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FINAL REPORT

LIBERTY DEVELOPMENT 2001 SEDIMENT QUALITY STUDY

Prepared for

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August 3, 2001

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Submittal of Sediment Quality Study 2001 Final Report
Liberty Development

Gentlemen:

BP Exploration (Alaska) Inc. (BPXA) is herein submitting the *Liberty Development 2001 Sediment Quality Study Final Report.* The work plan, field activity reports, grain size sampling report, laboratory data results, data quality summary reports and data plots are included in the appendices.

If you have any questions or require further information, please contact me at (907) 564-5517.

Sincerely,

Cash Fay

Cash Fay, Permitting Advisor
HSE-Alaska

Attachment

CEF/cef

cc: Dr. Billy Johnson, USACE

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BPXA	BP Exploration (Alaska), Inc.
Corps	U.S. Army Corps of Engineers
CVAA	Cold vapor atomic absorption
EPA	Environmental Protection Agency
EIS	Environmental Impact Study
GPS	Global Positioning System
HPAH	High Molecular Weight Polyaromatic Hydrocarbons
HSE	Heath, Safety, and Environment
LPAH	Low Molecular Weight Polyaromatic Hydrocarbons
MDL	Method Detection Limit
mg/kg	milligrams per kilogram
MMS	U.S. Minerals Management Service
MDRD	Minimum detectable relative difference
MS/DS	Matrix Spike/Duplicate Spike
NEPA	National Environmental Policy Act of 1969
NPDES	National Pollutant Discharge Elimination System
OCS	Outer Continental Shelf
PAH	Polyaromatic Hydrocarbons
ppb	parts per billion
ppm	parts per million
PSDDA	Puget Sound Dredged Disposal Analysis Program
PSEP	Puget Sound Estuary Program
QA/QC	quality assurance/quality control
QC	quality control
Rollagons	Arctic off-road vehicles
RPD	relative percent difference
SVOCs	semi-volatile organic compounds
TSS	total suspended sediments
USCS	Unified Soil Classification System
VOCs	volatile organic compounds
μg/kg	micrograms per kilogram

BP Exploration (Alaska) Inc, (BPXA) plans to develop the Liberty oil field in the Beaufort Sea for production and transport of sales-quality oil to the Trans-Alaska Pipeline System. The field will be developed from a gravel island to be constructed in Federal Outer Continental Shelf (OCS) waters within Foggy Island Bay (Figure 1-1). The Liberty oil field development will include construction of a subsea pipeline from the proposed island (Liberty Island) to a land-based connection with the Badami Sales Oil Pipeline.

The U.S. Minerals Management Service (MMS) is currently conducting an environmental evaluation of the Liberty Development based on the National Environmental Policy Act of 1969 (NEPA). The evaluation is presented in the *Liberty Development and Production Plan Draft Environmental Impact Statement* (MMS 2001), and includes evaluations of multiple pipeline routes and production island locations, including the applicant's proposed Liberty Island route (Figure 1-2).

The pipeline system is anticipated to be constructed during the winter. Ice roads will be built to allow equipment access to the construction area. The proposed pipeline construction activity sequence is: 1) ice cutting and slotting, 2) trenching, 3) pipeline assembly and installation, 4) trench backfilling, and 5) pipeline pressure testing. During construction, some dredged material will be stored temporarily at sites away from the trench due to loading capacity and deflection characteristics of the ice. If necessary, the storage sites also will serve as disposal sites. Although the majority of dredged material is intended to be backfilled into the trench, as much as 110,000 cubic yards (yd^3) (76,500 cubic meters [m^3]) of dredged material from the applicant's preferred trench could be disposed of in Foggy Island Bay. Also, a contingency plan for disposal of temporarily stored spoil is required in the event that weather or ice conditions necessitate abandonment of operations prior to completion of construction activities.

The U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers, Alaska District (Corps) are cooperative agencies with the MMS on the Liberty Development EIS. Construction permits administered by the Corps and EPA require that physical properties (e.g., grain-size distribution) and chemical characteristics of sediment be collected for the evaluation of potential impacts to the surrounding environment related to trench excavation and fill activities and possible ocean disposal of spoils. Because there are no existing sediment analyses for one of the alternative pipeline routes, the EPA and Corps requested sampling be conducted.

This document presents the results of the sediment sampling project completed in May 2001. These results provide baseline information about those sediments anticipated to be excavated and used as fill or disposed via ocean dumping for the three routes evaluated in the EIS. The Work Plan, Heath Safety and Environment (HSE) Interface Document, field activity reports, grain size sampling report, laboratory data results, data quality summary reports, and data plots are contained in the Appendices.

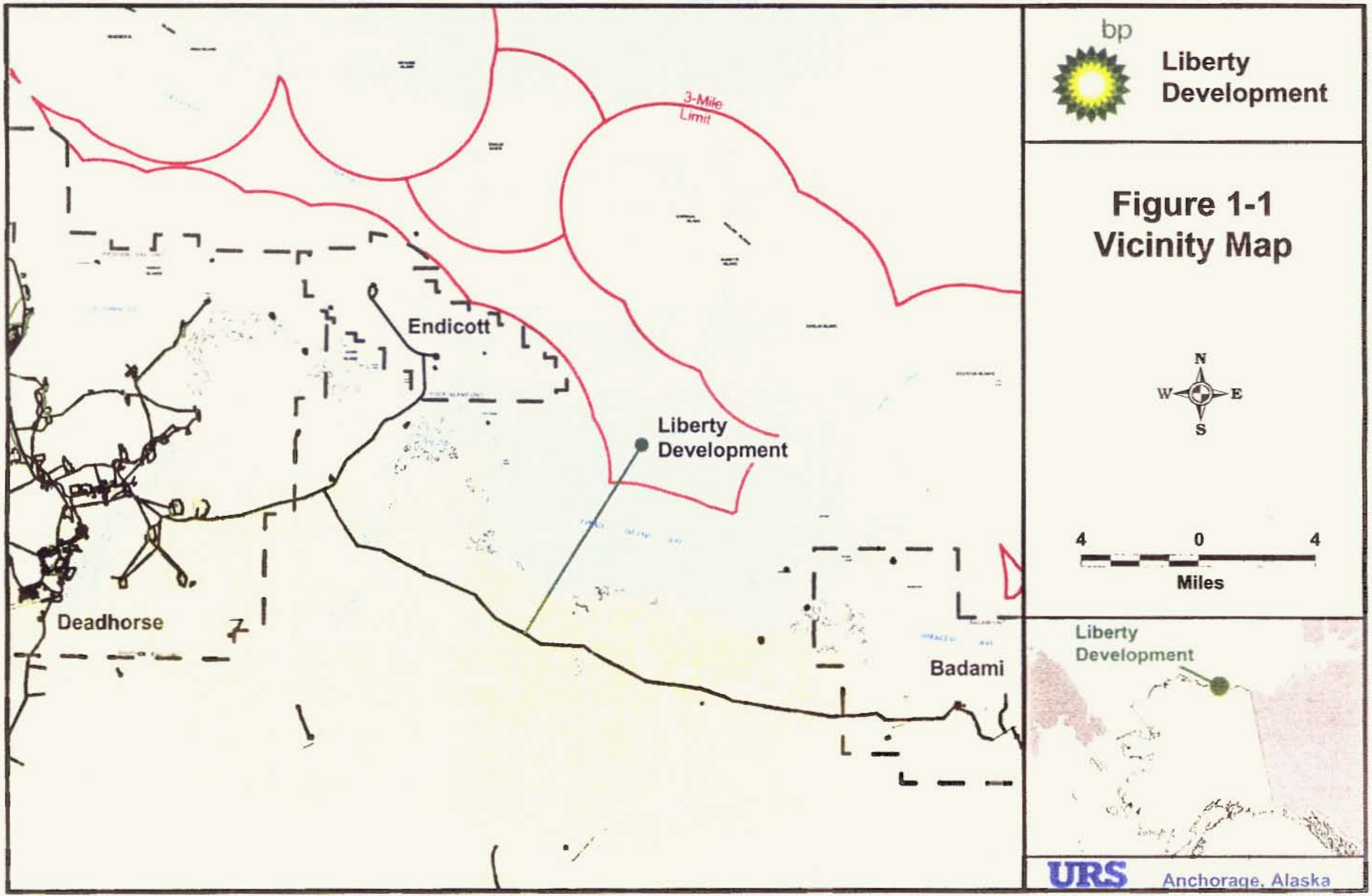

Figure 1-1
Vicinity Map

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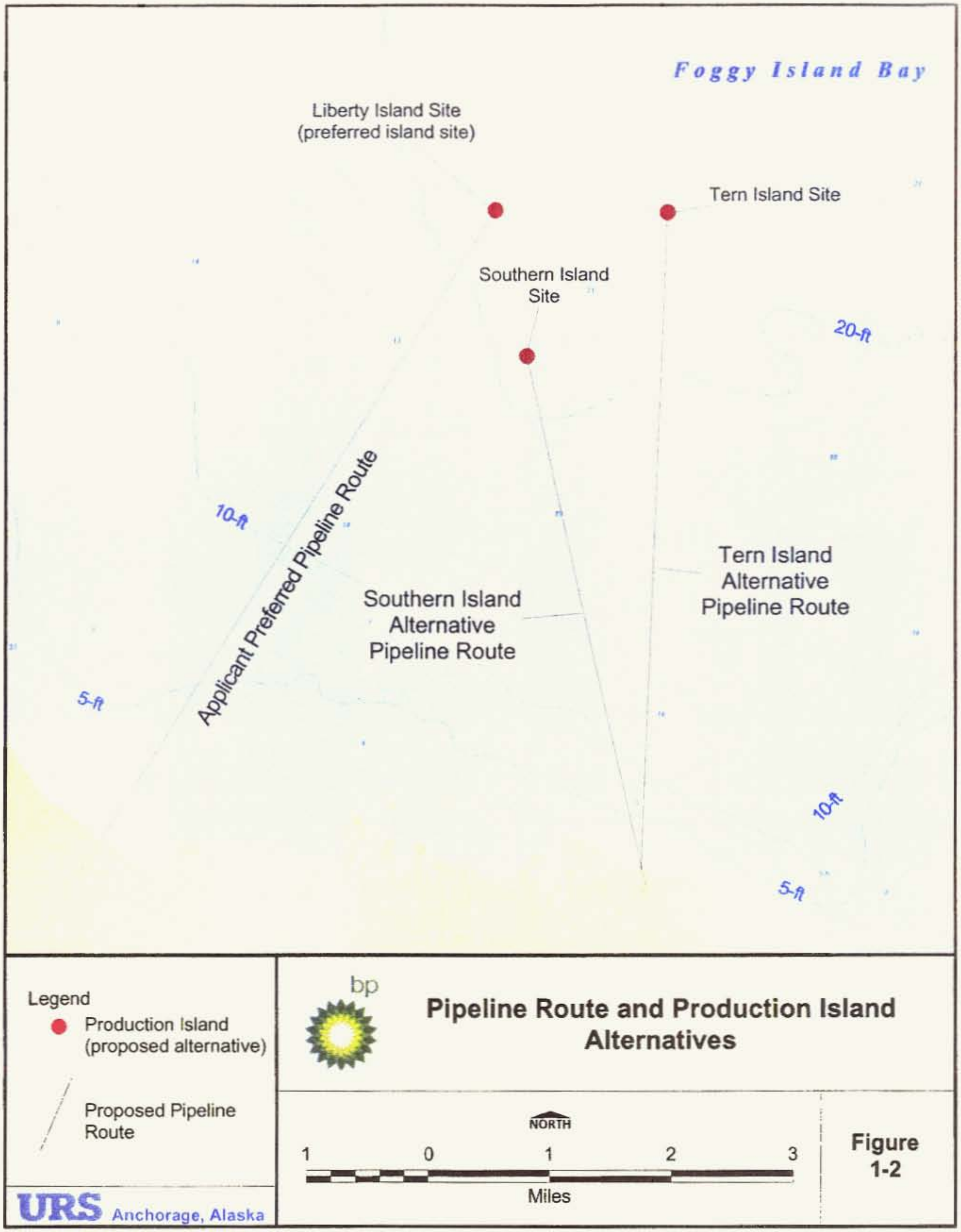

Pipeline Route and Production Island Alternatives

Figure 1-2

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The sediment sampling program is part of a baseline data collection survey to support permit activities associated with the Liberty Development. The goal of the sediment sampling plan is to describe the natural concentrations and variability of selected physical and chemical parameters of sediment anticipated to be excavated and used as fill or disposed via ocean dumping.

This sampling program has three objectives based on the Corps and EPA requirements:

- Collect sediment quality samples from the seafloor (i.e., surficial samples) to determine whether a larger group of chemicals-of-concern (CoCs) identified by the EPA exceeds regulatory screening levels as presented in *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998);

- Collect representative sediment quality samples of the proposed excavated material to determine if any of the CoCs identified by the EPA exceed regulatory screening levels as presented in the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998); and

- Collect representative samples of the proposed excavated material to ascertain the grain-size distribution, including silt and clay sized particles. This information will support the Corps' SSFATE modeling effort to predict suspended sediment transport associated with pipeline construction.

3.1 DEVELOPMENT ALTERNATIVES

The Liberty Development oil and gas production facilities will be placed on an artificial gravel island located in Federal OCS waters within Foggy Island Bay (Figure 1-1). A subsurface (buried) sales quality oil pipeline will connect to an onshore segment to transport oil to the Badami Sales Oil Pipeline. The applicant preferred island site – Liberty Production Island – is in approximately 22 feet of water. The offshore pipeline segment will follow a nearly straight route from the island to a landfall located about 6.1 miles to the southwest. The alternative Southern Island is in 18 feet of water located approximately 1.5 miles south-southeast of the proposed Liberty Island. The marine pipeline segment for the South Island alternative would extend toward the southeast approximately 4.2 miles until landfall. The alternative Tern Island is located in 23 feet of water, 5.5 miles offshore in Foggy Island Bay. Tern Island is approximately 1.5 miles east of the proposed Liberty Island location. The Tern Island alternative pipeline length is 8.6 miles with the offshore portion approximately 5.5 miles. The Southern Island and Tern Island offshore pipeline routes would reach landfall at the same location.

3.2 PHYSICAL PROCESSES AFFECTING FOGGY ISLAND BAY

Within Foggy Island Bay, the local input of fresh water from the Sagavanirktok River strongly influences water quality. The Sagavanirktok River delta forms the western shore of Foggy Island Bay and its eastern distributary discharges directly into the embayment. In Foggy Island Bay, as elsewhere along the entire Beaufort Sea coast, water column movements are due almost entirely to the frictional stress of wind on the water surface. Under prevailing east winds, the fresh water discharge typically flows along shore, around Point Brower and toward the west. For west wind conditions, the fresh water discharge flows directly into Foggy Island Bay.

Suspended sediment is introduced naturally to the marine environment through river runoff and coastal erosion (MMS 1996), which is resuspended during summer by wind and wave action. Satellite imagery and suspended particulate matter data suggest that turbid water generally is confined to depths less than 16 feet. In mid-June through early July, the shallow nearshore waters generally carry more suspended sediment as a result of increased sediment loads discharged from the Sagavanirktok, Kadleroshilik and Shaviovik Rivers. Storms and their associated winds and coastal erosion periodically increase turbidity in shallow waters during the open water season.

During the summer open-water season, the timing and rate of discharge from the Sagavanirktok, Kadleroshilik, and Shaviovik rivers determine the amount of freshwater available for distribution in the marine environment of Foggy Island Bay. Sea ice breakup typically occurs in late June to early July. As warming continues into summer, the sea ice melts, resulting in about 75-90 days of open water. After sea ice breakup, wind speed and direction become the key factor in determining the fate of freshwater advected along the coast. Wind speed and direction also influence water level variations, which in turn play a key role in the exchange rates between brackish nearshore and offshore marine waters. Other agents controlling currents include the small tides and occasionally large storm surges, and more locally, river discharge adjacent to river deltas.

During winter, the Beaufort Sea is covered by sea ice that begins to form in late September. Freezeup of the waters is completed by the end of October, with ice growing to a maximum thickness by April. Ice cover persists on average for 290 days until spring warming results in river breakup, and subsequent sea ice melting near the river and stream deltas. Under ice observations in the Beaufort Sea indicate that very low-speed currents are aligned with bathymetry, which result in an easterly or westerly flow.

Ice gouging and scouring are other mechanisms by which seafloor sediments are affected. Moving ice interacts with the seafloor to form gouges that displace or rework the soils. Ice gouging occurs when the bottoms of ice floes (i.e., keels) contact the seafloor. Ice motion is directed by wind, current, and pack ice pressures. Hydraulic scour occurs before the melting and breakup of the land fast sea ice, when the Sagavanirktok River waters flood the surface of coastal sea ice. The fresh water overflow drains through holes or cracks in the ice, creating a subsurface whirlpool that erodes the seafloor into roughly circular depressions–strudel scours (Watson Company 1998).

3.3 SITE HISTORY

In the winter of 1982, Shell Oil Company constructed Tern Island at the mouth of Foggy Island Bay to support exploratory drilling. Wastewater discharge permits under the National Pollutant Discharge Elimination System (NPDES) allowed for the discharge of potassium chloride drilling muds, cuttings, and fluids onto the surrounding sea ice during winter and direct discharge into Beaufort Sea waters during the summer open-water season. A total of 2,800 barrels (bbl) of drilling effluents were discharged between June and August 1982 on the northwest side of Tern Island, approximately 50 feet (ft) (15 meters [m]) from the island shoreline (NORTEC 1983). During the winter, approximately 700 bbl of drilling effluents were transported to a sea ice disposal area approximately 500 feet (150 m) northwest of the island. Well cuttings were transported by heavy equipment and placed on the island slope immediately adjacent to the drilling effluent outfall during periods of open water. The island slope was sufficient for the well cuttings to move down slope, resulting in deposition on the submerged island slope.

In the winter of 1997, BPXA drilled an exploration well (Liberty #1) on Tern Island. Drilling muds and cuttings, deck drainage, sanitary and domestic wastewater, and miscellaneous wastes including excess cement slurry, and desalination unit wastes were discharged into Foggy Island Bay under the NPDES permit. Approximately 16,200 bbl of muds and cuttings were transported to a sea ice disposal site located approximately 7,000 feet (2,100 m) southeast of Tern Island in 18 to 20 feet of water. Sanitary and domestic wastewater discharges were placed at the muds and cuttings disposal site, or discharged through a line with an outfall on the southeast side of Tern Island. Bioassays indicated that the drilling fluid was nontoxic (AMBAR Technical Labs 1997).

It is unlikely that the sediments along or near the applicant's preferred or alternative pipeline routes have been disturbed by past activities. Past activities occurred east and north of the pipeline route, were of limited duration, and resulted in minimal discharge of drilling muds and cuttings. Geophysical surveys conducted throughout the Liberty Development Project area did not identify any anthropogenic (i.e., man-made) structures or observable effects from human-use activities. With the exception of drillings muds and cuttings discharged immediately adjacent to

Tern Island during exploration drilling in the early 1980s and 1997, there are no other known potential sources of contamination. Prevailing currents produce a net westward drift, placing the Prudhoe Bay coastal oil production facilities down current of Foggy Island Bay.

Access to Foggy Island Bay is limited to marine vessels during the brief summer open-water season and tundra travel vehicles during the winter. During autumn freeze-up and spring ice breakup there is virtually no surface accessibility. Foggy Island Bay is occasionally used by the local native population for subsistence hunting and fishing. There are no industrial or military activities operating within the bay, with the exception of occasional geophysical exploration surveys.

3.4 RESULTS OF PREVIOUS INVESTIGATIONS

Two geotechnical investigations (Duane Miller & Associates 1997, 1998), two sediment quality studies (Montgomery Watson 1997, 1998), and two geophysical hazard surveys (Watson Co. 1998a, 1998b, 1998c) provide a comprehensive understanding of the sediments encountered along the applicant's proposed pipeline route and production island location. No evidence of any anthropogenic features or disturbance was found by these studies. Following is a summary of the current understanding of the site.

3.4.1 Geophysical Hazard Surveys

High-resolution geophysical data were collected in the summer of 1997 to identify geological hazards and man-made materials that could affect or alter the design of the proposed Liberty Development (Watson Company 1998a). This was a comprehensive survey, which included geophysical data from high-resolution multi-channel seismic systems, digital side-scan sonar, and a sub-bottom profiler. No man-made structures or evidence of human-use activities were identified.

Watson described the seafloor as gently undulating, although a northwest-southeast ridge with 3 to 6 feet (1 to 2 m) of relief was delineated west of the applicant's preferred gravel island. Interpretations of side-scan sonar records indicated seafloor sediments with greater than 25 percent boulders and cobbles are situated west and northwest of the proposed gravel island. Watson noted that the seafloor areas, characterized by boulders and cobbles, are considered to be lag deposits of Pleistocene origin and were formed by the erosion of the Flaxman marine units of the Gubik Formation. These lag deposits are exposed on the seafloor where Holocene (recent) sediments are absent (Watson Company 1998a).

Analysis of geophysical records determined that approximately 75 percent of the 1997 survey area consists of Holocene fine-grained materials characterized by low reflectivity with few boulders (Watson Company 1998a). Watson states that the Holocene sediments are relatively thin, less than 8.5 feet (2.6 m), with distributions characterized as small patchy accumulations of soft mud. While the deposits are considered to be marine sediments, the source may be fine-grained silts and clays discharged from the Sagavanirktok River (Watson Company 1998a).

3.4.2 Geotechnical Investigations

Duane Miller & Associates conducted geotechnical exploration surveys in 1997 and 1998 along possible pipeline alignments, including the selected route. The 1998 survey, which included 18 borings along the applicant's preferred pipeline route, yielded the following information.

Seafloor sediments at the island location can be divided into three primary horizons: the upper Holocene non-plastic silt; the intermediate Pleistocene clayey silt; and the underlying granular sand and gravel (Duane Miller & Associates 1998). No frozen soils were encountered at any location along the offshore pipeline route. Soft silts were documented from the seafloor (0 feet) to a depth of 4 to 6 feet. The underlying stiff clayey silt horizon reached depths between 18 to 21.5 feet. This stratigraphy corresponds with the relatively flat seafloor with depths averaging 22 feet (Figure 3-1).

The seafloor rises gently from the 22-ft isobath to the 15-ft isobath where the sediments typically consists of sand, silty sand with some soft silt, and many pockets and layers of peaty soil. One 4.5-ft thick shoal consisting of uniform fine-grained, clean sand was identified in 15 feet (4.6 m) of water.

The sediments found in water depths between the 15-ft and 7-ft isobaths are silty sands interbedded with medium stiff silt to a depth of 10 feet. Stiff silt underlain by sandy gravel are found below the silty sands.

Between the 7-ft and 4-ft isobaths, the dominant material is silty sand with thin interbeds of silt and thin organic rich layers. The underlying gravelly sand is shallower than the pipeline depth at Boring D-16 (Figure 3-2).

