gravel areas contained fractured cobbles that would puncture the balloon of a volumeter or preclude driving a cylinder. Other soil sample locations would fill with water and/or flow. Seven successful bulk density measurements were made.

Because measuring the grainsize of material that is primarily peat has no recognized method or application for our objectives, the 4 peaty samples were submitted for analysis of organic content by ignition furnace. Three background soil samples appeared to contain mineral soil with over 10% fines, and were submitted for grainsize analysis with hydrometer testing of the fines. Thirteen background soil samples have been submitted for sieve analysis. A grainsize portion was not collected from one background soil sample location because there was not enough soil left between the rocks after collecting the analytical sample to be representative of the analytical sample.

6.2 Background Sediment Samples

Granular sediments and sediments that were exposed due to low water levels were also difficult to find. The majority of sediment samples are highly organic, and were collected through a water column. The soft organic sediments are similar to those found in the Suqitughneq River and Estuary. No bulk density tests of sediment were successfully completed. Due to a misunderstanding after discussing how a meaningful bulk density sample could be achieved, only two grainsize samples were collected from background sediment locations. One of these samples is primarily peat and an organic content test by ignition furnace was requested. The other sample was submitted for full grainsize analysis.

7.0 DRILLING-RELATED DATA

The use of an air-rotary type drilling system to handle the rocky ground necessitated the use of a lubricant in the compressed air to keep the down-hole hammer functioning. This lubricant may be forced into the pores of the soil beyond the borehole when drilling. The lubricant used was Mazola corn oil. Split spoon samplers often had a thin film of oil after sampling. In order to see if the drill steel above the split spoon may impact a soil sample collected through water, one equipment blank sample included the drill rod connector that had had an oily coating on the interior surfaces. To evaluate the contribution of corn oil to analytical chromatograms, a sample of Mazola corn oil was submitted to SGS Environmental Services for fingerprinting.

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 6898
ELMENDORF AFB, ALASKA 99506-6898

REPLY TO
ATTENTION OF:

July 6, 2005

Programs and Project Management Division
Civil Works Management Branch

«Title» «FirstName» «LastName»
«JobTitle»
«Company»
«Address1»
«City», «State» «PostalCode»

Dear «Title» «LastName»:

Enclosed is a copy of the *Final* Phase IV Remedial Investigation (RI) report, Northeast Cape, St. Lawrence Island, Alaska, dated June 2005. The U.S. Army Corps of Engineers (USACE) contracted with Shannon & Wilson, Inc., to perform this environmental investigation work during the summer of 2004.

Please remove the *Draft* Report with the same title dated January 2005 from your holdings, and replace that with this copy.

If you would like an electronic copy of the RI Report text only, I have that available in a 481 KB WORD file that I can e-mail to you upon request.

This report has also been furnished to the following individuals and organizations:

Mr. Jeff Brownlee, Alaska Department of Environmental Conservation
Ms. Vi Waghiyi, SLI Coordinator, Alaska Community Action on Toxics
Dr. Ron Scrudato, State University of New York,
Mr. Jerald Reichlin, Attorney, Fortier and Mikko
    Anchorage Information Repository, ARLIS
    Gambell Information Repository, Sivuqaq Lodge
    Nome Information Repository, UAF Northwest Campus
    Savoonga Information Repository, Savoonga City Hall
Mr. Morris Toolie, Jr., President, Savoonga Native Corporation
Mr. Merle Apassingok, President, Sivuqaq, Inc.

If you have any questions, please contact me at (907) 753-2689, or by e-mail at carey.c.cossaboom@poa02.usace.army.mil.

Sincerely,

Carey Cossaboom
Project Manager

Enclosure

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Scrudato		SUNY at Oswego	54 Sunset Bluff	Oswego	NY	13126	Ronald	Dr.
Waghiyi	Project Coordinator	Alaska Community Action on Toxics	505 W. Northern Lights Blvd., #205	Anchorage	AK	99503	Viola	Ms.
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Smith, Director	St. Lawrence Island FUDS Information Repository	UAF Northwest Campus	Pouch 400	Nome	AK	99762	Gary	Mr.
Lawrence Island FUDS	Anchorage Information Repository	Alaska Resource Library and Information Services (ARLIS)	Suite 111, Library Building 3211 Providence Drive	Anchorage	AK	99508		St.
	Savoonga Information Repository	City Hall	P.O. Box 40	Savoonga	Alaska	99769		

DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 6898
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REPLY TO
ATTENTION OF:

May 12, 2004

Programs and Project Management Division
Civil Works Management Branch

«Title» «FirstName» «LastName»
«JobTitle»
«Company»
«Address1»
«City», «State» «PostalCode»

Dear «Title» «LastName»:

Enclosed for your review is a copy of the *Draft* Northeast Cape Phase IV Remedial Investigation Work Plan which describes the planned sampling and monitoring well installation activities scheduled for this summer. The U.S. Army Corps of Engineers (USACE) contracted with Shannon & Wilson, Inc. to conduct this work. Field work is anticipated to start in late July and last 3 or 4 weeks.