Sediments from water depths less than 4 feet and extending to the shoreline consist of thin surface layers of sand and soft silt with the underlying sand and gravel at shallow depths 5 to 6 feet. Frozen ice bound sediments were observed up to 230 feet north of the shoreline.

Figure 3.1 Offshore Pipeline Route Cross-Section (from Island to Boring D-11)

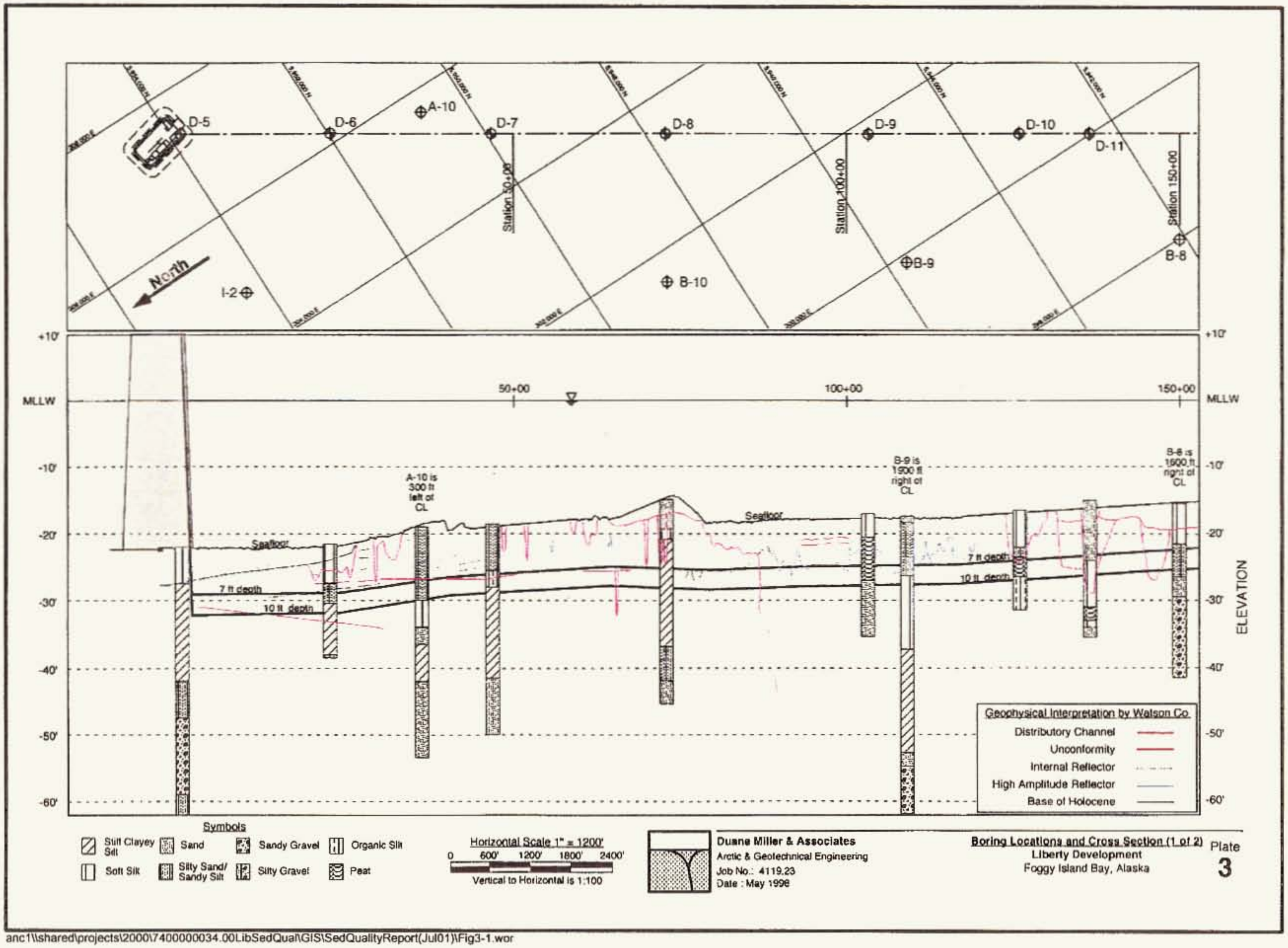

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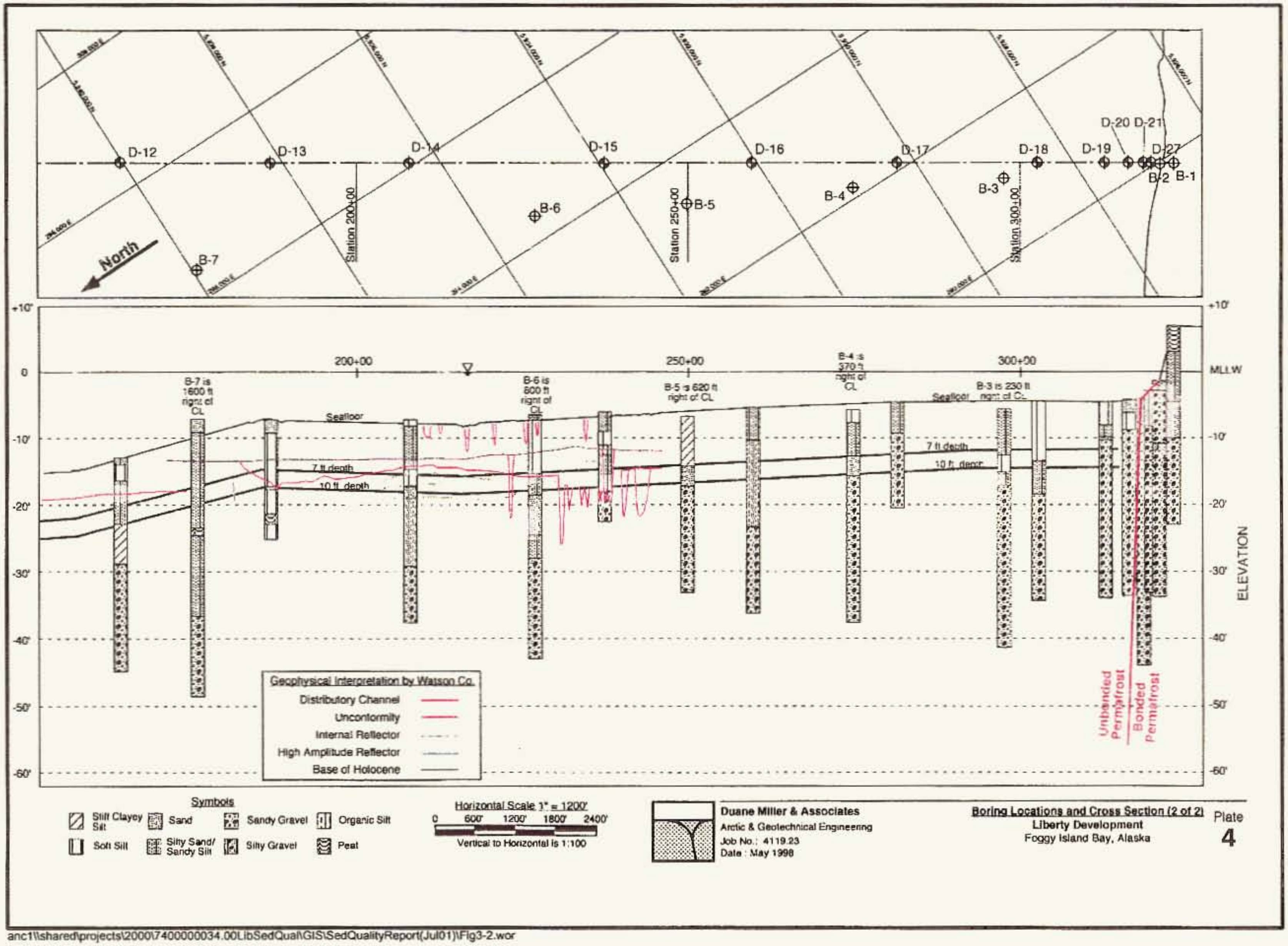
Figure 3.2 Offshore Pipeline Route Cross-Section (from Boring D-12 to shore)



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3.4.3 Sediment Quality and Geochemistry Studies

Numerous sediment samples from Foggy Island Bay have been analyzed to quantify natural background concentrations of selected heavy metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and petroleum hydrocarbons (NORTEC 1983; Montgomery Watson 1997, 1998). Prior to 1982, no petroleum exploration occurred within Foggy Island Bay. Accordingly, the samples collected by NORTEC in 1983, prior to drilling of the first well in Foggy Island Bay (Shell Oil Tern #1) served to establish the natural background concentrations.

Barium concentrations for five samples collected at one location prior to 1982 drilling activities ranged from 210 to 9,040 milligrams per kilogram (mg/kg). Further analyses indicated that the seafloor sediments in the Beaufort Sea are heterogeneous with a patchy nature; that is, it is not uncommon to find large variations in sediment grain-size and trace metal concentrations among samples taken at the same location (NORTEC 1983). The natural variability in these sediments is reflected in lead concentrations found in sediments collected in the western half of Foggy Island Bay during evaluation of several proposed pipeline routes associated with the Liberty Development (Montgomery Watson 1997).

Table 3-1 is a statistical summary of selected heavy metal concentrations for sediments collected throughout the Beaufort Sea and within Foggy Island Bay. Within Foggy Island Bay, arsenic, chromium, and mercury exhibit consistent concentrations, while barium and lead tend to be variable. On average, metal concentrations from the pipeline route studies (Montgomery Watson 1997, 1998) are lower than results from the study conducted prior to exploratory drilling in 1982 (NORTEC 1983). Also, most of the heavy metal results from samples collected from Foggy Island Bay are within the range of concentrations found throughout the Beaufort Sea. The only exception is chromium, of which Foggy Island Bay sediments contained a maximum concentration of 34 mg/kg (Montgomery Watson 1997).

In 1998, Montgomery Watson collected samples at three depths below the seafloor to describe the sediment chemistry along the applicant's preferred pipeline route. All heavy metals and VOCs, were uniformly below the screening levels set forth by the Puget Sound Dredged Disposal Analysis, which was developed for dredging operations by EPA Region X (Seattle), Corps, and the Washington State Department of Natural Resources and Ecology. One sample collected approximately 9 feet below the seafloor contained 4-Methylphenol (p-Cresol), a SVOC, at a concentration that was above the minimum screening level. However, this sample was collected approximately 1970 feet (600 m) northwest of the proposed gravel island, and outside the proposed pipeline trench.

Analyses of samples collected throughout the western portion of Foggy Island Bay in 1997 demonstrated a positive linear correlation between chromium and lead concentrations. Also, barium and arsenic levels increased proportionally with increasing chromium concentrations. Similarly, the relationship of these metals to grain-size reflects a positive linear trend. The samples collected represent undisturbed subsurface strata, and thus, the positive linear relationships found between the metals and similar relationships between metals and grain-size describe naturally existing baseline conditions. It was interesting to note that sediment chemistry analysis did not delineate any differentiation between Holocene and Pleistocene sediments.

Table 3-1 Heavy Metal Concentrations for Sediments

Investigation	Location	Arsenic (mg/kg)	Barium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)
1982 Tern Island (NORTEC 1983) [1]	Foggy Island Bay	no analysis	30 minimum **121 (537[†])** average 360 (9040[†]) maximum	13 minimum **19** average 27 maximum	12 minimum **16** average 20 maximum	no analysis
Proposed Liberty Pipeline Routes (Montgomery Watson 1997)	Foggy Island Bay	3 minimum **5.5** average 11.4 maximum	29 minimum **67.5** average 194 maximum	7.2 minimum **18.5** average 34 maximum	2.79 minimum **10.1** average 67.8 maximum	No Detect minimum **0.24** average 1.35 maximum [‡] all sample results are estimates due to failed precision criteria. The relative percent difference (RPD) for duplicate analyses exceeded acceptance limits.
Selected Liberty Pipeline Route (Montgomery Watson 1998)	Foggy Island Bay (pipeline route)	3.3 minimum **5.5** average 11.2 maximum	23 minimum **45** average 86 maximum	5.4 minimum **12.2** average 27 maximum	2.2 minimum **5.4** average 13.9 maximum	No Detect minimum **0.035** average 0.085 maximum
Northstar Development Pilot Offshore Trenching Program (Montgomery Watson 1996)	Offshore of Stump Island (Site C)	5.0 minimum **7.1** average 16 maximum	46 minimum **63** average 122 maximum	10 minimum **16.6** average 21 maximum	No Detect minimum 23 maximum	Not detected
Beaufort Sea Planning Area Oil & Gas Lease Sale 144 (MMS 1996) [2]	Beaufort Sea	no analysis	185 minimum 745 maximum	17 minimum 19 maximum	3.9 minimum 20 maximum	0.02 minimum 0.09 maximum

[1] Samples collected prior to exploratory drilling.

[2] Regional summary

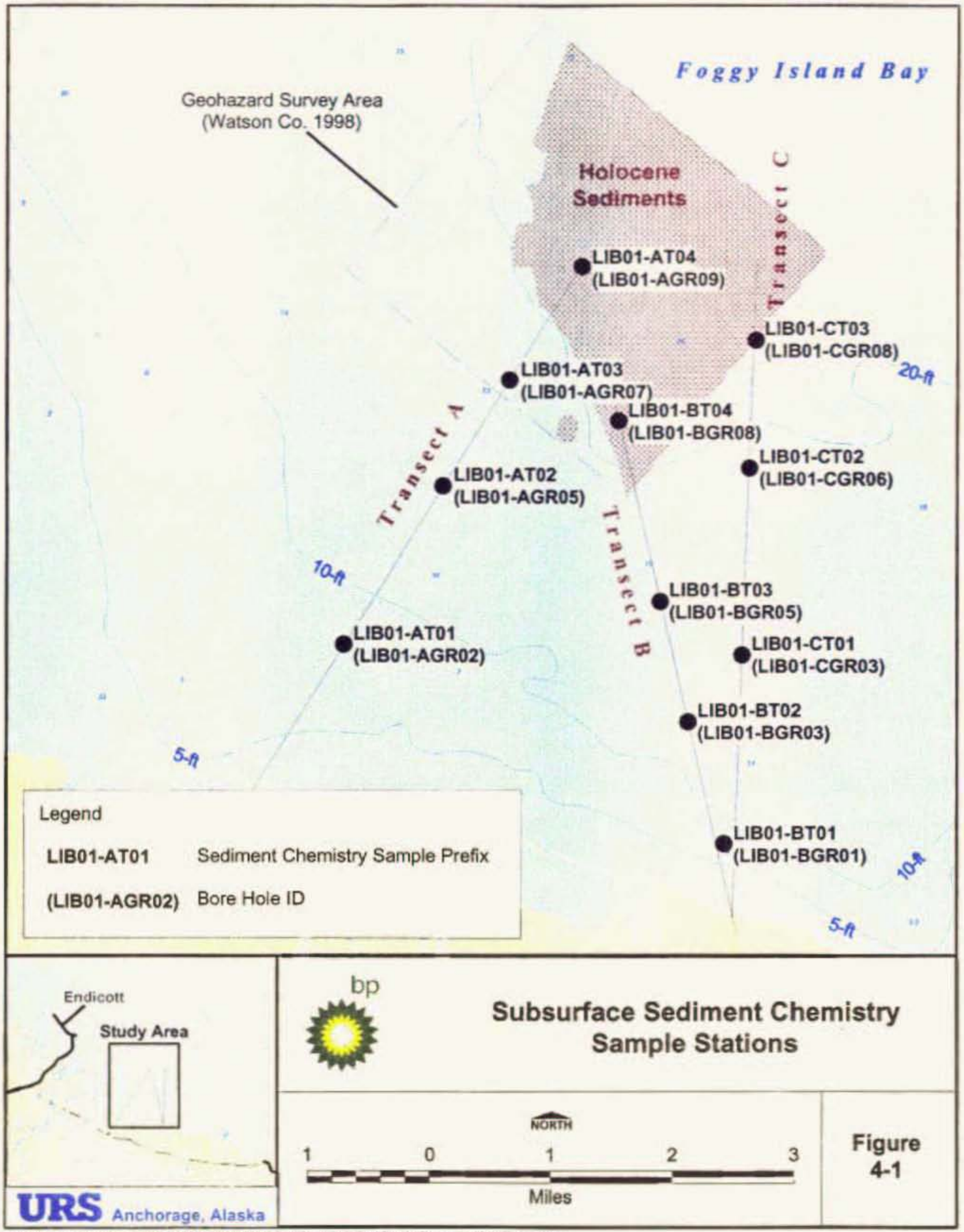
[†] Five samples collected at Station 1 resulted in barium concentrations ranging from 120 to 9040 mg/kg.

4.1 FIELD ACTIVITIES

The sediment sampling program was based on the *Liberty Development 2001 Sediment Quality Study Work Plan*, and field activities for this study were conducted between April 25th and May 8th, 2001. The field team successfully collected a representative sample set along the three alternative pipeline routes based on statistical performance criteria noted in the Work Plan (see Appendix A, Section 4.2.2). The Liberty Island (applicant's preferred) route was designated Transect A. Survey Transects B and C followed the Southern Island and Tern Island pipeline routes respectively. Twenty stations were occupied during the sampling effort. Sampling methods and other field protocols were completed as described in the Work Plan (Appendix A). Appendix C provides a summary of the field activities, including a description of other operations that affected the field program.

A sampling priority plan was developed due to tundra travel closure potential, inclement weather and time constraints. Sampling proceeded according to scheme intended to maximize the likelihood that a representative number of samples would be collected.

- Subsurface chemistry and the associated grain size samples were collected first, beginning with Transect A stations and continuing to Transect B and C stations, respectively. This west to east order followed the route of cleared trails on the ice after leaving the Prudhoe Bay in-field road system. Approximately 94 percent (%) of the subsurface sediment chemistry samples (51 total) were collected (Figure 4-1). All of the subsurface sediment chemistry sampling was completed; however, there was low sample recovery at two stations, BGR03 and BGR05, due to heaving, fluid (completely saturated) sands. Thus, a total of three samples from the two stations were not submitted for analysis as originally detailed in the Work Plan.
- Secondly, surface sediment chemistry and the associated grain size samples were collected from east to west along the cleared trails. 100% of surface chemistry samples (4 total) were collected (Figure 4-2).
- Finally, the outstanding grain size samples were collected as time allowed, commencing with Transect A stations, which were the nearest stations to the surface sediment locations, and proceeded from west to east. Although all attempts were made to complete the planned sampling as detailed in the Work Plan, the drilling and sampling program was terminated on May 6th, 2001 due to time constraints. At that time, Transect A grain size sampling had been completed and approximately 61 percent of the grain-size samples (68 total) had been collected (Figure 4-3). The drilling and sampling program proceeded at a slower pace than originally planned due to a number of unforeseen difficulties. A delay in the seal structure identification was encountered, due to a delay in obtaining a letter of authorization (LOA) from the US Fish and Wildlife Service (USFWS). The presence of Western GeoCo geophone cable lines increased the one way travel time to approximately three (3) hours and prevented efficient usage of CATCO trails. Weather, seal structures and the geophysical survey caused delays throughout the program.



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Subsurface Sediment Chemistry Sample Stations

Figure 4-1

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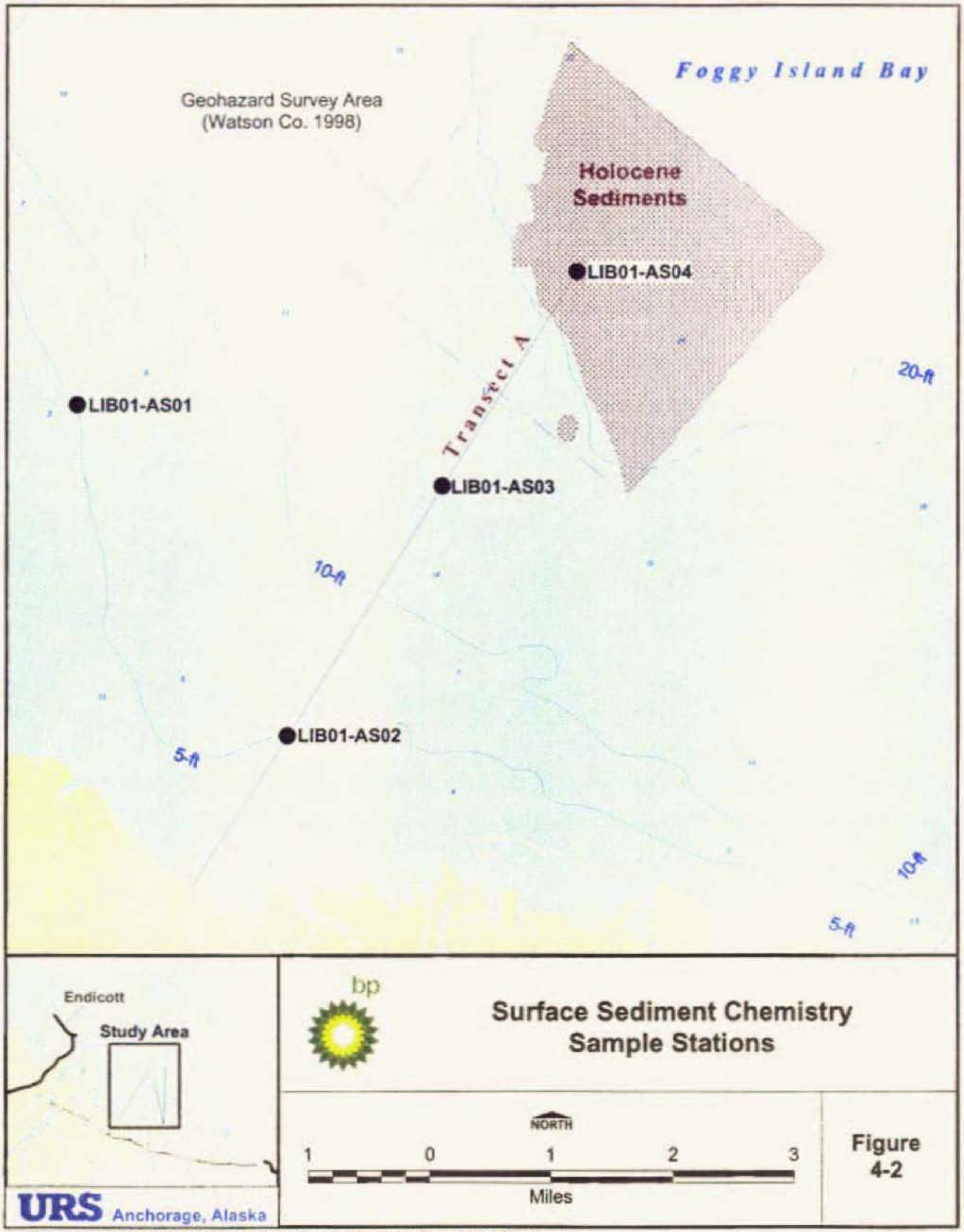

Surface Sediment Chemistry Sample Stations

Figure 4-2

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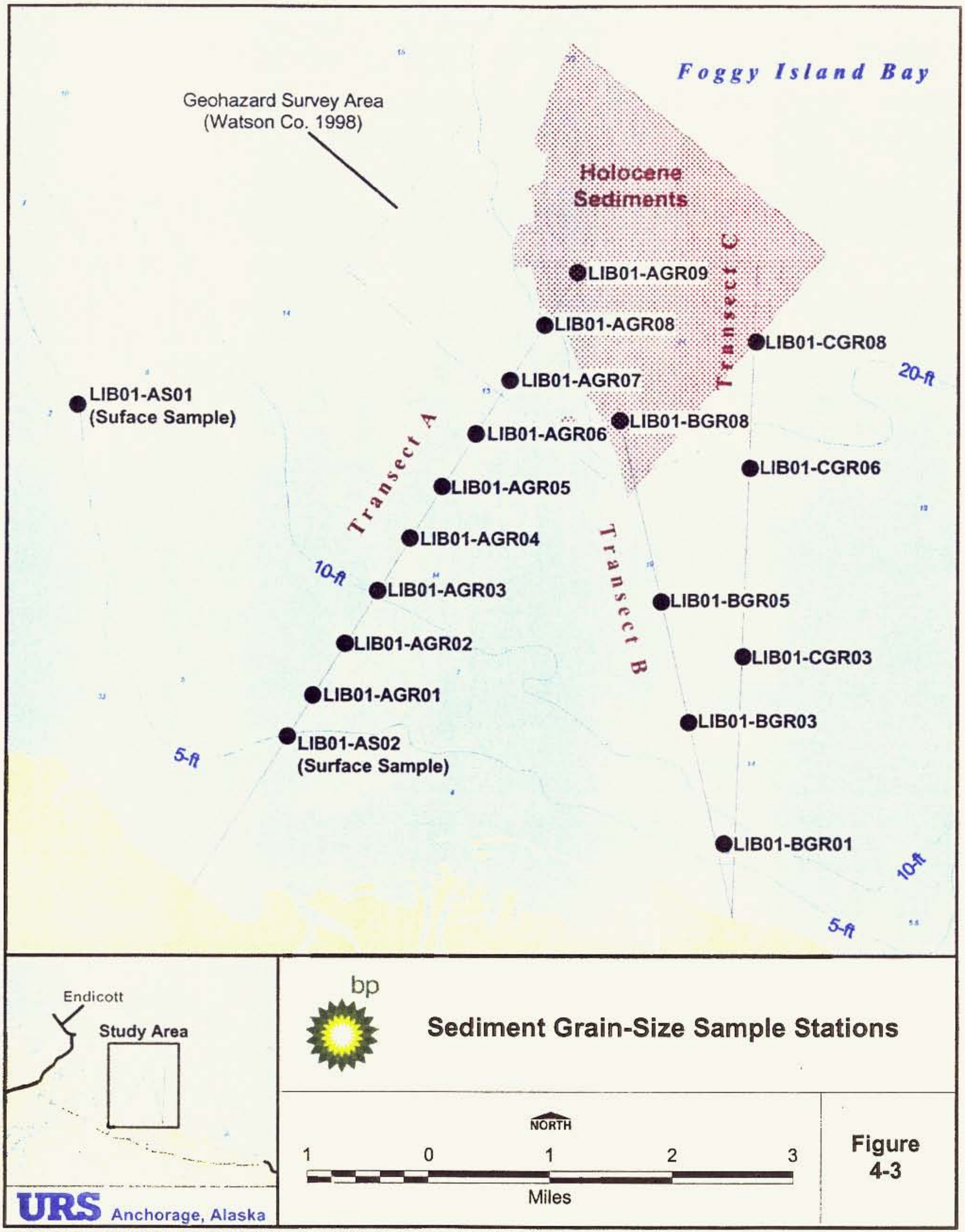

Sediment Grain-Size Sample Stations

Figure 4-3

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As specified in the Work Plan, samples were collected at four depths at a minimum of four stations along each of the three transects, fulfilling the statistical requirements of the stratified systematic sampling design. This design, intended to provide statistically sufficient characterization of sediment chemistry and thus grain size data, was based on EPA (1992) guidance and statistical methods summarized by Gilbert (1987). However, as noted above, not all of the grain-size samples were collected as initially prescribed by the Corps.

4.2 SURFACE SEDIMENT CHEMISTRY RESULTS

Four surficial sediment samples were collected from stations in the study area at depths ranging from the surface to 0.5 feet below the existing seafloor (Figure 4-2). Table 4-1 presents a complete list of the chemical and physical parameters analyzed by an independent laboratory and the reported minimum, maximum, and average concentrations.

The EPA and Corps have not promulgated guidance for environmental evaluation of dredging activities specific to Alaska. However, guidance exists for the Lower Columbia River and other Pacific Northwest estuaries in the form of the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998). EPA Region X directed that this guidance be applied to the Liberty Development sampling program. Screening levels for specific chemicals-of-concern (CoCs) are provided in Table 4-1.

Metal and PAH analyses conducted on the sediment samples collected for this baseline study resulted in concentrations consistently less than the regulatory screening levels (Table 4-1). Notable results are summarized below for select physical properties and the CoCs. The quality control/assurance (QA/QC) for all laboratory analyses is summarized in Appendix E and laboratory results for all sample analyses are presented in Appendix F.

Physical properties and conventional chemicals-of-concern:

- Ammonia as Nitrogen: Concentrations generally increased toward the north (offshore). Station AS02 exhibited the lowest concentration at 0.7 milligram per kilogram (mg/kg) and Station AS04 the highest at 3.3 mg/kg. Stations AS01 and AS03 (Figure 4-2) had similar concentrations ranging of 2.6 mg/kg and 2.4 mg/kg, respectively.
- Total Organic Carbon (TOC): Results ranged from 8,000 mg/kg (0.8 percent) TOC, for Station AS02, to 40,400 mg/kg (4.04 percent) for Station AS01.
- Total Volatile Solids (TVS): Sample results showed a distribution similar to that of TOC. Results ranged from 12,700 mg/kg (1.27%) in a sample collected at the nearshore Station AS02 to 46,500 mg/kg (4.65%) in a sample collected at Station AS01.
- Sulfides: Sulfides were detected in all samples, with the lowest concentration, 51.6 mg/kg, reported in a sample collected at the nearshore Station AS02. The highest concentration, 882 mg/kg, was measured from a sample collected at Station AS01.

Metals:

- All sediment analyses for the selected metals resulted in concentrations lower than (below) the screening levels prescribed *in Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998). See Table 4-1.

- Measurable concentrations of all metals were found in all surface sediment samples.
- Mercury was detected in low (≤ 0.05 mg/kg) concentrations near the method detection limit (MDL).
- Antimony concentrations were lower than 0.2 mg/kg for all samples. The highest concentration reported was for a sample collected at Station AS04 at 0.17 mg/kg.
- Silver concentrations were lower than or equal to 0.105 mg/kg for all samples. The highest concentration reported was for Station AS04 at 0.105 mg/kg.

Polycyclic Aromatic Hydrocarbons (PAH):

- All sediment samples analyzed for PAH compounds indicated concentrations lower than (below) the screening levels prescribed in *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998). See Table 4-1.
- With the exception of 14 µg/kg of phenanthrene measured in a sample collected at Station AS03, the low molecular weight PAH (LPAH) and high molecular weight PAH (HPAH) compounds were not detected above the method reporting limit (MRL) in the surface sediment samples. Only estimated (J) values are reported.

Additional Analyses:

Additional analyses were performed on the four surface samples. The samples were analyzed for pesticides, PCBs, semi-volatile organic compounds (SVOC) and select volatile organic compounds (VOC). The majority of the analytes were not present in measurable quantities. Estimated (J) values near the MDLs were reported for select compounds not present at concentrations above the method reporting limits.

Table 4-1 Surface Sediment Chemistry Results and Screening Levels

Chemical	Screening Level	Minimum Result	Maximum Result
Physical Properties and Conventional Chemicals of Concern			
Total Solids (Percent)	--	68	79.7
Total Volatile Solids (Percent)	--	1.27	4.65
Total Organic Carbon (Percent)	--	0.8	4.04
Total Sulfides (mg/kg)	--	51.6	882
Ammonia as Nitrogen (mg/kg)	--	0.7	3.3
Metals (mg/kg)			
Antimony	150	0.1	0.17
Arsenic	57	4.6	8
Barium	--	29.5	58.5
Cadmium	5.1	0.11	0.34
Calcium	--	25100	73200
Chromium	--	8.51	13
Copper	390	6.29	15.1
Iron	--	11300	16500
Lead	450	6.03	9.29
Manganese	--	142	256
Mercury	0.41	0.01 B	0.05
Nickel	140	12.4	20.7
Silver	6.1	0.033	0.105
Zinc	410	34.9	57.8
Organics (mg/kg)			
Low Molecular Weight Polynuclear Aromatic Hydrocarbons (mg/kg)			
2-Methylnaphthalene	670	ND (3.8)	12 J
Acenaphthene	500	ND (3.7)	ND (4.1)
Acenaphthylene	560	ND (2.3)	ND (2.6)
Anthracene	960	ND (2.9)	ND (3.7)
Fluorene	540	ND (3.3)	ND (3.6)
Naphthalene	2,100	ND (2.3)	6.7 J
Phenanthrene	1,500	4.1 J	15 J
High Molecular Weight Polynuclear Aromatic Hydrocarbons (mg/kg)			
Benzo(a)anthracene	1,300	ND (1.8)	3.1 J
Benzo(a)pyrene	1,600	ND (1.2)	3.8 J
Benzo(b+k)fluoranthene	3,200	ND (2.8)	4 J
Benzo(g,h,i)perylene	670	ND (1.3)	4 J
Chrysene	1,400	2.7 J	7.6 J
Dibenzo(a,h)anthracene	230	ND (1.3)	2.3 J
Fluoranthene	1,700	ND (3.2)	ND (4)
Indeno(1,2,3-cd)pyrene	600	ND (0.64)	ND (0.74)
Pyrene	2,600	ND (3.7)	7.8 J

Table 4-1 (Cont.) Surface Sediment Chemistry Results and Screening Levels

Chemical	Screening Level	Minimum Result	Maximum Result
Chlorinated Hydrocarbons (mg/kg)			
1,3-Dichlorobenzene	170	ND (0.9)	ND (1)
1,4-Dichlorobenzene	110	ND (1)	ND (2)
1,2-Dichlorobenzene	35	ND (0.9)	ND (1)
1,2,4-Trichlorobenzene	31	ND (3.3)	ND (3.9)
Hexachlorobenzene (HCB)	22	ND (3.8)	ND (4.9)
Phthalates (mg/kg)			
Dimethyl Phthalate	1,400	ND (3.4)	ND (4.1)
Diethyl Phthalate	1,200	ND (4)	ND (4.7)
Di-n-butyl Phthalate	5,100	ND (3.7)	ND (4.1)
Butyl Benzyl Phthalate	970	ND (2.2)	ND (2.5)
Bis(2-ethylhexyl)phthalate	8,300	ND (200)	ND (230)
Di-n-octyl Phthalate	6,200	ND (2.3)	ND (2.6)
Phenols (mg/kg)			
Phenol	420	24 J	35 J
2-Methylphenol	63	ND (3)	ND (3.8)
4-Methylphenol	670	ND (3.4)	9.2 J
2,4-Dimethylphenol	29	ND (19)	ND (27)
Pentachlorophenol	400	ND (3)	ND (3.8)
Miscellaneous Extractables (mg/kg)			
Benzyl Alcohol	57	ND (3.5)	ND (4.5)
Benzoic Acid	650	37 J	57 J
Dibenzofuran	540	ND (3.6)	ND (4.7)
Hexachloroethane	1,400	ND (2.9)	ND (3.7)
Hexachlorobutadiene	29	ND (3.5)	ND (4.5)
N-Nitrosodiphenylamine	28	ND (3.5)	ND (3.9)
Pesticides and PCBs (mg/kg)			
Total DDT	6.9	ND (0.2)	0.3 J
(sum of 4,4'-DDD, 4,4'-DDE and 4,4'-DDT)			
Aldrin	10	ND (0.3)	ND (0.4)
a-Chlordane	10	ND (0.2)	ND (0.2)
Dieldrin	10	ND (0.4)	ND (0.5)
Heptachlor	10	ND (0.2)	ND (0.2)
g-BHC (Lindane)	10	ND (0.4)	ND (0.7)
Total PCBs	130	ND (3)	ND (3)

Notes:

1 *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998);

-- No screening level

J The result is an estimated concentration that is less than the MRL but ≥ the MDL.

ND Analyte Not Detected, the maximum method detection limit (MDL) is shown in parentheses as applicable

4.3 SUBSURFACE SEDIMENT CHEMISTRY RESULTS

Ninety-four subsurface sediment samples were collected from stations aligned along the three alternative pipeline routes (Figure 4-1). Table 4-2 presents a complete list of the chemical and physical parameters analyzed by independent laboratories and the reported minimum, maximum, and average concentrations and the regulatory screening levels as listed in the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998). Analyses conducted on the sediment samples collected for this baseline study resulted in concentrations consistently less than the screening levels (Table 4-2). Notable results are summarized below for physical properties and the CoCs.

Physical properties and conventional chemicals-of-concern:

- Ammonia as Nitrogen: Sample results indicate two positive trends: a depth relationship where ammonia as nitrogen concentrations increased with depth below the seafloor; and a nearshore/offshore trend where concentrations were notably higher for offshore sediments as compared to nearshore sediments. However, there were two exceptions, Stations CGR06 and CGR08. These stations had similar concentrations ranging from 3.8 mg/kg (3-4 feet) to 49.7 mg/kg (7.8-8.8 feet). The highest concentrations reported were for sediments collected at Stations AGR09 (11.5-12.5 feet) and BGR08 with results up to 710 mg/kg. The only sample having no ammonia as nitrogen reported was the near surface sediment sample collected at Station BGR01 (1.5-2.5 feet), non-detect (ND) at 0.3 mg/kg. The deepest sample at Station BGR01 (13-14 feet) had the lowest concentration reported at all depths of all samples taken, at 0.7 mg/kg.
- Total Organic Carbon (TOC): Results ranged from 2,200 mg/kg (0.22 percent) in a sample collected at Station BGR01 (5.5-6.5 feet) to 147,000 mg/kg (14.7 percent) TOC in a sample collected at Station AGR05 (4.5-5.5 feet, peat). Coarse-grained offshore sediments collected in shallow nearshore waters (Station BGR01 [sand]) exhibited the lowest concentrations. TOC levels tended to increase as the percentage of fine-grained (silt and clay) surficial sediment increased.
- Total Volatile Solids (TVS): Sample results showed a distribution similar to that of TOC. Results ranged from 7,100 (0.71%) in a sample collected at the nearshore Station BGR01 (13-14 feet, gravel) to 264,000 (26.4%) in a sample collected at Station AGR05 (4.5-5.5 feet, peat).
- Sulfides: Sulfides were detected in all samples. The lowest concentration, 18.8 mg/kg was reported in a sample collected at the nearshore Station BGR01 (1.5-2.5 feet). The highest concentration, 3,290 mg/kg was present in a sample collected at Station AGR02 (11.5-12.5 feet, organic silt).

Metals:

- All sediment analyses for the selected metals resulted in concentrations lower than (below) the screening levels prescribed *in Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998). See Table 4-2.

- Measurable concentrations of all metals were found in all of the samples with the exception of one analysis for cadmium at Station BGR01 (5.5-6.5 feet, sand) and one analysis for mercury at Station AGR02 (6.5-7.5 feet, silty sand).
- All reported cadmium concentrations were less than 1 mg/kg with the exception of samples taken at Station AGR05 (4.5-5.5 feet), which contained concentrations up to 1.12 mg/kg. These sample concentrations were notable as compared the other samples taken at the same station, but below the regulatory screening level of 5.1 mg/kg. The next highest concentration reported at the same station was 0.24 mg/kg (10-11 feet).
- Mercury was detected in low concentrations near the method detection limit (MDL). All samples contained mercury at concentrations less than or equal to 0.09 mg/kg.
- Antimony concentrations were lower than 0.35 mg/kg for all samples. The highest concentrations were reported for samples taken at Station AGR05 (4.5-5.5 feet, peat) and AGR09 (6.5-7.5 feet, silty sand and 11.5-12.5 feet, clayey silt).
- Silver was detected at concentrations lower than 0.3 mg/kg in all samples. Like antimony, the highest concentrations were reported for samples at Station AGR05 (0.267 and 0.297 mg/kg at 4.5-5.5 feet) and AGR09 (0.229 mg/kg at 6.5-7.5 feet, and 0.226 mg/kg at 11.5-12.5 feet). Additionally, one sample collected at Station AGR07 (1-2 feet, silty sand) contained silver at 0.266 mg/kg.

Polycyclic Aromatic Hydrocarbons (PAH):

- All sediment samples analyzed for PAH compounds resulted in concentrations lower than (below) the screening levels prescribed in *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998).
- The low molecular weight PAH (LPAH) compounds acenaphthene, acenaphthylene, and anthracene were not detected above the method reporting limit in the sediment samples. Only estimated (J) values are reported.
- The high molecular weight PAH (HPAH) compounds benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd) pyrene were not detected above the method reporting limit in the sediment samples. Only estimated (J) values are reported.
- All reported estimated concentrations for all PAH compounds were less than or equal to 52 parts per billion (ppb) or micrograms per kilogram (µg/kg). The maximum PAH concentration of 52 µg/kg were reported for 2-methylnaphthalene and phenanthrene at Station AGR07 (1-2 feet).

Table 4-2 Subsurface Sediment Chemistry Results and Screening Levels

Chemical	Screening Level	Minimum Result	Maximum Result
Physical Properties and Conventional Chemicals of Concern			
Total Solids (Percent)	--	43.7	93.1
Total Volatile Solids (Percent)	--	0.71	26.4
Total Organic Carbon (Percent)	--	0.22	14.7
Total Sulfides (mg/kg)	--	18.8	3290
Ammonia as Nitrogen (mg/kg)	--	ND (0.3)	710
Metals (mg/kg)			
Antimony	150	0.04 B	0.35
Arsenic	57	2.4	15.2
Barium	--	28.6	171
Cadmium	5.1	ND (0.03)	1.12
Calcium	--	2160	86600
Chromium	--	5.84	33.1
Copper	390	2.91	41.2
Iron	--	6620	36000
Lead	450	2.33	18.4
Manganese	--	52.7	738
Mercury	0.41	ND (0.01)	0.09
Nickel	140	6.48	47.1
Silver	6.1	0.02 B	0.297
Zinc	410	20.1	110
Organics (mg/kg)			
Low Molecular Weight Polynuclear Aromatic Hydrocarbons (mg/kg)			
2-Methylnaphthalene	670	ND (3)	52
Acenaphthene	500	ND (2)	2 J
Acenaphthylene	560	ND (2)	ND (3)
Anthracene	960	ND (2)	6 J
Fluorene	540	ND (2)	6.8
Naphthalene	2,100	ND (3)	28
Phenanthrene	1,500	ND (2)	52
High Molecular Weight Polynuclear Aromatic Hydrocarbons (mg/kg)			
Benzo(a)anthracene	1,300	ND (2)	6 J
Benzo(a)pyrene	1,600	ND (3)	5 J
Benzo(b+k)fluoranthene	3,200	ND (2)	12
Benzo(g,h,i)perylene	670	ND (2)	8
Chrysene	1,400	ND (3)	22
Dibenzo(a,h)anthracene	230	ND (2)	3 J
Fluoranthene	1,700	ND (2)	14
Indeno(1,2,3-cd)pyrene	600	ND (0.7)	3 J
Pyrene	2,600	ND (2)	14

Notes:

1 *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998);
-- No screening level
B The inorganic analyte result is an estimated concentration that is less than the MRL but ≥ to the MDL.
J The organic analyte result is an estimated concentration that is less than the MRL but ≥ to the MDL.
ND Analyte Not Detected, the maximum method detection limit (MDL) is shown in parentheses as applicable

4.4 GRAIN SIZE RESULTS

Grain-size sediment samples were collected at a minimum of four locations along each transect, with a total of 43 samples collected along Transect A, 15 along Transect B, and 20 along Transect C (including four samples collected from Station BGR01). Grain-size distribution data obtained from the 74 total samples collected in 2001 add to the existing knowledge base of Foggy Island Bay sediments, where 53 marine sediment samples were collected in 1997 and 34 samples were collected in 1998 (Duane Miller & Associates 1997, 1998).

- Sediments are predominantly clastic with organic silt and thin inter-bedded layers of peat. Silts and fine sands dominated the surficial sediment distribution for the offshore samples. Coarser-grained nearshore sediments transitioned to finer-grained sediments offshore as shown in boring logs presented in Appendix D (Duane Miller & Associates 2001).
- On average, sediments samples contained 62% fines (silt and clay).
- Sediment samples collected from offshore (water depths greater than 15 feet) boreholes contained 70% fines.
- Offshore sediments typically consisted of sand, silty sand, with some soft Holocene silt, and many pockets and layers of peaty soil. Organic silt generally was found overlaying firmer Pleistocene deposits (Duane Miller & Associates 2001).
- Sediment samples collected from nearshore (water depths less than 15 feet) boreholes contained 45% fines.
- Nearshore, sandy zones were more prevalent and in some cases dominant with sandy gravel found below (Duane Miller & Associates 2001).
- Complex features (e.g., distributary channels, submerged shoreface) identified in a geophysical survey conducted along Transect A (Figures 3-1 and 3-2) were not delineated along Transects B and C. Grain-size samples collected within these complex features tended to be coarser-grained than the surrounding sediment; however, these were small-scale features and coarse-grained material only comprise a small portion of sediments in these features.
- Sediments sampled in 2001 displayed grain-size distributions consistent with those found previously in geotechnical studies in the area (Figures 3-1 and 3-2) (Duane Miller & Associates 1997, 1998).

Concern regarding suspended sediment generated by the pipeline construction (i.e., excavation and fill) and ocean dumping activities and its probable movement through the nearby Boulder Patch community prompted the requirement to conduct this sampling program. Representative samples from sediment anticipated to be excavated and used as fill during pipeline construction activities were collected and analyzed for selected physical properties and CoCs. The sampling effort was restricted to water depths that coincide with the floating land fast sea ice, where bay waters will be encountered below the sea ice during construction activities, and thus, provide a medium to suspend sediment. The grounded sea ice zone is typically restricted to shallower (<6.5 feet) nearshore areas where the sea ice rests directly on the seafloor with little to no free water to suspend sediments.

Sediment chemistry samples were collected to ascertain concentrations of selected CoCs and compare the results to regulatory screening levels. Grain size distribution samples were collected to support a predictive modeling effort led by the Corps to delineate areas that would probably be directly affected by the suspended sediment generated by construction activities, and determine its significance to the Boulder Patch community.

5.1 SEDIMENT CHEMISTRY

Transformations & Correlations: Variability among hydrocarbons concentrations (e.g., PAH) tend to be relatively large, and thus, it can be problematic to delineate natural and anthropogenic sources from the data set. To reduce the variability for a selected analyte, TOC and grain-size distribution are common physical properties used to normalize results. The State of Washington established sediment management standards (SMS) for PAH results normalized by TOC.