The Corps is seeking comments on this draft work plan within thirty (30) days of receipt of this document. Therefore, the comment deadline will be **June 16, 2004**. To assist us in answering your comments and keeping track of responses, I ask those of you with computers and e-mail to use the comment templates in Microsoft WORD that we have used in the past. If you do not have an electronic copy of that template, please contact me and I will e-mail it to you.

This letter has also been furnished to the following individuals and organizations:

Mr. Jeff Brownlee, Alaska Department of Environmental Conservation
Ms. June Martin, SLI Coordinator, Alaska Community Action on Toxics
Dr. Ron Scrudato, State University of New York, TAPP Grant
Mr. Jerald Reichlin, Attorney, Fortier and Mikko
Anchorage Information Repository, ARLIS
Gambell Information Repository, Sivuqaq Lodge
Nome Information Repository, National Park Service
Savoonga Information Repository, Savoonga IRA Building
Honorable Fritz Waghiyi, President, Native Village of Savoonga

Honorable Edmond Apassingok, President, Native Village of Gambell
Mr. Morris Toolie, Jr., President, Savoonga Native Corporation
Mr. Job Koonooka, President, Sivuqaq, Inc.
Honorable Jesse Gologergen, Mayor, Village of Savoonga
Honorable Jason Nowpakahok, Mayor, Village of Gambell

If you have any questions, please contact me at (907) 753-2689, or by e-mail at carey.c.cossaboom@poa02.usace.army.mil.

Sincerely,

LKG

for Carey Cossaboom
Project Manager

Enclosure

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Scrudato		SUNY at Oswego	54 Sunset Bluff	Oswego	NY	13126	Ronald	Dr.
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DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, ALASKA
P.O. BOX 6898
ELMENDORF AFB, ALASKA 99506-6898

REPLY TO
ATTENTION OF:

May 12, 2004

Programs and Project Management Division
Civil Works Management Branch

«Title» «FirstName» «LastName»
«Company»
«Address1»
«City», «State» «PostalCode»

Dear «Title» «LastName»:

A copy of the *Draft* Northeast Cape Phase IV Remedial Investigation Work Plan was recently sent to your local Information Repository. This document describes the planned sampling and monitoring well installation activities scheduled for this summer at Northeast Cape. The U.S. Army Corps of Engineers (USACE) contracted with Shannon & Wilson, Inc. to conduct this work. The field work is anticipated to start in late July and last 3 or 4 weeks.

The Corps is seeking comments on this report within thirty (30) days of receipt of this letter. Therefore, the comment deadline will be **June 16, 2004**. To assist us in answering your comments and keeping track of responses, I ask those of you with computers and e-mail to use the comment templates in Microsoft WORD that we have used in the past. If you do not have an electronic copy of that template, please contact me and I will e-mail it to you.

This letter has been furnished to the following RAB Members:

Mr. Alex Akeya
Ms. Peggy Akeya
Mr. Leonard Apangalook, Sr.
Mr. Paul Apangalook
Mr. Melvin Apassingok
Mr. Merle Apassingok
Mr. Jerome Apatiki
Ms. Lucy Apatiki
Mr. Jeff Brownlee
Mr. Jesse Gologergan
Ms. Linda Gologergan
Ms. Jeanette Iya
Ms. C. Jane Kava

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Mr. Christopher Koonooka
Mr. Job Koonooka
Mr. Merlin Koonooka
Ms. June Martin
Ms. Pam Miller
Mr. George Noongwook
Mr. Conrad Oozeva
Mr. Jerry Reichlin
Mr. Paul Rookok, Sr.
Mr. Morris Toolie, Jr.
Ms. Viola Waghiyi
Mr. Kevin Zweifel

Please mail your comments to me at: Carey Cossaboom, Project Manager, CEPOA-PM-C, Post Office Box 6898, Elmendorf AFB, Alaska 99506-6898. Alternatively, you may e-mail your comments to me at: carey.c.cossaboom@poa02.usace.army.mil

Call me at (907) 753-2689, or e-mail me, if you have any questions.

Sincerely,

JKG
for Carey Cossaboom
Project Manager

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Mr.	Melvin	Apassingok		P.O. Box 91	Gambell	AK		99742
Mr.	Merle	Apassingok						
Mr.	Jerome	Apatiki		P.O. Box 12	Gambell	AK		99742
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Mr.	Jeff	Brownlee	Alaska Department of Environmental Conservation	555 Cordova St., 2nd floor	Anchorage	AK	ADEC	99501
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