The sediment quality values (i.e., screening levels) listed in the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998) and the *Puget Sound Dredged Disposal Analysis* or PSDAA (Corps et al. 1998b) do not normalize PAH results by TOC or any other physical property. Therefore, the PAH results are not normalized by TOC in this report.

Correlation is a useful method to delineate relationships and trends between the CoCs and physical properties if there is a reason to believe that such correlations might exist. The relationship between TOC and the percent fines (silt plus clay size particles) results in a linear trend (Figure 5-1). Similar proportional relationships exist between TVS and percent fines, and thus between TOC and TVS (Figure 5-2). Past analyses (Corps 1999) indicated that TOC concentrations are higher near the river mouths; however, this spatial distribution with proximity to fluvial discharges could not be distinguished using sample data obtained this study. Figures 5-3 and 5-4 show the near-surface distributions of manganese and calcium. These figures illustrate the complexity involved in distinguishing spatial correlations (e.g., fluvial proximity) from depositional environments.

Relationships between metal concentrations and percent fines were found in this study to be roughly proportional (Appendix G). These correlations are similar to those of previous investigations in the region where metal concentrations were typically higher in fine-grained, clay-rich sediments because of their greater surface area and differences in mineralogy. Due to

Figure 5-1
Relationship Between TOC and Fines

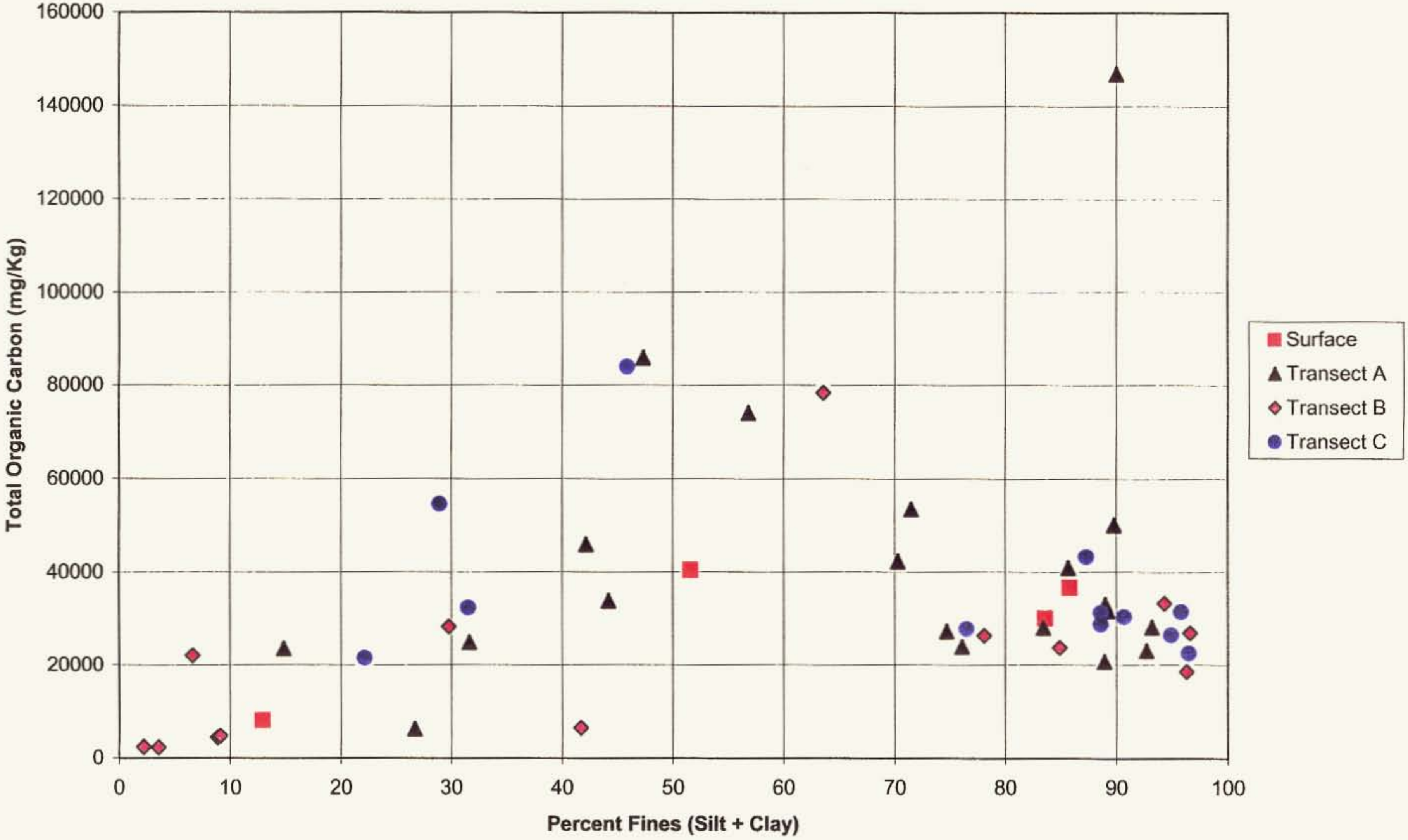
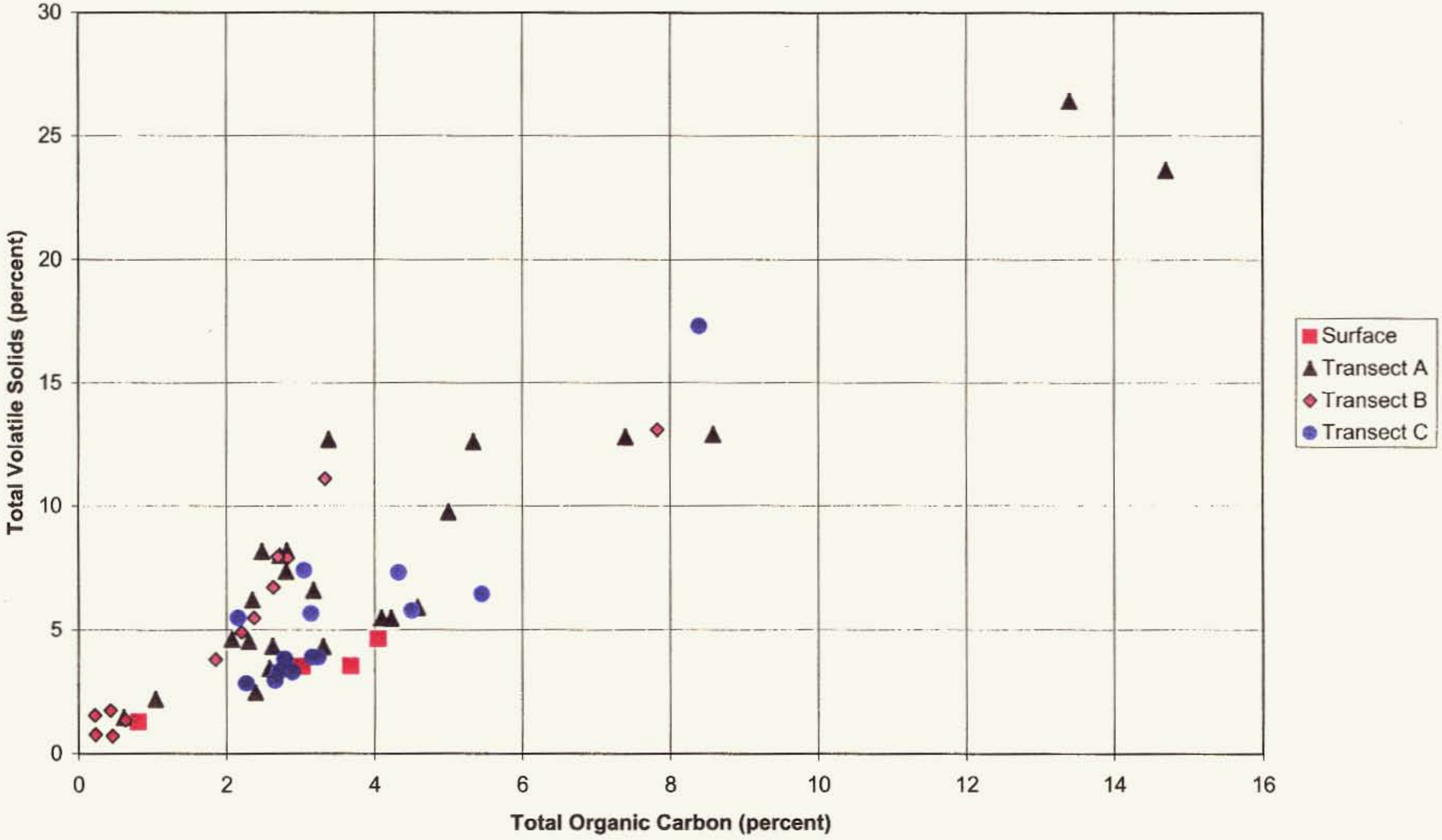
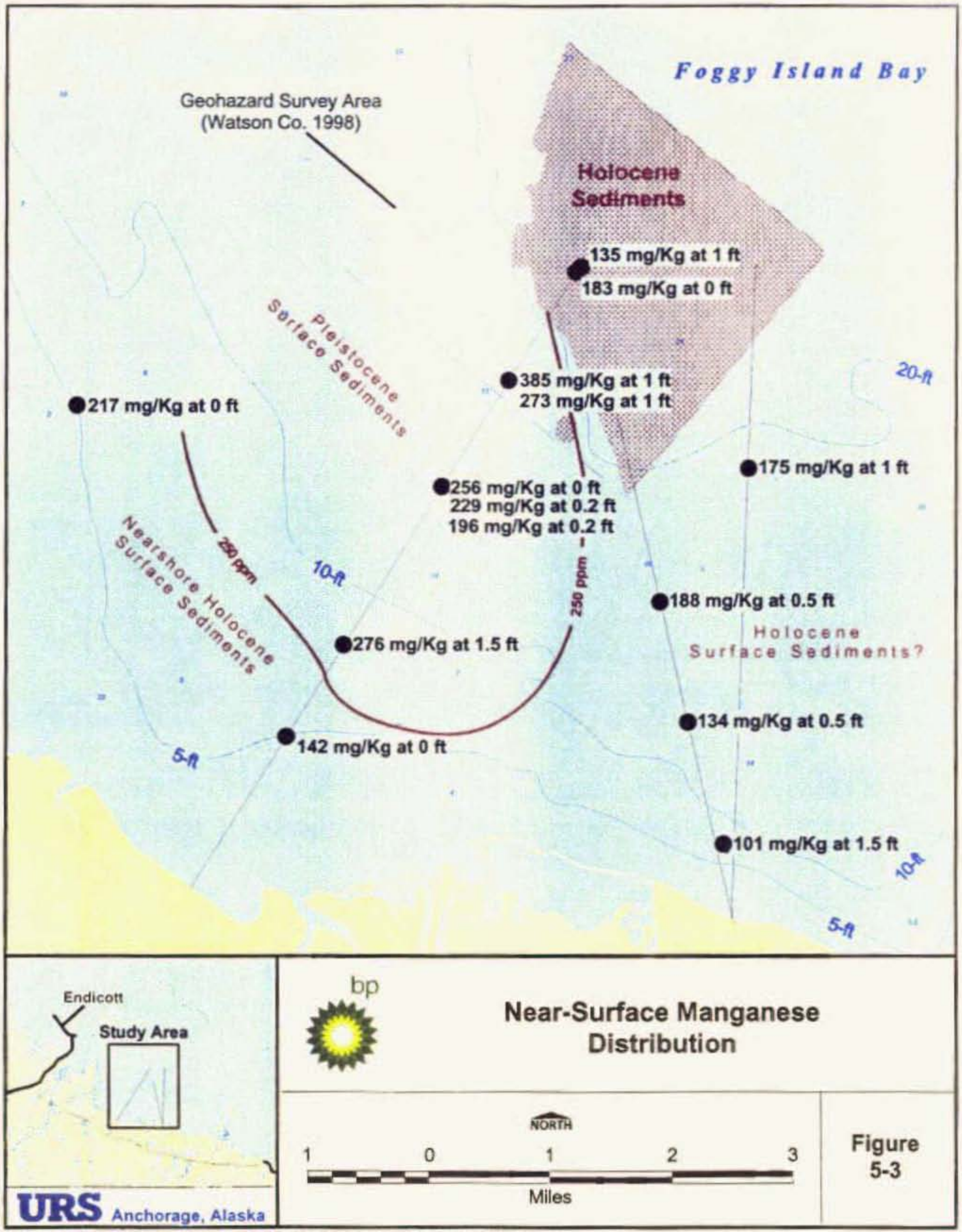


Figure 5-2
Relationship Between TVS and TOC

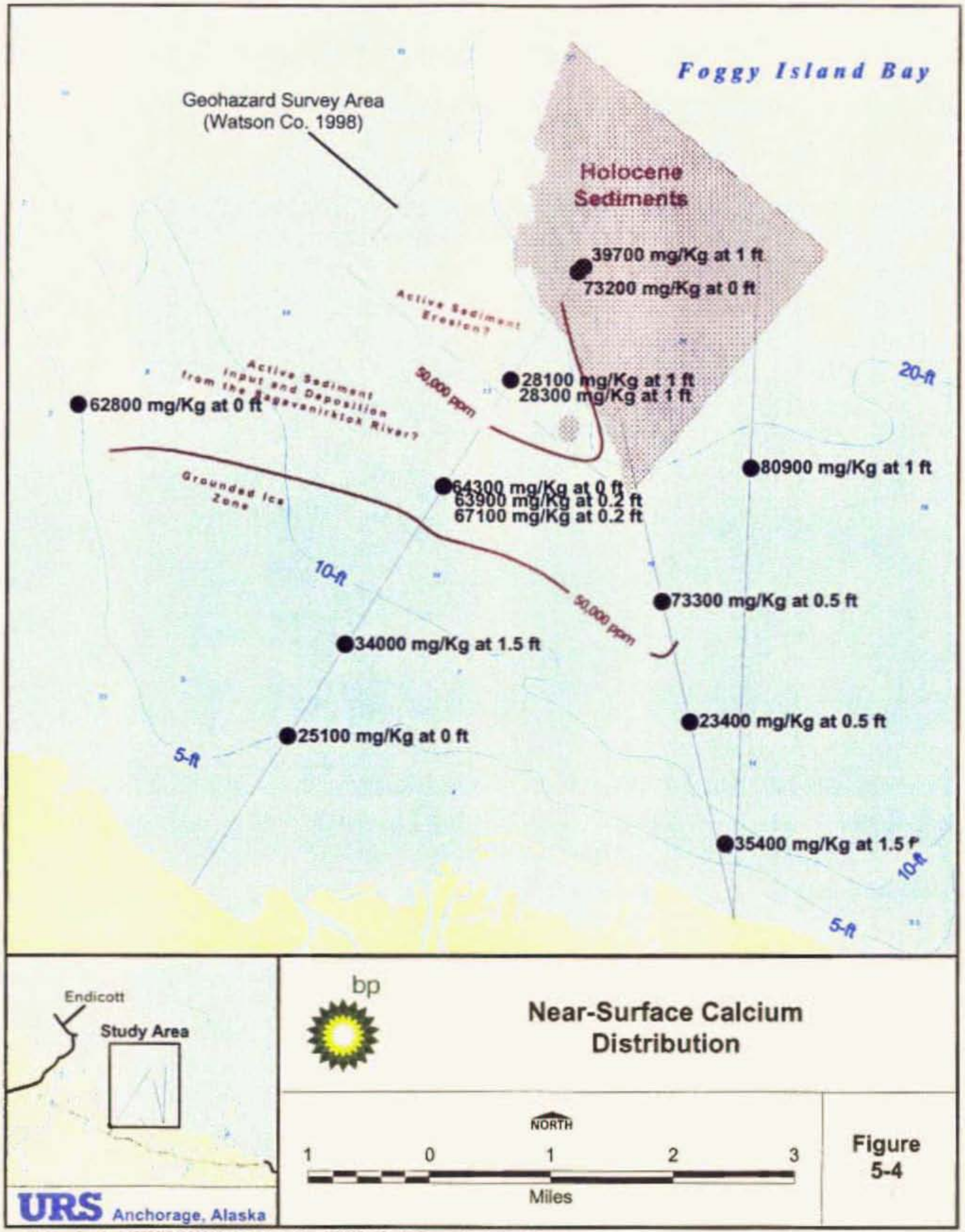




Near-Surface Manganese Distribution

Figure 5-3

anc1\\shared\projects\2000\7400000034.00LlbSedQual\GIS\SedQualityReport(Jul01)\Fig5-3.wor



Near-Surface Calcium Distribution

Figure 5-4

anc1\\shared\projects\2000\7400000034.00LibSedQual\GIS\SedQualityReport(Jul01)\Fig5-4.wor

the relatively low concentrations found in this study for many of the metals, the correlation with percent fines could not be quantified. Similar uncertainty in determining spatial relationships was encountered for metals as is illustrated in Figures 5-3 and 5-4 for manganese and calcium. However, relationships between metals were evident.

Correlation of concentrations of cadmium, chromium, copper, iron, lead, nickel, and zinc demonstrated various levels of proportionality, with the strongest correlations existing between chromium, nickel, and zinc (Figures 5-5, 5-6, 5-7, and 5-8).

Although metal concentrations were generally too low to establish definitive relationships with grain-size, relationships between metals showed a positive correlation for both surface and subsurface samples. These proportional metal-to-metal relationships are indicative of natural variability. Also, there was no notable difference in analyte concentrations between surface and subsurface samples. All CoC concentrations were low, with many PAH results below method reporting limits being designated as estimates.

Because the subsurface sediments have not been affected by anthropogenic activity, the CoC concentrations are considered to represent natural background conditions. Furthermore, since the surface sediments exhibited similar concentrations for all of the CoCs as the subsurface sediments, it is likely that these results also describe natural background values.

Comparison with Findings from Previous Studies: Numerous studies have collected and evaluated sediment geochemistry within the study area. Samples collected by NORTEC in 1983 prior to the first drilling in Foggy Island Bay (Shell Oil Tern #1) served to establish the natural background concentrations. Two additional studies have also provided information on selected heavy metals, volatile organic compounds (VOCs), semi volatile organic compounds (SVOCs), and petroleum hydrocarbons (Montgomery Watson 1997, 1998).

Similar to the results of previous investigations, no CoCs exceeded screening levels in this study. Table 3-1 presents a statistical summary of heavy metal concentrations from previous studies for sediment quality samples collected in Foggy Island Bay and other Beaufort Sea areas. Metal concentrations found in this study were found to be consistent with historic and regional data. Barium, chromium, lead and mercury concentrations were within the ranges previously established for the study area.

Metal-to-metal correlations agreed with findings from the Beaufort Sea Monitoring Program (BSMP) sponsored by the MMS (Battelle 1987; A. D. Little 1990), 1995 Northstar Unit Sampling Program (Woodward Clyde 1996), and the 1999 Northstar baseline sampling (URS 2000). Past studies have shown correlations between PAHs and percent fines to be similar to the relationship between metals and percent fines. However the concentrations of the compounds reported in this study were only slightly above the MDLs and many were reported as estimates. The relationship between PAH compounds and percent fines has not been characterized because using very low, estimated values could be misrepresentative.

Previous investigations noted natural background concentrations and this study had similar results. This observation supports the conclusion that these sediment samples are representative of natural background conditions.

Figure 5-5
Relationship Between Nickel and Zinc

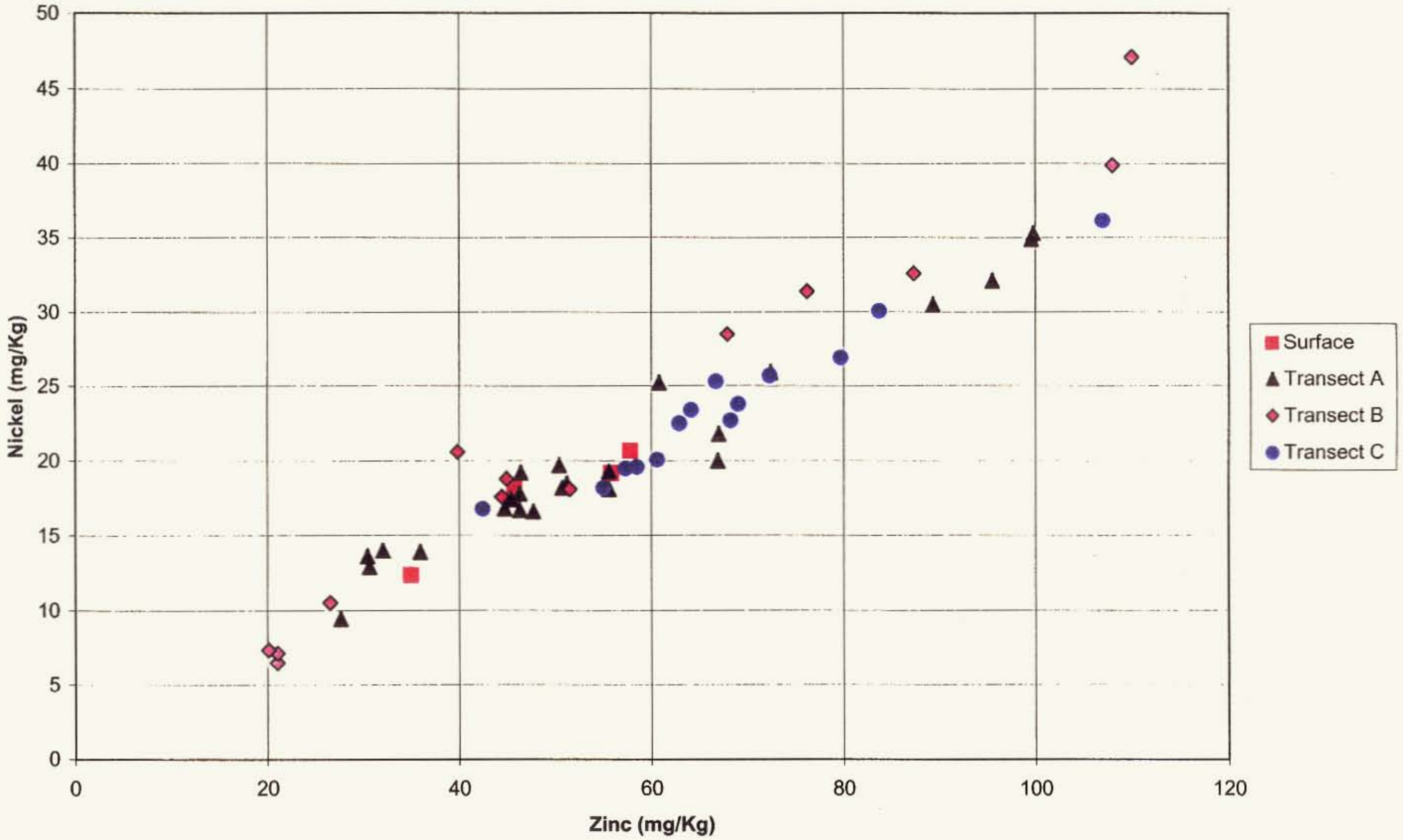


Figure 5-6
Relationship Between Chromium and Zinc

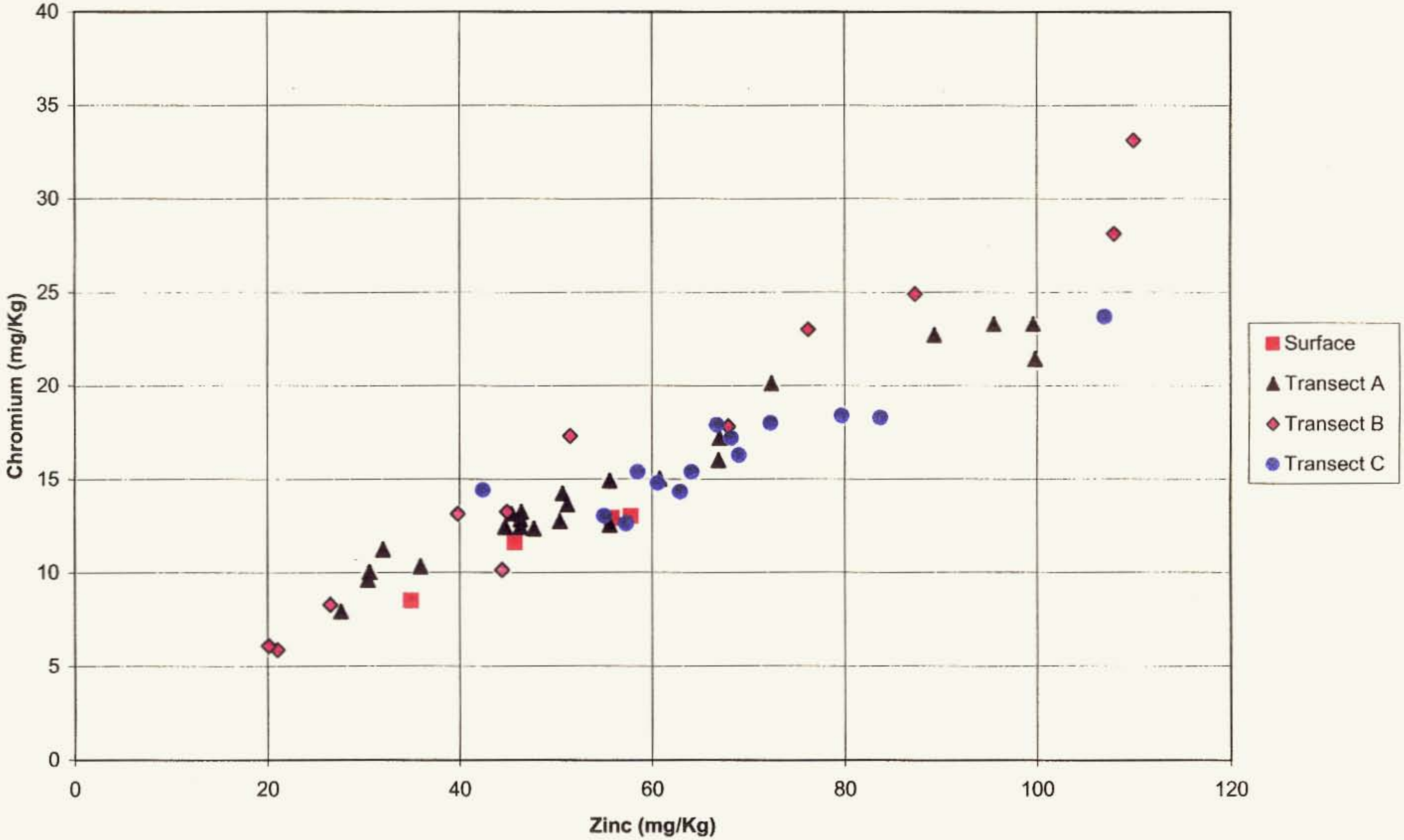


Figure 5-7
Relationship Between Chromium and Nickel

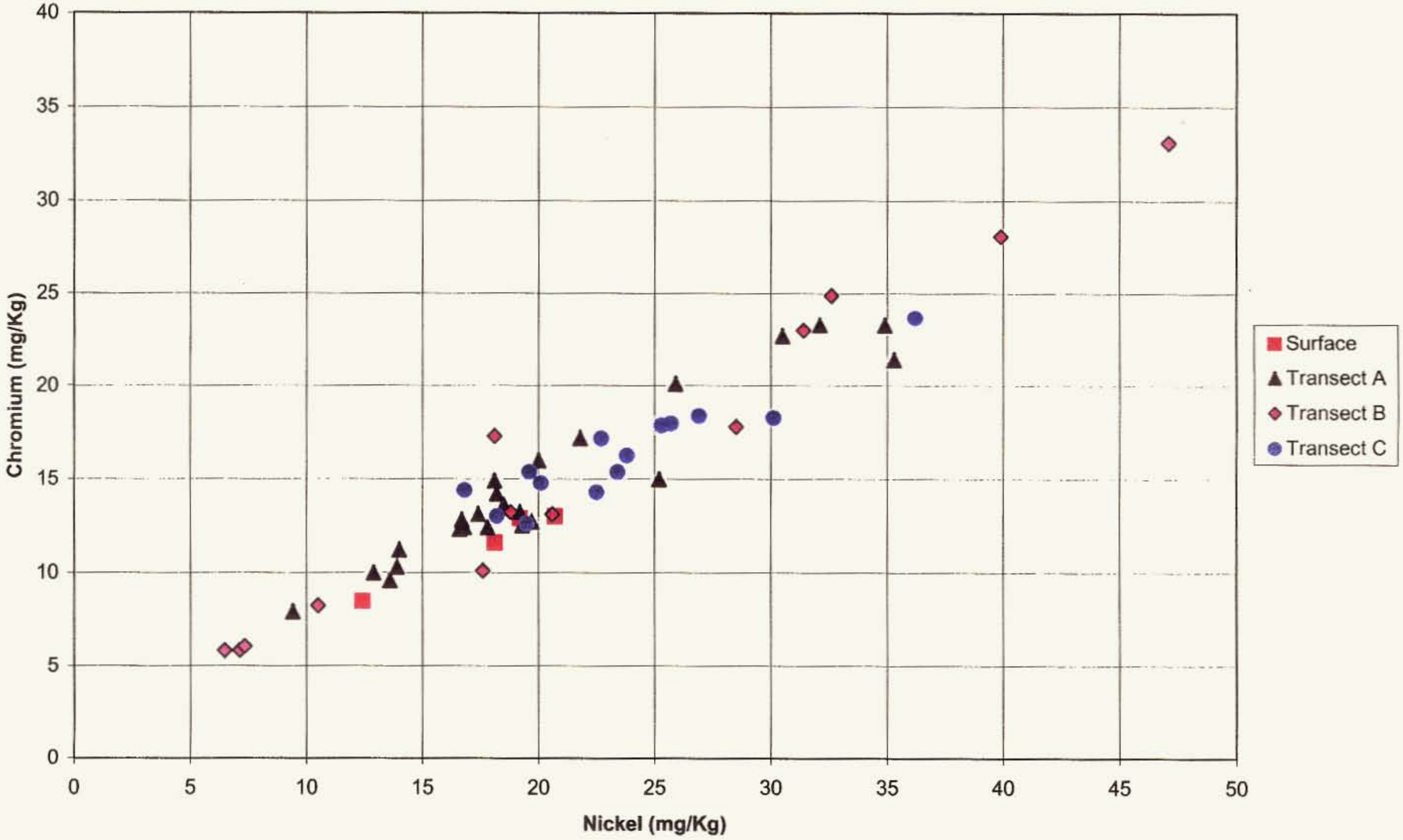
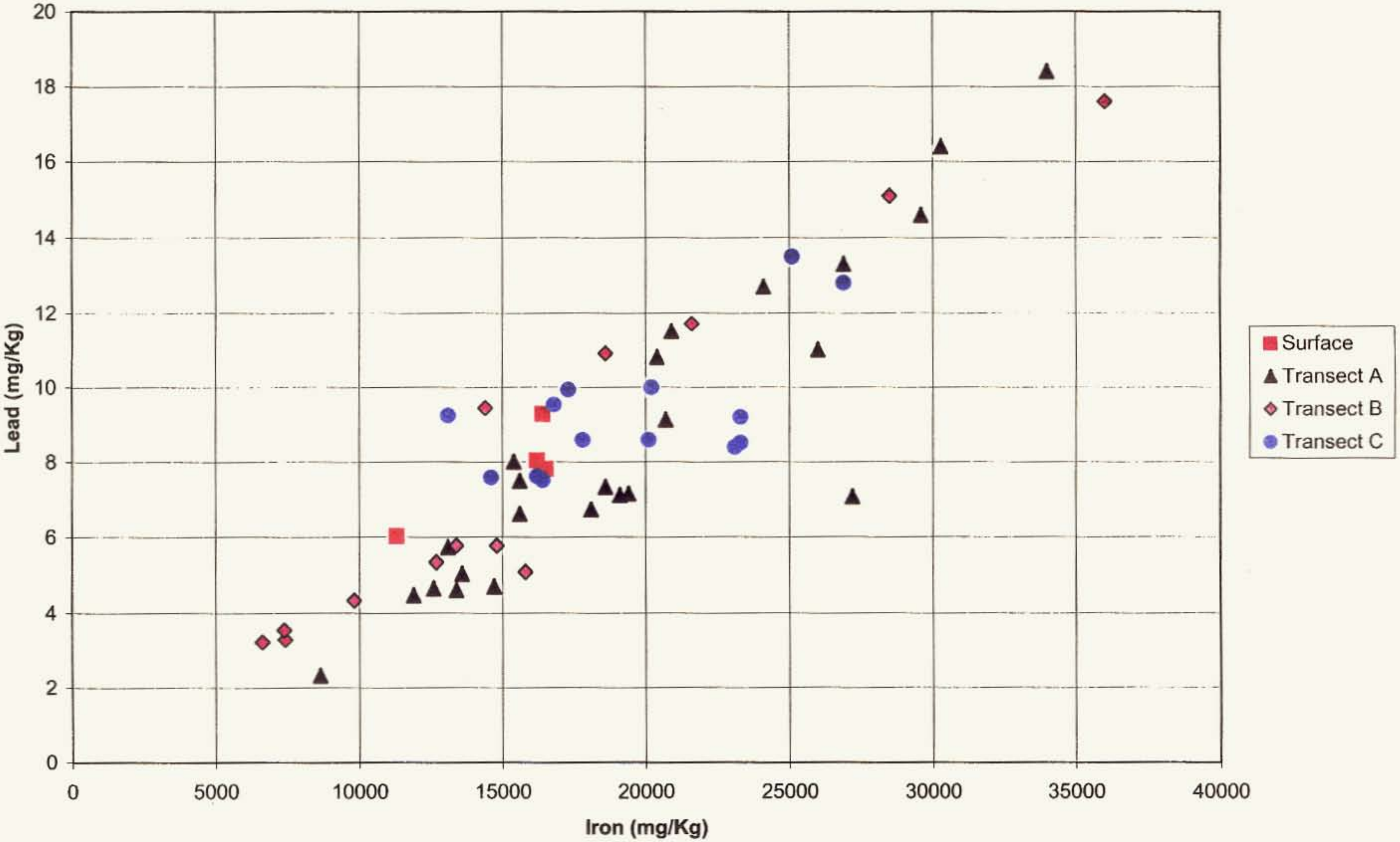


Figure 5-8
Relationship Between Lead and Iron



5.2 GRAIN SIZE

Excavation and fill activities related to marine pipeline construction will generate suspended sediment in water depths greater than 6.5 ft. Coarser sediments such as gravel and sands that are suspended by the construction activities will fall out of the water column in proximity of the construction site. However, the finer-grained sediments (silt and clay size particles smaller than the #200 sieve [0.075 mm]) are anticipated to be transported further down current, possibly affecting the nearby Boulder Patch community.

Grain size samples have been collected during three separate efforts in support of the Liberty Development: 1997 geotechnical investigation (D. Miller & Associates 1997); 1998 geotechnical investigation (D. Miller & Associates 1998); and this study. The 1997 geotechnical investigation collected representative samples nearby the applicant's preferred pipeline route (Transect A) and nearby the South Island alternative pipeline route (Transect B), while the 1998 effort focused on Transect A. This study added to the sample set for Transects A and B, and collected samples along the Tern Island alternative pipeline route (Transect C).

Earlier analysis of grain-size distribution results for Transect A determined that the fine-grained materials (silt and clay size particles smaller than the #200 sieve [0.075 mm]) were approximately 23% of the sediment that would be excavated and used as fill during pipeline construction (USGWC 1998). However, this earlier analysis inadvertently included results from sediment samples collected within the grounded ice zone where coarser-grained (sands and gravel) are the predominant sediments. Thus, for this discussion, samples that coincide with the maximum trench depth and water depths greater than 6.5 feet below sea level were used to characterize the sediment grain-size distribution along the three alternative pipeline routes.

This analysis is based on the following assumptions:

- The maximum trench depth will be 15 feet
- The trench lengths under consideration extend from the seaward limit of the grounded ice zone (6.5 feet below sea level) to the proposed alternative production islands
- The trench excavation dimensions are:
    - Bottom width = 10 feet
    - Side slopes = 3:1 or 45 feet:15 feet
    - Effective cross-sectional trench width = 55 feet

Two analyses were performed to characterize the grain-size distribution for each transect. First, an average grain-size distribution was determined for each proposed trench excavation prism based on samples that were collected along or immediately adjacent to each alternative pipeline route. This simplified representation should only be used as a rough estimate of sediment texture. Second, spatial analysis was performed to estimate the distribution of percent fine-grained sediments (silt and clay) along each of the pipeline route alternatives evaluated in *Liberty Development and Production Plan Draft Environmental Impact Statement* (MMS 2001). To assure that a conservative (i.e., slight overestimate of percent fines) approach was taken, the highest result of fine-grained sediments was used when there were two or more samples (typically duplicate samples) collected within a single depth interval for a given core.

5.2.1 Average Grain-Size Percent Fraction

The heterogeneous nature of the sediments encountered in borings located along the pipeline route alternatives indicate that no one grain-size sample describes the different sediments that will be removed from the pipeline trench. A generalized estimate of grain-size distribution can be made by computing the average percent fraction by retained weight for each sieve size from the samples collected along each transect. This approach estimated that Transect A and C trench prisms contained similar percentages, 64% and 61% respectively, of fine-grained sediments, while 42% of the Transect B trench prism contained fined-grained sediments (Table 5-1). This generalized approach does not consider sample location along the transect, so if the samples are clustered or biased in any manner to a particular portion of the transect, there is a possibility for erroneous conclusions. To gain a better understanding of the distribution and volume of fine-grained sediments within the trench prisms, spatial analysis was used.

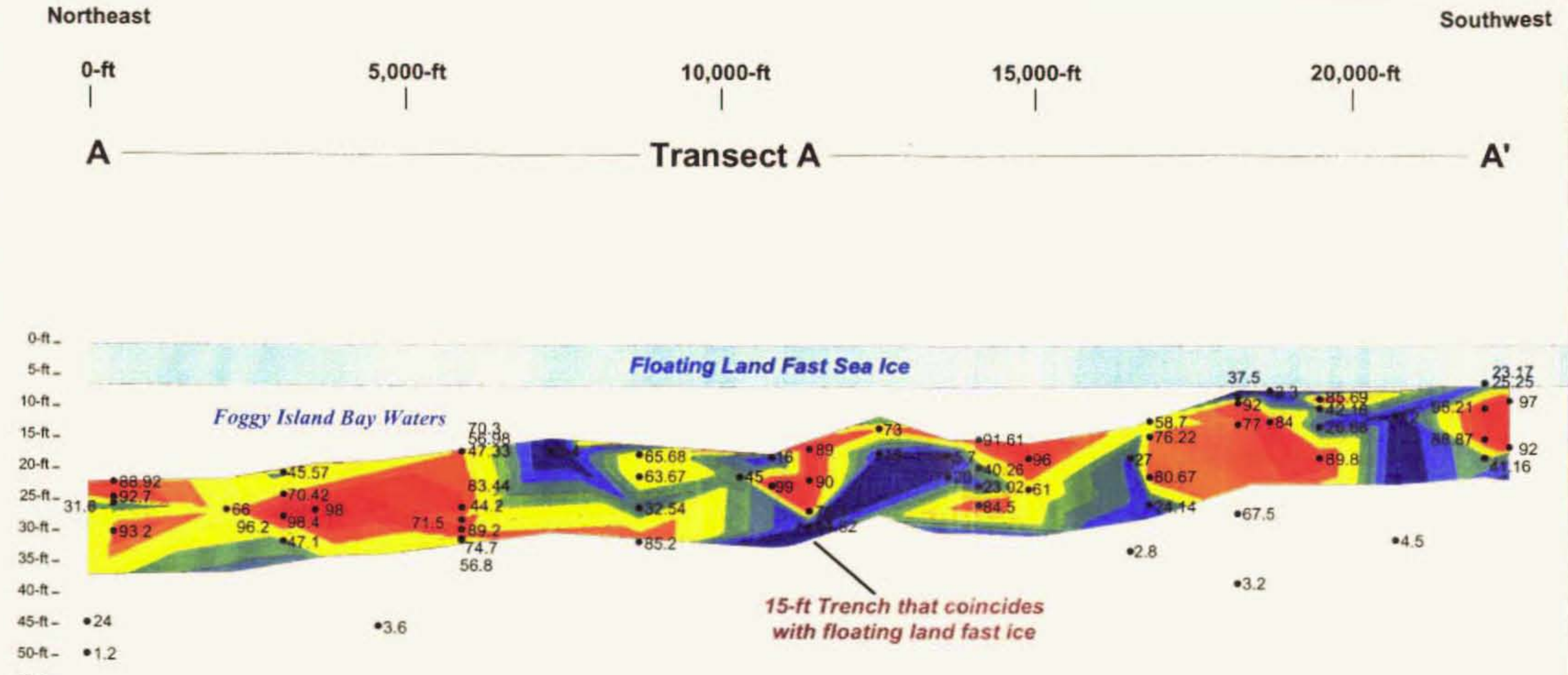
Table 5-1 Grain-size Distribution

Soil Classification	Sieve/Particle Size	Sieve Number	Percent Fraction Average (weight retained)		
			Transect A	Transect B	Transect C
Gravel	4.75 mm	4	1.3	14.4	5.4
	2.00 mm	10	0.9	4.2	1.7
Sand	0.850 mm	20	1.0	2.0	0.7
	0.425 mm	40	1.3	3.7	1.7
	0.250 mm	60	4.3	13.9	8.6
	0.106 mm	140	18.2	17.2	14.2
	0.075 mm	200	7.3	2.9	4.9
Silt	0.0039 - 0.0625 mm	NA	52.8	27.7	49.0
Clay	<0.0039 mm	NA	11.2	13.8	11.9
Average Fines (Silt and Clay)			64%	42%	61%

5.2.2 Spatial Grain-Size Analysis

Spatial analysis was used to determine the volume of fine-grained sediments that are anticipated to be excavated in waters that coincide with floating land-fast sea ice. Cross-sections were constructed for each pipeline alignment illustrating profile depths and grain-size results reported for samples collected at each applicable bore hole. Vertical distributions of grain-size gradations along Transects A, B, and C are shown on Figures 5-9, 5-10 and 5-11 respectively. Based on the trench dimension assumptions, the following volume estimates were computed for fine-grained (silt and clay) sediments to be excavated in water depths great than 6.5 feet:

- Transect A: 60% fines or 419,036 cubic yards (cy)
- Transect B: 52% fines or 292,984 cy
- Transect C: 63% fines or 489,677 cy



CLASSIFICATION	ESTIMATED TOTAL VOLUME (CUBIC YARDS [CY])	PERCENT VOLUME OF TRENCH	ESTIMATED VOLUME OF SILT & CLAY (CY)
🟦 Less than 10% Fines	3,905	1%	391
🟦 10 to 20% Fines	50,880	7%	10,176
🟦 20 to 30% Fines	57,518	8%	17,255
🟦 30 to 40% Fines	74,050	11%	29,620
🟩 40 to 50% Fines	93,158	13%	46,579
🟨 50 to 60% Fines	99,709	14%	59,825
🟨 60 to 70% Fines	106,095	15%	74,267
🟥 70 to 80% Fines	120,610	17%	96,488
🟥 80 to 90% Fines	69,330	10%	62,397
🟥 Greater than 90% Fines	22,038	3%	22,038

Total Fines (Silt + Clay) Size Fraction is approximately 419,036 cy or 60% of the trench volume.

bp

Liberty Development

Figure 5-9

Interpolated Percent Fines Grain-Size Distribution

Applicant Preferred Pipeline Route (Transect A)

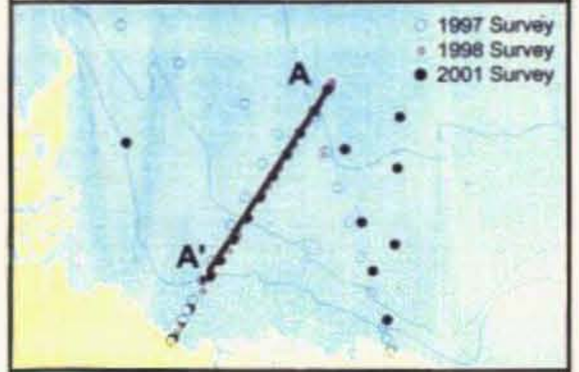
Legend

● 4.5 Percent Fines (Silt + Clay) from laboratory sample results

Notes:

100 to 1 Vertical Exageration

This anaylsis used the maximum value for percent fines for depth intervals where more than one sample was collected.



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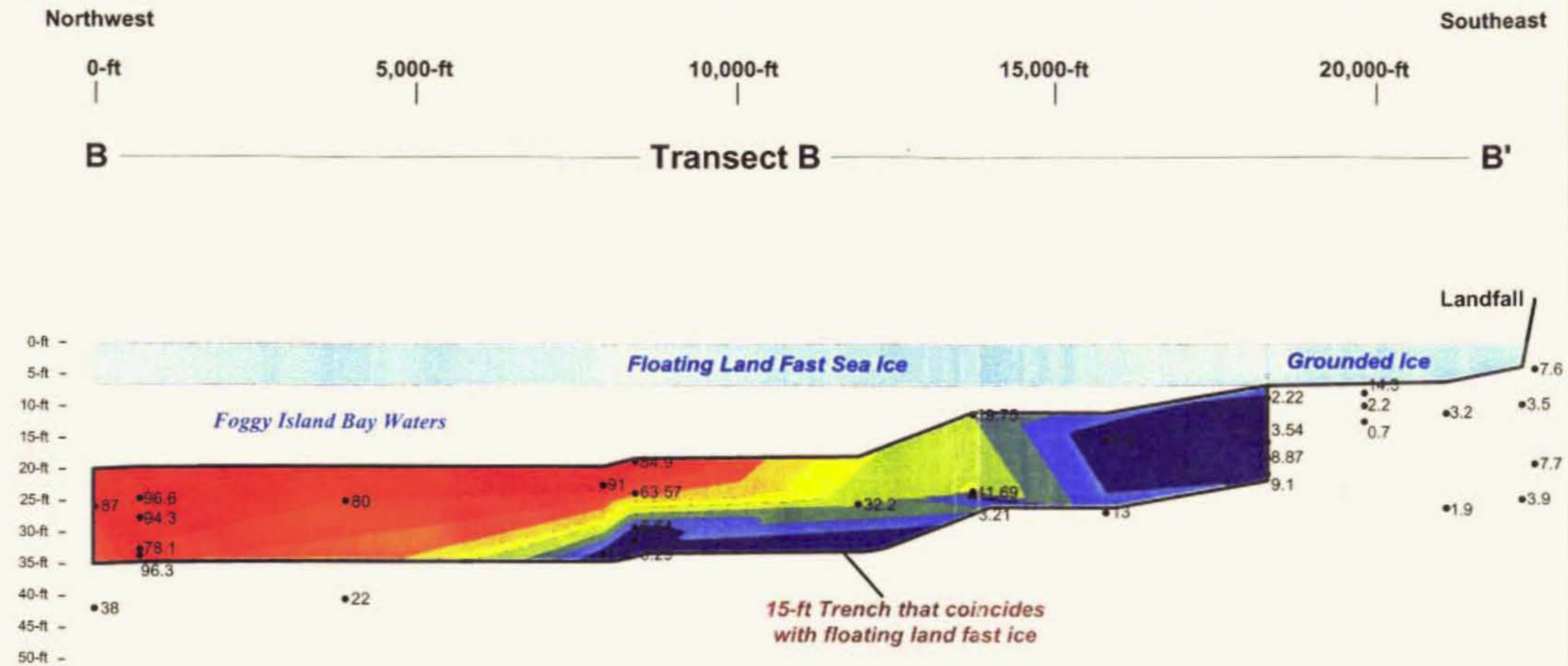
Liberty Development

Figure 5-10

Interpolated Percent Fines Grain-Size Distribution

South Island Alternative Pipeline Route (Transect B)



CLASSIFICATION	ESTIMATED TOTAL VOLUME (CUBIC YARDS [CY])	PERCENT VOLUME OF TRENCH	ESTIMATED VOLUME OF SILT & CLAY (CY)
🟪 Less than 10% Fines	105,169	19%	10,722
🟪 10 to 20% Fines	63,540	12%	13,477
🟦 20 to 30% Fines	44,014	9%	15,097
🟩 30 to 40% Fines	63,571	12%	27,738
🟩 40 to 50% Fines	25,144	6%	17,211
🟨 50 to 60% Fines	24,508	6%	21,680
🟨 60 to 70% Fines	48,795	7%	27,092
🟥 70 to 80% Fines	67,293	7%	31,562
🟥 80 to 90% Fines	70,475	12%	63,428
🟥 Greater than 90% Fines	52,431	9%	52,431

Total Fines (Silt + Clay) Size Fraction is approximately 292,984 cy or 52% of the trench volume.

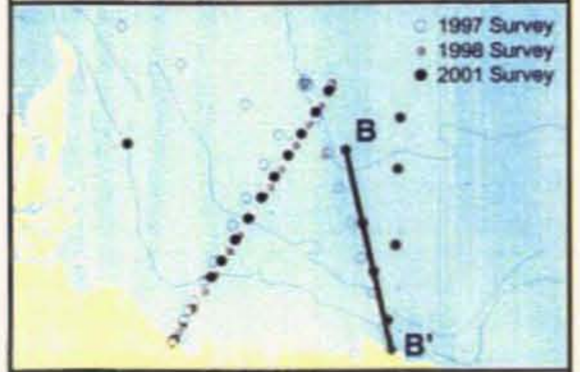
Legend

● 4.5 Percent Fines (Silt + Clay) from laboratory sample results

Notes:

100 to 1 Vertical Exageration

This anaylsis used the maximum value for percent fines for depth intervals where more than one sample was collected.



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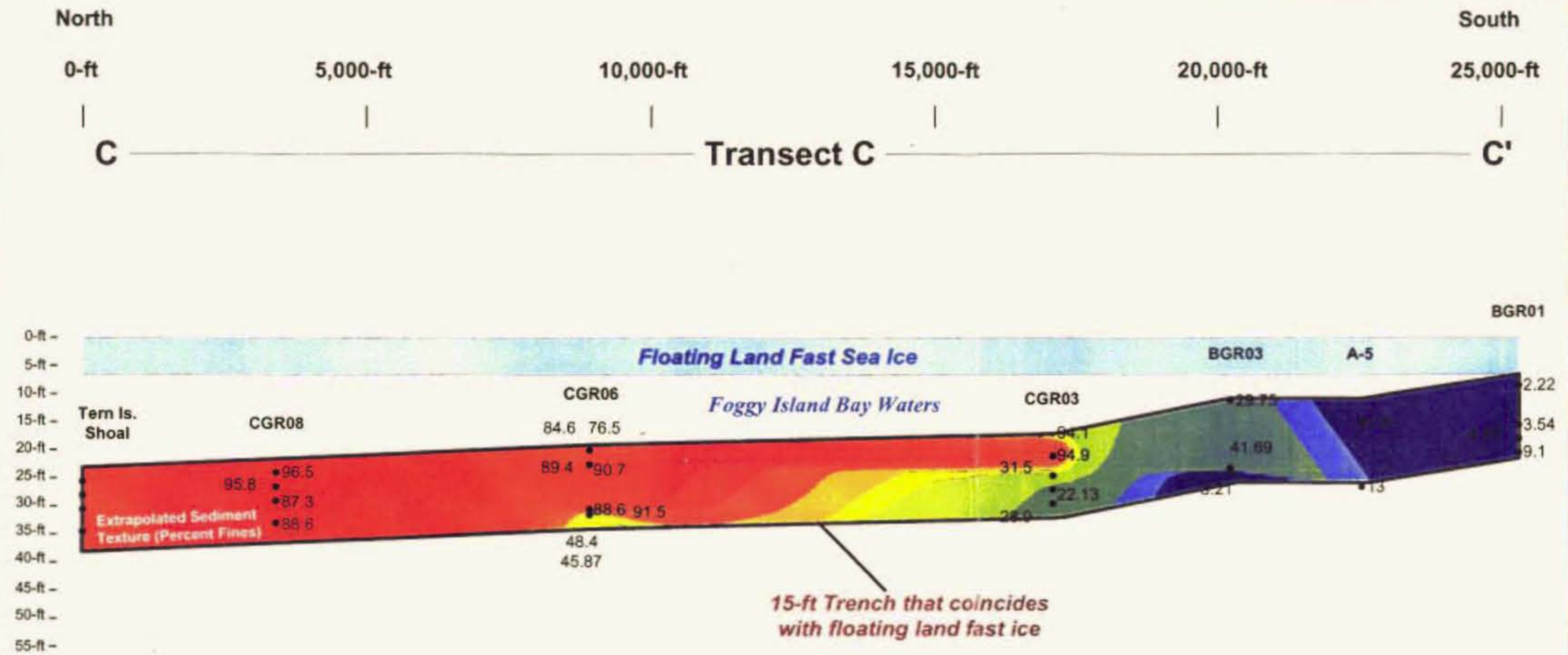


CLASSIFICATION		ESTIMATED TOTAL VOLUME (CUBIC YARDS [CY])	PERCENT VOLUME OF TRENCH	ESTIMATED VOLUME OF SILT & CLAY (CY)
🟦	Less than 10% Fines	107,925	14%	10,793
🟦	10 to 20% Fines	30,140	4%	6,028
🟦	20 to 30% Fines	102,814	13%	30,844
🟦	30 to 40% Fines	50,373	6%	20,149
🟩	40 to 50% Fines	22,342	3%	11,171
🟨	50 to 60% Fines	31,295	4%	18,777
🟨	60 to 70% Fines	42,507	5%	29,755
🟥	70 to 80% Fines	36,037	5%	28,830
🟥	80 to 90% Fines	194,006	25%	174,605
🟥	Greater than 90% Fines	158,725	20%	158,725

Total Fines (Silt + Clay) Size Fraction is approximately 489,677 cy or 63% of the trench volume.

bp

Liberty
Development

Figure 5-11

Interpolated Percent Fines
Grain-Size Distribution

Tern Island
Alternative
Pipeline Route
(Transect C)

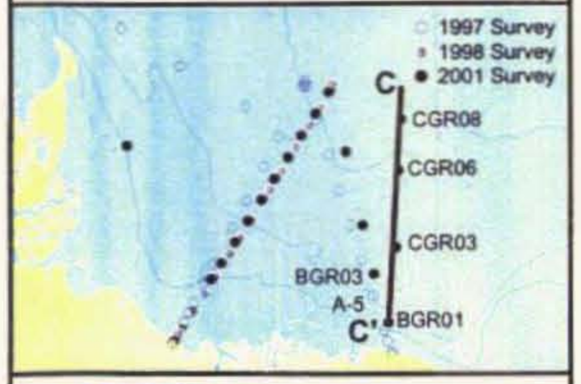
Legend

● 4.5 Percent Fines (Silt + Clay) from laboratory sample results

Notes:

100 to 1 Vertical Exageration

This anaylsis used the maximum value for percent fines for depth intervals where more than one sample was collected.



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Grain-size distribution in sediments along the three pipeline route alternatives showed variability according to distance offshore and transect location.

- Coarser-grained sediments were predominantly found in samples collected from cores located near the shallow waters adjacent to the grounded ice zone
- Finer-grained sediments dominated the grain-size distribution for samples collected at the northern end of all three alternative pipeline routes
- Transect A exhibited complex sediment distribution as a result of small-scale depositional features such as distributary channels and a submerged shoreface that were identified during a previous geophysical hazard survey (Watson Co. 1998b)
- Small-scale depositional features that typically correspond with Pleistocene deposits were not identified along Transects B and C. Watson Co. (1998a) delineated a surface outcrop of Pleistocene deposits seaward of the grounded ice zone near the 1998 bore hole D-12 and extending to approximately 2,800 ft south of the proposed Liberty Island (Figures 3-1 and 3-2). These Pleistocene lag deposits provide sufficient clasts (i.e., pebbles and occasional cobbles) for kelp recruitment, and thus, serves as the substrate for the nearby Boulder Patch communities. However, the finer-grained Holocene deposits cover the Pleistocene sediments at the northern and southern ends of Transect A, restricting kelp recruitment. Also, small-scale features delineated within the Pleistocene deposits were not observed in the abundance within the Holocene sediments (Figures 3-1 and 3-2). It is possible that the near surface distribution of manganese as shown in Figure 5-3 represents the contact between the surface outcrops of Pleistocene and Holocene deposits. Also, the absence of sizable amounts of kelp east of Transect A probably is indicative of finer-grained Holocene sediments covering the Pleistocene lag deposits throughout the length of Transects B and C. Thus, the apparent lack of encountering small-scaled features along Transects B and C is consistent with our current understanding of the surficial geology within the study area.

5.2.3 Comparison with Findings from Previous Analyses

Previous studies employed similar spatial analyses to estimate the volume of fine-grained sediments that would be excavated along the offshore pipeline route (URSGWC 1998; URS 2000). These analysis were completed using data obtained during 1997 and 1998 geotechnical investigations (Duane Miller and Associates 1997, 1998).

The earlier spatial analysis correlated grain-size (percent fine-grained sediment) results with the Unified Soil Classification System (USCS) units. Based on proposed excavation descriptions provided in the *Liberty Development Project Development and Production Plan* (BPXA 1998), volume estimates were computed for each excavated USCS unit. Based on average percent fines for each USCS unit, estimated volumes of fine-grained (silt and clay) sediments were computed. (Table 5-2).

Table 5-2 Fine-grained Material Estimated for Trench Excavations

Location	Grain-size Sample Result Analysis				USCS-based Analysis (Previous Analysis)			
	Trench Depth[1] (feet)	Trench Length (feet)	Percent Fines (Silt and Clay)	Volume of Fines to be Excavated (cy)	Trench Depth[1] (feet)	Trench Length (feet)	Percent Fines (Silt and Clay)	Volume of Fines to be Excavated (cy)
Transect A	15	22,500	60	419,036	10	22,500	65	148,100
Transect B[2]	15	18,300	52	292,984	10	23,500	69	162,500
Transect C	15	25,300	63	489,677	NA - Western pipeline route to Endicott had been third alternative			

[1] Trench depths for the two analyses are different because of pipeline burial depth changes. The increased depths in the present analysis result in larger volumes being calculated for excavated sediments.

[2] In the previous analysis, Transect B extends approximately 4,000 feet north of Southern Island to Liberty Island. This length, which covers an offshore area containing Holocene fine-grained sediments was not included in the present analysis, and thus results in a lower percentage of fine-grained sediments.

The two analyses employed different assumptions that must be considered when comparing the findings. First the USCS-based spatial analysis was based on an average grain-size (percent fines) and the resulting distribution based on interpolating USCS units. Second, the trench volumes calculated in the previous analysis were based on a shallower trench depth of 10 feet rather than 15 feet; therefore, volumes of fine-grained sediment were lower. Third, the trench length for Transect B in the previous analysis extended approximately 4,000 feet beyond Southern Island to the proposed Liberty Island. Thus, the percent fine-grained sediment was higher as compared to the truncated South Island Alternative pipeline route used in the current analysis since the 4,000-foot section between Southern Island and Liberty Island is composed of Holocene fine-grained sediments (Figure 4-3). The values for percent fine-grained sediments in the proposed excavated material were relatively consistent, and thus it is unlikely that additional sampling along any of these transects would result in significantly different volume estimates for fine-grained sediments.

5.2.4 Grain-size Distribution Conclusions

1) Based on grain-size spatial analysis, the percent fines are relatively consistent between the three transects (52-63%).
2) Earlier analyses using USCS-based spatial analysis to calculate the estimated volume of fine-grained sediments within the pipeline trenches produced similar results to this report.
3) Additional sampling would probably encounter similar sediments, with local variations due to small-scale features such as distributary channels and submerged shoreface – especially from samples collected within the Pleistocene lag deposits. However, it is anticipated that the overall percentage (and calculated volume) of fine-grained sediments would be similar to results in this and previous reports.

The Liberty Development 2001 Sediment Quality Study provides an understanding of selected physical and chemical parameters of sediment anticipated to be excavated and used as fill or disposed of via ocean dumping. Key findings from this study include:

Surface and Subsurface Sediment (Chemistry) Quality

- All CoC concentrations in surface and subsurface sediment samples were less than the regulatory screening levels presented in the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998).
- The range of values for sediment chemistry and physical properties corresponded with findings from regional sediment studies and other sediment sample studies conducted to support the Liberty Development.
- Concentrations of CoCs were similar to sediment chemistry concentrations described in regional and previous studies as representing natural background concentrations
- There was a positive linear correlation between the fine-grained sediment fraction and heavy metal concentrations from surface and subsurface sediments. This study concludes that there is no evidence of contaminant input from industrial or human-use activities.
- Most PAH analytes were not present in measurable quantities. Estimated (J) values near the MDLs were reported for select compounds detected but not present at concentrations above the method reporting limits.

Grain-size Distribution

- Coarser-grained sediments were predominantly restricted to the shallow waters adjacent to the grounded ice zone and finer-grained sediments dominated the grain-size distribution for samples collected in northern end of the alternative pipeline routes. This trend toward increasing percent fines with distance offshore is consistent with earlier geotechnical investigations (Duane Miller and Associates 1997, 1998).
- Based on spatial analysis, the percent fines are relatively consistent between the three transects (52-63%). Earlier analyses using soil classification correlations with the average percent fine-grained sediment fraction produced results similar to those found in this report.
- Additional sampling would probably not result in an overall change in the estimated volume of fine-grained (silt and clay) sediments in the proposed excavated material.

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Appendix A

Work Plan

Liberty Development 2001

Sediment Quality Study

WORK PLAN

LIBERTY DEVELOPMENT 2001 SEDIMENT QUALITY STUDY

Prepared for

BP Exploration (Alaska), Inc.
900 East Benson Blvd.
P.O. Box 196612
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March 9, 2001

URS

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907-561-1020
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74-00000034.00 Task 10000

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LIST OF ACRONYMS

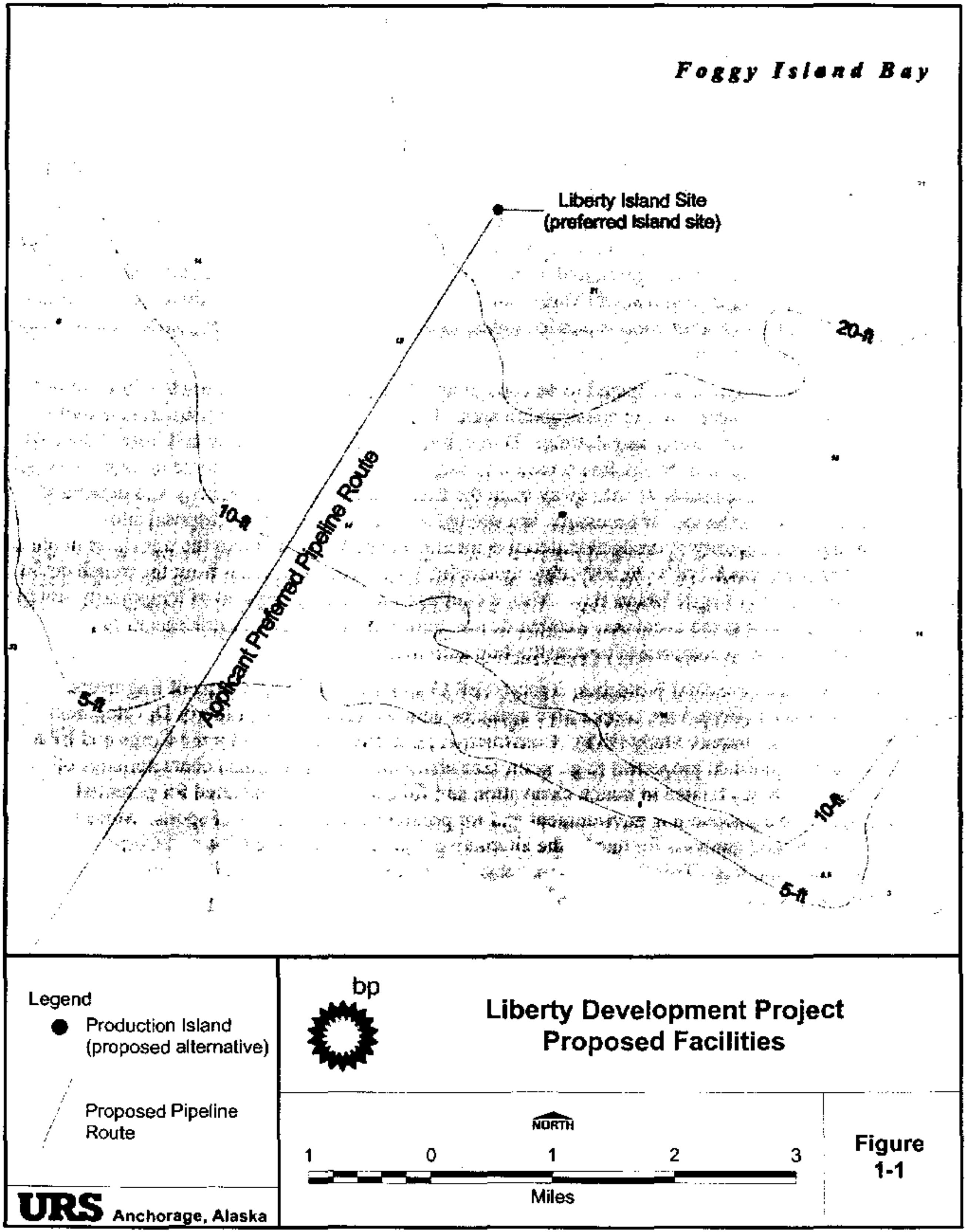
BPXA	BP Exploration (Alaska), Inc.
CORPS	U.S. Army Corps of Engineers
CVAA	Cold vapor atomic absorption
EPA	Environmental Protection Agency
EIS	Environmental Impact Study
GPS	Global Positioning System
HPAH	High Molecular Weight Polyaromatic Hydrocarbons
LPAH	Low Molecular Weight Polyaromatic Hydrocarbons
MDL	Method Detection Limit
mg/kg	milligrams per kilogram
MMS	U.S. Minerals Management Service
MDRD	Minimum detectable relative difference
MS/DS	Matrix Spike/Duplicate Spike
NEPA	National Environmental Policy Act of 1969
NPDES	National Pollutant Discharge Elimination System
OCS	OUTER CONTINENTAL SHELF
PAH	Polyaromatic Hydrocarbons
ppb	parts per billion
ppm	parts per million
PSDDA	Puget Sound Dredged Disposal Analysis Program
PSEP	Puget Sound Estuary Program
QA/QC	quality assurance/quality control
QC	quality control
Rollagons	Arctic off-road vehicles
RPD	relative percent difference
SVOCs	semi-volatile organic compounds
TSS	total suspended sediments
USCS	Unified Soil Classification System
VOCs	volatile organic compounds

BP Exploration (Alaska) Inc. (BPXA) plans to develop the Liberty oil field in the Beaufort Sea for production and transport of sales-quality oil to the Trans-Alaska Pipeline system. The field will be developed from a gravel island to be constructed on the Federal Outer Continental Shelf (OCS) in Foggy Island Bay (Figure 1-1). The Liberty oil field development will include a subsea pipeline construction from the proposed island (Liberty Island) to a land-based connection with the Badami Sales Oil Pipeline.

The U.S. Minerals Management Service (MMS) is currently conducting an environmental evaluation of the Liberty Development based on the National Environmental Policy Act of 1969 (NEPA). The evaluation is presented in the *Liberty Development and Production Plan Draft Environmental Impact Statement* (MMS 2001). This document includes evaluations of multiple pipeline routes and production island locations, including the applicant's proposed Liberty Island route (Figure 1-2).

The pipeline system is anticipated to be constructed during the winter. Ice roads will be built to allow equipment access to the construction area. The proposed pipeline construction activity sequence is: 1) ice cutting and slotting, 2) trenching, 3) pipeline assembly and installation, 4) trench backfilling, and 5) pipeline pressure testing. During construction, some dredged material will be stored temporarily at sites away from the trench due to loading capacity and deflection characteristics of the ice. If necessary, the storage sites also will serve as disposal sites. Although the majority of dredged material is intended to be backfilled into the trench, as much as 110,000 cubic yards (yd^3) (76,500 cubic meters [m^3]) of dredged material from the trench could be disposed of in Foggy Island Bay. Also, a contingency plan for disposal of temporarily stored spoil is required in the event that weather or ice conditions necessitate abandonment of operations prior to completion of construction activities.

The U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers, Alaska District (Corps) are cooperative agencies with the MMS on the Liberty Development Environmental Impact Study (EIS). Construction permits administered by the Corps and EPA require that physical properties (e.g., grain-size distribution) and chemical characteristics of sediment samples related to trench excavation and fill activities be evaluated for potential impacts to the surrounding environment and for possible ocean disposal of spoils. Since there are no sediment analyses for one of the alternative pipeline routes, the EPA and Corps requested additional sampling. This document presents the sampling and analysis plan to evaluate the sediments anticipated to be excavated for the three routes evaluated in the EIS and used as fill or disposed of via ocean dumping.



Liberty Development Project
Proposed Facilities

Figure 1-1

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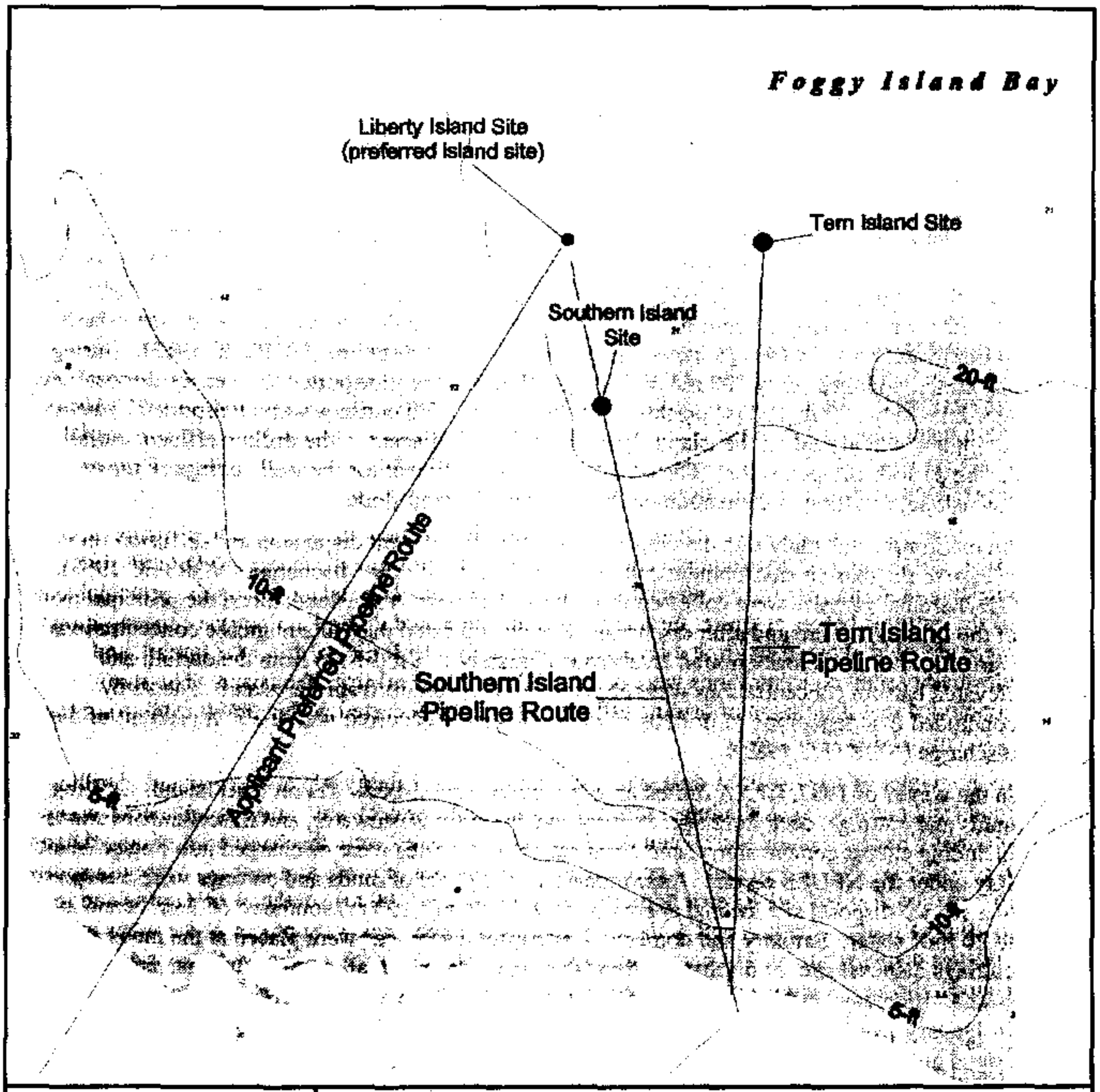

Legend

● Production Island (proposed alternative)

/ Proposed Pipeline Route

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bp

Pipeline Routes and Production Islands Evaluated in the Liberty Development EIS

NORTH

1 0 1 2 3

Miles

Figure 1-2

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2.1 SITE HISTORY

In the winter of 1982, Shell Oil Company constructed Tern Island at the mouth of Foggy Island Bay to support exploratory drilling. Wastewater discharge permits under the National Pollutant Discharge Elimination System (NPDES) allowed for the discharge of drilling muds, cuttings, and fluids onto the surrounding sea ice during winter and direct discharge into Beaufort Sea waters during the summer open-water season. Drilling muds used at the site in the early 1980s are classified as potassium chloride (KC/Polymer) muds. A total of 2,800 barrels (bbl) of drilling effluents was discharged between June and August 1982 on the northwest side of Tern Island, approximately 50 feet (ft) (15 meters [m]) from the island shoreline (NORTEC 1983). During the winter, approximately 700 bbl of drilling effluents were transported to a sea ice disposal area approximately 500 ft (150 m) northwest of the island. Well cuttings were transported by heavy equipment and placed on the island slope immediately adjacent to the drilling effluent outfall during periods of open water. The island slope was sufficient for the well cuttings to move downslope, resulting in deposition on the submerged island slope.

An environmental study was developed to quantify the effluent dispersion and diffusion upon release to the marine environment and to assess the fate of these discharges (NORTEC 1983). Geochemical samples were collected from the seabed near Tern Island, along the principal axis of the currents before and after discharge. Results indicated that oil and grease concentrations were elevated above background levels approximately 115 ft (35 m) from the outfall, and elevated barium concentrations were observed 330 ft (100 m) from the island. The study concluded that deposition of drilling effluents may have occurred within 330 ft (100 m) of the discharge (NORTEC 1983).

In the winter of 1997, BPXA drilled an exploration well (Liberty #1) on Tern Island. Drilling muds and cuttings, deck drainage, sanitary and domestic wastewater, and miscellaneous wastes including excess cement slurry, and desalination unit wastes were discharged into Foggy Island Bay under the NPDES permit. Approximately 16,200 bbl of muds and cuttings were transported to a sea ice disposal site located approximately 7,000 ft (2,100 m) southeast of Tern Island in 18 to 20 ft of water. Sanitary and domestic wastewater discharges were placed at the muds and cuttings disposal site, or discharged through a line with an outfall on the southeast side of Tern Island. Bioassays indicated that the drilling fluid was nontoxic (AMBAR Technical Labs 1997).

In January 1997, during ice road construction, a truck broke through the ice southwest of Tern Island and spilled approximately 10 gallons of diesel and 0.5 gallons of hydraulic fluid into the open water. All of the spilled material was later recovered and properly disposed of.

It is unlikely that the sediments along or near the applicant's preferred or alternative pipeline routes have been disturbed by past activities. Past activities occurred east and north of the pipeline route, were of limited duration, and resulted in minimal discharge of drilling muds and cuttings. Geophysical surveys conducted throughout the Liberty Development Project area did not identify any anthropogenic (i.e., man-made) structures or observable effects from human-use activities.

2.2 PREVIOUS INVESTIGATIONS

Two geotechnical investigations (Duane Miller & Associates 1997, 1998), one sediment quality study (Montgomery Watson 1998), and two geophysical hazard surveys (Watson Co. 1998a, 1998b, 1998c) provide a comprehensive understanding of the sediments encountered along the applicant's proposed pipeline route and production island location. No evidence of any anthropogenic features or disturbance was found by these studies. Following is a summary of our current understanding of the site.

2.2.1 Geophysical Hazard Surveys

High-resolution geophysical data were collected in the summer of 1997 to identify geological hazards and man-made materials that could affect or alter the design of the proposed Liberty Development (Watson Company 1998a). This was a comprehensive survey, which included geophysical data from high-resolution multi-channel seismic systems, digital side-scan sonar, and a sub-bottom profiler. No man-made structures or evidence of human-use activities were identified.

Watson described the seafloor as gently undulating, although a northwest-southeast ridge with 3 to 6 ft (1 to 2 m) of relief was delineated west of the applicant's preferred gravel island. Interpretations of side-scan sonar records indicated seafloor sediments with greater than 25 percent boulders and cobbles are situated west and northwest of the proposed gravel island. Watson noted that the seafloor areas, characterized by boulders and cobbles, are considered to be lag deposits of Pleistocene origin and were formed by the erosion of the Flaxman marine units of the Gubik Formation. These lag deposits are exposed on the seafloor where Holocene (recent) sediments are absent (Watson Company 1998a).

Analysis of geophysical records determined that approximately 75 percent of the 1997 survey area consists of Holocene fine-grained materials characterized by low reflectivity with few boulders (Watson Company 1998a). Watson states that the Holocene sediments are relatively thin, less than 8.5 ft (2.6 m), with distributions characterized as small patchy accumulations of soft mud. While the deposits are considered to be marine sediments, the source may be fine-grained silts and clays discharged from the Sagavanirktok River (Watson Company 1998a).

2.2.2 Geotechnical Investigations

Duane Miller & Associates conducted geotechnical exploration surveys in 1997 and 1998 along possible pipeline alignments, including the selected route. The 1998 survey, which included 18 borings along the pipeline route, yielded the following information.

Seafloor sediments at the island location can be divided into three primary horizons: the upper Holocene non-plastic silt; the intermediate Pleistocene clayey silt; and the underlying granular sand and gravel (Duane Miller & Associates 1998). No frozen soils were encountered at any location along the offshore pipeline route. Soft silts were documented from the seafloor (0 ft) to a depth of 4 to 6 ft. The underlying stiff clayey silt horizon reached depths between 18 to 21.5 ft. This stratigraphy corresponds with the relatively flat seafloor with depths averaging 22 ft (Figure 2-1).

The seafloor rises gently from the 22-ft isobath to the 15-ft isobath where the sediments typically consists of sand, silty sand with some soft silt, and many pockets and layers of peaty soil. One 4.5-ft thick shoal consisting of uniform fine-grained, clean sand was identified in 15 ft (4.6 m) of water.

The sediments found in water depths between the 15-ft and 7-ft isobaths are silty sands interbedded with medium stiff silt to the maximum pipe burial depth of 10 ft. Stiff silt underlain by sandy gravel are found below the silty sands.

Between the 7-ft and 4-ft isobaths, the dominant material is silty sand with thin interbeds of silt and thin organic rich layers. The underlying gravelly sand is shallower than the pipeline depth at Boring D-16 (Figure 2-2).

Sediments from water depths less than 4 ft and extending to the shoreline consist of thin surface layers of sand and soft silt with the underlying sand and gravel at shallow depths 5 to 6 ft. Frozen ice bound sediments were observed up to 230 ft from shore.

2.2.3 Sediment Quality and Geochemistry Studies

Numerous sediment samples from Foggy Island Bay have been analyzed to quantify natural background concentrations of selected heavy metals, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and petroleum hydrocarbons (NORTEC 1983; Montgomery Watson 1997, 1998). Prior to 1982, no petroleum exploration occurred within Foggy Island Bay. Accordingly, the samples collected by NORTEC in 1983, prior to drilling of the first well in Foggy Island Bay (Shell Oil Tern #1) served to establish the natural background concentrations.

Barium concentrations for five samples collected at one location prior to 1982 drilling activities ranged from 210 to 9,040 mg/kg. Further analyses indicated that the seafloor sediments in the Beaufort Sea are heterogeneous with a patchy nature; that is, it is not uncommon to find large variations in sediment grain-size and trace metal concentrations among samples taken at the same location (NORTEC 1983). The natural variability in these sediments is reflected in lead concentrations found in sediments collected in the western half of Foggy Island Bay during evaluation of several proposed pipeline routes associated with the Liberty Development (Montgomery Watson 1997).

Table 2-1 is a statistical summary of selected heavy metal concentrations for sediments collected throughout the Beaufort Sea and samples specific to Foggy Island Bay. Within Foggy Island Bay, arsenic, chromium, and mercury exhibit consistent concentrations, while barium and lead tend to be variable. On average, metal concentrations from the pipeline route studies (Montgomery Watson 1997, 1998) are lower than results from the study conducted prior to exploratory drilling in 1982 (NORTEC 1983). Also, most of the heavy metal results from samples collected from Foggy Island Bay are within the range of concentrations found throughout the Beaufort Sea. The only exception is chromium, of which Foggy Island Bay sediments contained a maximum concentration of 34 mg/kg (Montgomery Watson 1997).

In 1998, Montgomery Watson collected samples at three depths below the seafloor to describe the sediment chemistry along the selected pipeline route. All heavy metals and VOCs, were uniformly below the screening levels set forth by the Puget Sound Dredged Disposal Analysis, which was developed for dredging operations by EPA Region X (Seattle), USACOE,

Table 2-1. Heavy Metal Concentrations for Sediments

Investigation	Location	Arsenic (mg/kg)	Barium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)
1982 Tern Island (NORTEC 1983)[1]	Foggy Island Bay	no analysis	30 minimum **121** (537†) average 360 (9040†) maximum	13 minimum **19** average 27 maximum	12 minimum **16** average 20 maximum	no analysis
Proposed Liberty Pipeline Routes (Montgomery Watson 1997)	Foggy Island Bay	3 minimum **5.5** average 11.4 maximum	29 minimum **67.5** average 194 maximum	7.2 minimum **18.5** average 34 maximum	2.79 minimum **10.1** average 67.8 maximum	‡ all sample results were deemed invalid by the laboratory since the relative percent difference (RPD) for duplicate analyses exceeded acceptance limits.
Selected Liberty Pipeline Route (Montgomery Watson 1998)	Foggy Island Bay (pipeline route)	3.3 minimum **5.5** average 11.2 maximum	23 minimum **45** average 86 maximum	5.4 minimum **12.2** average 27 maximum	2.2 minimum **5.4** average 13.9 maximum	No Detect minimum **0.035** average 0.085 maximum
Northstar Development Pilot Offshore Trenching Program (Montgomery Watson 1996)	Offshore of Stump Island (Site C)	5.0 minimum **7.1** average 16 maximum	46 minimum **63** average 122 maximum	10 minimum **16.6** average 21 maximum	No Detect minimum 23 maximum	Not detected
Beaufort Sea Planning Area Oil & Gas Lease Sale 144 (MMS 1996)[2]	Beaufort Sea	no analysis	185 minimum 745 maximum	17 minimum 19 maximum	3.9 minimum 20 maximum	0.02 minimum 0.09 maximum

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[1] Samples collected prior to exploratory drilling.

[2] Regional summary

and the Washington State Department of Natural Resources and Ecology. One sample collected approximately 9 ft below the seafloor contained 4-Methylphenol (p-Cresol), a SVOC, at a concentration that was above the minimum screening level. However, this sample was collected approximately 600 m northwest of the proposed gravel island, and outside the proposed pipeline trench.

Analyses of samples collected throughout the western portion of Foggy Island Bay in 1997 demonstrated a positive linear correlation between chromium and lead concentrations. Also, barium and arsenic levels increased proportionally with increasing chromium concentrations. Similarly, the relationship of these metals to grain-size reflects a positive linear trend. The samples collected represent undisturbed subsurface strata, and thus, the positive linear relationships found between the metals and similar relationships between metals and grain-size describe naturally existing baseline conditions. It was interesting to note that sediment chemistry analysis did not delineate any differentiation between Holocene and Pleistocene sediments.

It is reasonable to conclude that the pipeline trench sediments do not contain measurable concentrations of pollutants related to industrial and other human-use activities because:

- There were no artificial bathymetric features or other anthropogenic structures observed along or adjacent to the pipeline route
- The concentrations of selected heavy metals and hydrocarbons collected in the western portion of Foggy Island Bay (along the proposed and alternative Liberty Development pipeline routes) are similar to sediment chemistry concentrations described in regional and pre-industrial activity studies as representing natural background concentrations
- The strong positive linear correlation between the fine-grained sediment fraction and heavy metal concentration from undisturbed subsurface strata is evidence that there is no observable input from industrial or human-use activities. If pollutants were introduced into the environment, there would not be a linear correlation between the concentration of metals or polyaromatic hydrocarbons (PAH) with physical properties such as grain-size distribution (e.g., percent fines).

2.3 CURRENT SITE USES

Access to Foggy Island Bay is limited to marine vessels during the brief summer open-water season and tundra travel vehicles during the winter. During autumn freeze-up and spring ice breakup there is virtually no surface accessibility. Foggy Island Bay is used occasionally by the local native population for subsistence hunting and fishing. There are no industrial or military activities operating anywhere near the bay, with the exception of occasional geophysical exploration surveys.

2.4 POTENTIAL SOURCES OF CONTAMINATION

With the exception of drillings muds and cuttings discharged immediately adjacent to Tern Island during exploration drilling in the early 1980s and 1997, there are no other known potential sources of contamination. Prevailing currents produce a net westward drift, placing the Prudhoe Bay coastal oil production facilities downcurrent of Foggy Island Bay.

Figure 2-1. Offshore pipeline route cross section (from island to Boring D-11).

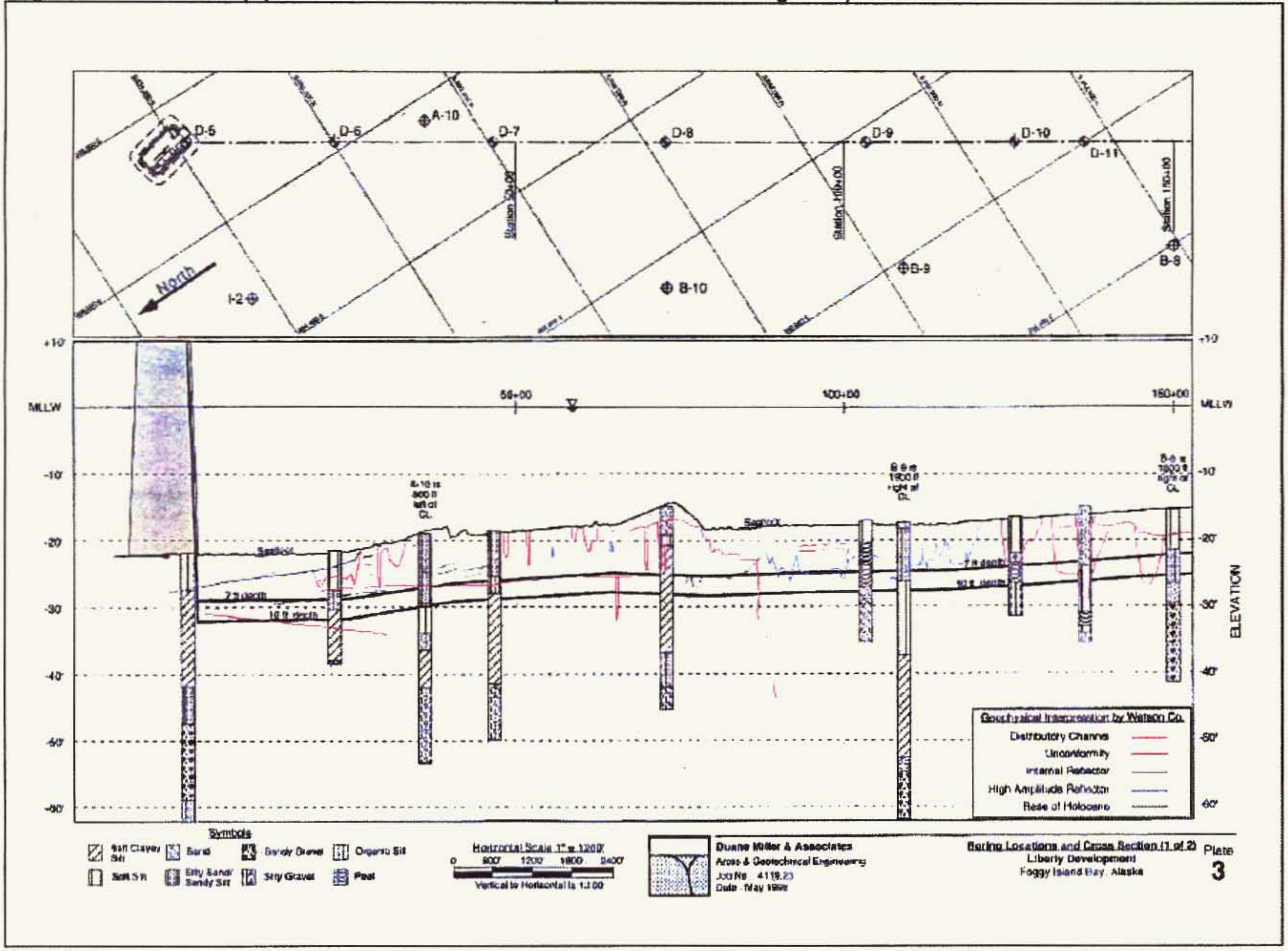
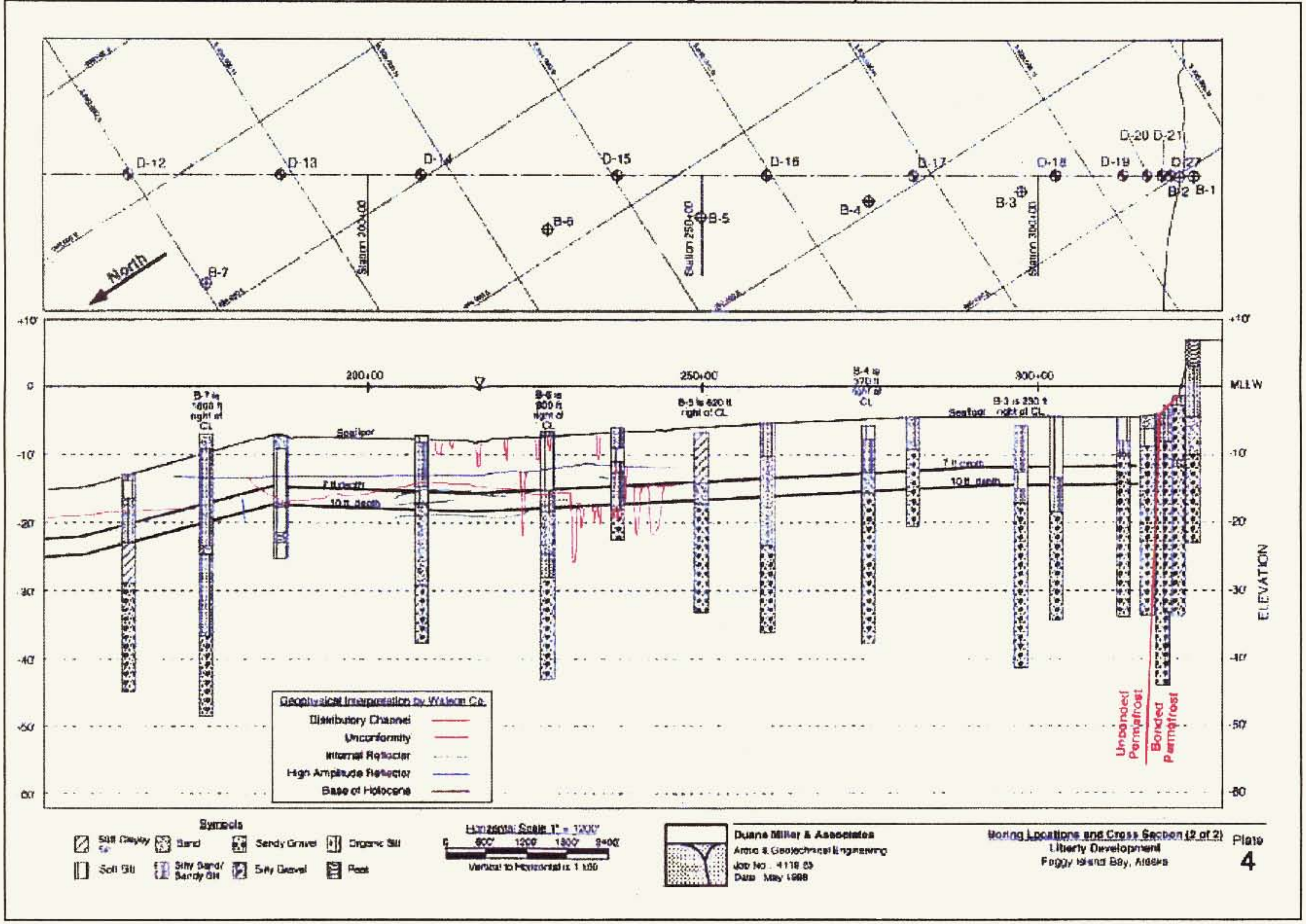


Figure 2-2. Offshore pipeline route cross section (from Boring D-12 to shore).



The sediment sampling program is part of a baseline data collection survey to support permit activities associated with the Liberty Development. The goal of the sediment chemistry sampling plan is to describe the natural concentrations and variability of selected physical and chemical parameters of sediment anticipated to be excavated and used as fill or disposed of via ocean dumping.

This sampling program has three objectives, which are based on the Corps and EPA requirements:

- Collect representative samples of the proposed excavated material to ascertain the grain-size distribution, including silt and clay sized particles to support a modeling effort that will be used to predict suspended sediment transport associated with pipeline construction
- Collect representative sediment quality samples of the proposed excavated material to determine if any of the chemicals-of-concern (CoCs) identified by the EPA exceed regulatory screening levels as presented in the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998)
- Collect sediment quality samples from the seafloor (i.e., surficial samples) to determine whether a larger group of CoCs identified by the EPA exceeds regulatory screening levels as presented in *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998).

4.1 REGULATORY SEDIMENT QUALITY RANKING

The EPA and Corps have not promulgated guidance for environmental evaluation of dredging activities specific to Alaska. However, such guidance does exist for the Lower Columbia River and other Pacific Northwest estuaries in the form of the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (November 1998). In this document, the EPA, Corps, and State participants developed a ranking scheme that classifies proposed dredged materials as a function of known chemical and physical properties (Table 4-1). EPA Region X directed that these classifications be used for the design of this sampling program.

Table 4-1 Management Area Ranking Definitions (Corps 1998)

Ranking	Parameters
Exclusionary	Available data indicate coarse-grained sediment with at least 80% sand retained in a No. 230 sieve and a total volatile solids content of less than 5.0 percent. Locations sufficiently removed from potential sources of sediment contamination based on historical information and/or best professional judgement. Typical locations include the mouth and mainstream channel of the Lower Columbia River.
Low	Available data indicate low concentrations of CoCs and/or no significant response in biological tests. Locations with higher percentage of finer-grained sediments and organic material but few sources of potential contamination. Typical locations include adjacent entrance channels, rural marinas, navigable side sloughs, and small community berthing facilities.
Low-Moderate	Available data indicate a "low" rank may be warranted but data are not sufficient to validate the ranking.
Moderate	Available data indicate moderate concentrations of CoCs in sediments in a range known to cause adverse response in biological tests. Locations where sediments are subject to several sources of contamination, or where existing or historical use of the site has the potential to cause sediment contamination. Typical locations include urban marinas, fueling and ship berthing facilities, areas downstream of major sewer or stormwater outfalls, and medium-sized urban areas with limited shoreline industrial development.
High	Available data indicates high concentrations of CoCs in sediments and/or significant adverse responses in at least one of the last two cycles of biological tests. Locations where sediments are subject to numerous sources of sediment contamination, including industrial runoff and outfalls, or where existing or historical use of the site has the potential to cause sediment contamination. Typical locations include large urban areas and shoreline areas with major industrial development.

Application of these ranking definitions to the sediments proposed for excavation along any of the alternative pipeline routes shows them to have a low ranking. The low rank is based on available sediment chemistry data collected by Montgomery Watson (1998) which indicated low concentrations of CoCs for samples collected along two of the alternative pipeline routes. The study encountered only naturally occurring fine-grained sediments, with no indication of anthropogenic disturbance.

The estimated excavation volumes for each of the pipeline alternatives are summarized in Table 4-2 as presented in MMS 2001.

Table 4-2 Estimated Pipeline Trench Dimensions (MMS 2001)

Pipeline Trench Design Parameters	Preferred Pipeline Route (Shallow Burial)	Preferred Pipeline Route (Deeper Burial)	Southern Island Alternate Route	Tern Island Alternate Route
Average Trench Depth	10.5 ft	15 ft	10.5 ft	10.5 ft
Trench Depth Range	8-12 ft	15 ft	8-12 ft	8-12 ft
Trench Width Range	61-132 ft	120-152 ft	61-132 ft	61-132 ft
Trench Length	32,400 ft	32,400 ft	22,276 ft	29,140 ft
Quantity of Trench Dredge/Excavation Material	724,000 cubic yards (cy)	1,438,560 cy	652,800 cy	557,300 cy
Quantity of Trench Backfill Material	724,000 cy	1,438,560 cy	652,800 cy	557,300 cy
Minimum Burial Depth	7 ft	11 ft	7 ft	7 ft
Surface Area Disturbed by Trench	59 acres	81 acres	37 acres	59 acres

4.2 SAMPLING DESIGN AND LOCATIONS

4.2.1 Grain-Size Sampling

Representative samples of proposed excavated material will be collected to ascertain the sediment grain-size distribution. This sampling will be conducted based on the Corp prescriptive requirement to estimate the total suspended sediments (TSS) associated with construction activities. The resulting grain-size distributions will be used in the modeling effort to predict suspended sediment associated with the planned pipeline construction.

The grain-size sampling plan is to collect borehole sediments along each alternative pipeline route (Figure 4-1). The sampling will be performed only within the floating land-fast ice areas (no grounded ice areas) using a ½-mile spacing interval between boreholes, where the land-fast ice is greater than 6.5 ft. Table 4-3 summarizes the number of samples to be collected along each pipeline route.

Four samples will be collected in each borehole along the preferred pipeline route. The sample depths will be selected based on changes in sediment grain-size. If changes are not visually evident, then samples will be collected at equal intervals from the mud line to a depth of 15 ft below the seafloor. If material is recovered successfully from all boreholes, 104 samples will be collected for grain-size analysis (Table 4-3).

Table 4-3 Grain-Size Samples and Borings Planned along a Pipeline Route

Pipeline Routes	Total Borings Per Route	Total Samples Per Route
Preferred Pipeline Route	9	36
Southern Island Alternative Route	8	32
Tern Island Alternative Route	9	36
Total Borings and Samples	*26*	*104*

As noted previously, the sampling design for grain-size distribution is prescriptive; however, to assure that sufficient samples are collected, statistical performance standards can be determined using existing grain-size data sets from Foggy Island Bay. These grain-size data sets are used as the basis to determine the number of samples required for the trench excavation sediment quality sampling. As noted in the following section, only 16 samples are required per route.

4.2.2 Trench Excavation Sediment Quality Sampling

In 1992 the EPA developed sampling design guidelines based on statistical methods summarized by Gilbert (1987) and presented in a structured manner that allows investigators to design robust sampling programs. Both Gilbert (1987) and EPA (1992) provide a descriptive review of various sampling designs and their applicability for estimating chemical distributions and trends. The objective of this sampling program is to determine if the concentrations for the CoCs exceed regulatory screening levels issued in the *Dredged Material Evaluation Framework, Lower Columbia River Management Area* (EPA 1998). The baseline study should delineate the representative concentrations for each chemical-of-concern along each alternative pipeline route presented in the Liberty Development draft EIS (MMS 2001). Based on the EPA 1992 guidance, this study will use the classical stratified systematic sampling design because it is appropriate for use in sampling any medium to define the representative concentration values over a site.

The 1992 EPA guidance document developed standardized tables to quantify the statistical performance of a sampling program, in terms of:

- *Confidence Level*: The confidence level is 100 minus a, where a is the percent probability of taking action when no action is required (i.e., false positive result–a is the probability of a type I error)
- *Power*: Power is 100 minus ß, where ß is the percent probability of not taking action when action is required (i.e., false negative result–ß is the probability of a type II error)

- *Minimum detectable relative difference (MDRD)*: MDRD is the percent difference required between site and background concentration levels before the difference can be detected statistically.

Baseline sampling design strategy is presented in the 1992 EPA guidance, with an example that uses the standardized tables to quantify statistical performance of the sampling program. These tables presume that the investigator can estimate the coefficient of variance. Visual grain-size descriptions from existing geotechnical bore logs were used to estimate the coefficient of variance. Bore logs noted that on average three strata were encountered within the proposed excavation depth (0 to 15 ft below the seafloor) in each borehole. If it is assumed that similar strata found at similar depths are not continuous between adjacent boreholes–a very conservative assumption that will increase the minimum number of samples required–then 70 discrete sediments were delineated along the applicant's preferred route. The resulting coefficient of variance is approximately 30 percent. Following the example found in EPA (1992) for baseline samples, and based on these visual grain-size descriptions, the following can be determined:

- Coefficient of Variance is 30 percent
- False positive error is 20 percent (i.e., the confidence level is 80 percent)
- False negative error is 5 percent (i.e., the power is 95 percent)
- MDRD is 20 percent
- The resulting minimum number of samples required is 15.

A simplification of an example presented in Gilbert (1987) was used to determine the number of samples needed from each borehole to have the necessary confidence to describe stratified sediments. The number of borehole samples is determined to be the sum of the mean and variance, where the sample population is the number of strata encountered in boreholes along the preferred pipeline route. As noted below, four samples are the minimum number to be collected within a borehole.

Vertical Sample Number = mean + variance
= 3 + 0.86
= 3.86
≈ 4 samples

The sampling design assumes that the sampling program will encounter, on average, three strata per borehole. So, as stated above, the minimum number of samples required to be collected along a given pipeline route is 15, and the minimum number of samples to be collected within each borehole is 4. Therefore, the minimum number of boreholes required along each alternative pipeline route is four (i.e., 4 samples/borehole x 4 boreholes = 16 samples).

Subsurface sediment quality samples representing the proposed excavated material will be collected along the three alternative pipeline routes. These samples will be analyzed to determine if any of the CoCs identified by the EPA exceed regulatory screening levels.

Based on the statistical performance standards, a minimum of 15 samples will be collected to describe sediments from the seafloor along the preferred pipeline route. Four samples will be collected in each borehole based on changes in sediment grain size, or if changes are not visually evident, then at equal spacing from the mud line to a depth of 15 ft below the seafloor.

The sediment quality sampling plan is to collect sediments from a minimum of 4 boreholes situated along the preferred pipeline route, from four boreholes along the Southern Island alternative, and from 3 boreholes along the Tern Island route, for a total of 12 boreholes (Figure 4-2). Only three boreholes are identified along the Tern Island route, since the shoreward sample from the Southern Island route is located very near the Tern Island route. If material is recovered successfully from all boreholes, a total of 44 samples will be collected. Table 4-4 presents the minimum number of sediment quality borings planned for each pipeline route.

Table 4-4 Minimum Number of Sediment Quality Borings along a Pipeline Route

Pipeline Routes	Total Borings Per Route	Total Samples Per Route
Preferred Pipeline Route	4	16
Southern Island Alternative Route	4	16
Tern Island Alternative Route	3	12
Total Borings	*11*	*44*

4.2.3 Surface Sediment Quality Sampling

Seafloor sediment quality samples will be collected to determine if a larger group of CoCs identified by the EPA exceed regulatory screening levels, and if future sediment quality sampling within the Beaufort Sea warrant expanding the list of CoCs. The sampling design is based on the opportunity to collect a small data set without incurring significant costs, since the samples will be taken in conjunction with the trench excavation sediment quality sampling, and it is expected that the concentrations for the expanded CoCs are well below the regulatory screening levels.

Sediment samples will be collected from four seafloor locations, three sites located along the preferred pipeline route. A fourth site, a background or reference sample will be collected immediately seaward of the Sagavanirktok River delta in the western part of Foggy Island Bay (Figure 4-3). Each sample will be collected from the mud line to approximately 6 inches below the surface. If shallow seafloor sediments are recovered successfully from the subsurface boring effort, those samples will be collected as representative seafloor surface sediments.

4.2.4 Chemicals of Concern for Subsurface Sediments

Table 4-5 presents a complete list of the chemical and physical parameters to be measured from the borehole sampling effort to characterize the proposed excavation material. A minimum of 5 replicate samples will be collected at the 11 boreholes. Additional samples will be collected at selected boreholes to address quality control and quality assurance (QA/QC) protocols as noted in Section 5.

Table 4-5 Proposed Chemical and Physical Analyses for Subsurface Sediments

PARAMETER	PREP METHOD (recommended)	ANALYSIS METHOD (recommended)	SEDIMENT MDL (1)
CONVENTIONALS:			
Total Solids (%)	NA	160.3M	0.1
Total Volatile Solids(%)	NA	160.4M	0.1
Total Organic Carbon (%)	NA	ASTMD4129M	0.1
Total Sulfides (mg/kg)	NA	SW9030	1
Ammonia (mg/kg)	NA	Plumb 1981	1
Grain Size (%)	NA	ASTM 2422 (Pipette)	NA
METALS (ppm):			
Antimony	SW3050	SW6020	0.05
Arsenic	SW3050	SW6020	0.1
Barium	SW3050	SW6020	0.1
Cadmium	SW3050	SW6020	0.05
Calcium	SW3050	SW6010B	2.0
Chromium	SW3050	SW6020	0.1
Copper	SW3050	SW6020	0.05
Iron	SW3050	SW6010B	2.0
Lead	SW3050	SW6020	0.05
Manganese	SW3050	SW6020	.1
Mercury	NA	SW7471	0.01
Nickel	SW3050	SW6020	0.05
Silver	SW3050	SW6020	0.05
Zinc	SW3050	SW6020	0.05
ORGANICS (ppb):			
LPAH			
Naphthalene	SW3550	SW8270SIM	5
Acenaphthylene	SW3550	SW8270SIM	5
Acenaphthene	SW3550	SW8270SIM	5
Fluorene	SW3550	SW8270SIM	5
Phenanthrene	SW3550	SW8270SIM	5
Anthracene	SW3550	SW8270SIM	5
2-Methylnaphthalene	SW3550	SW8270SIM	5
Total LPAH	—	—	—
HPAH			
Fluoranthene	SW3550	SW8270SIM	5
Pyrene	SW3550	SW8270SIM	5
Benzo(a)anthracene	SW3550	SW8270SIM	5
Chrysene	SW3550	SW8270SIM	5
Benzofluoranthenes	SW3550	SW8270SIM	5
Benzo(a)pyrene	SW3550	SW8270SIM	5
Indeno(1,2,3-c,d)pyrene	SW3550	SW8270SIM	5
Dibenzo(a,h)anthracene	SW3550	SW8270SIM	5
Benzo(g,h,i)perylene	SW3550	SW8270SIM	5
Total HPAH	—	—	—

[1] Cold vapor atomic absorption (CVAA)

4.2.5 Chemicals of Concern for Surface Sediments

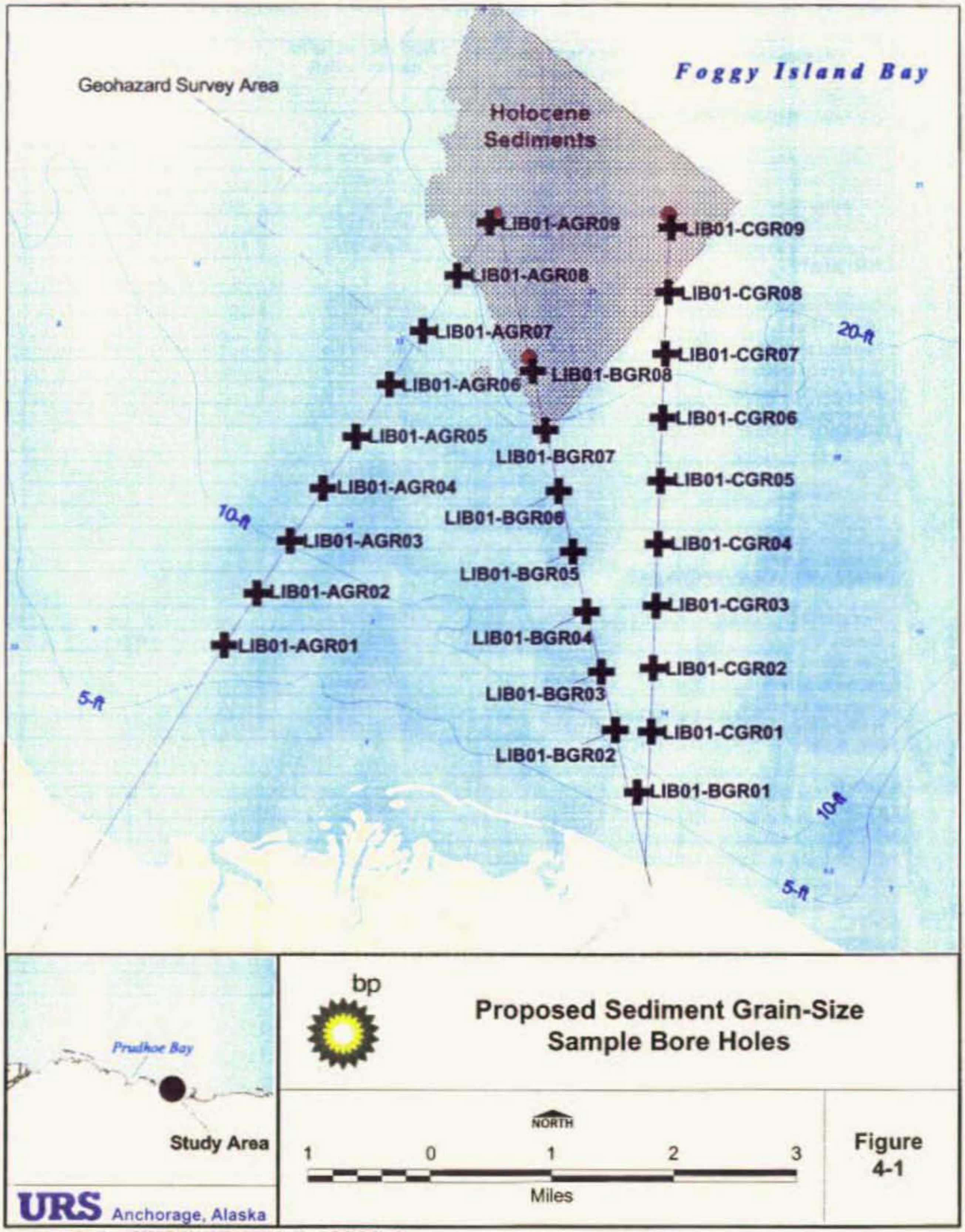
Table 4-6 presents a complete list of the chemical and physical parameters to be measured from the surface sediment sampling effort. If sufficient sediment is collected, additional QA/QC samples will be collected including replicate, split, matrix spike, and matrix spike duplicate samples.

Table 4-6 Proposed Chemic and Physical Analyses for Surface Sediments

PARAMETER	PREP METHOD (recommended)	ANALYSIS METHOD (recommended)	SEDIMENT MDL (1)
CONVENTIONALS:			
Total Solids (%)	NA	160.3M	0.1
Total Volatile Solids(%)	NA	160.4M	0.1
Total Organic Carbon (%)	NA	ASTMD4129M	0.1
Total Sulfides (mg/kg)	NA	SW9030	1
Ammonia (mg/kg)	NA	Plumb 1981	1
Grain Size (%)	NA	ASTM 2422 (Pipette)	NA
METALS (ppm):			
Antimony	SW3050	SW6020	0.05
Arsenic	SW3050	SW6020	0.1
Barium	SW3050	SW6020	0.1
Cadmium	SW3050	SW6020	0.05
Calcium	SW3050	SW6010B	2.0
Chromium	SW3050	SW6020	0.1
Copper	SW3050	SW6020	0.05
Iron	SW3050	SW6010B	2.0
Lead	SW3050	SW6020	0.05
Manganese	SW3050	SW6020	.1
Mercury	NA	SW7471	0.01
Nickel	SW3050	SW6020	0.05
Silver	SW3050	SW6020	0.05
Zinc	SW3050	SW6020	0.05
ORGANICS (ppb):			
LPAH			
Naphthalene	SW3550	SW8270SIM	5
Acenaphthylene	SW3550	SW8270SIM	5
Acenaphthene	SW3550	SW8270SIM	5
Fluorene	SW3550	SW8270SIM	5
Phenanthrene	SW3550	SW8270SIM	5
Anthracene	SW3550	SW8270SIM	5
2-Methylnaphthalene	SW3550	SW8270SIM	5
Total LPAH	—	—	—
HPAH			
Fluoranthene	SW3550	SW8270SIM	5
Pyrene	SW3550	SW8270SIM	5
Benzo(a)anthracene	SW3550	SW8270SIM	5
Chrysene	SW3550	SW8270SIM	5
Benzofluoranthenes	SW3550	SW8270SIM	5
Benzo(a)pyrene	SW3550	SW8270SIM	5
Indeno(1,2,3-c,d)pyrene	SW3550	SW8270SIM	5
Dibenzo(a,h)anthracene	SW3550	SW8270SIM	5
Benzo(g,h,i)perylene	SW3550	SW8270SIM	5

PARAMETER	PREP METHOD (recommended)	ANALYSIS METHOD (recommended)	SEDIMENT MDL (1)
Total HPAH	—	—	—
CHLORINATED HYDROCARBONS			
1,3-Dichlorobenzene	NA	SW8260	1
1,4-Dichlorobenzene	NA	SW8260	1
1,2-Dichlorobenzene	NA	SW8260	1
1,2,4-Trichlorobenzene	SW3550	SW8270SIM	5
Hexachlorobenzene (HCB)	SW3550	SW8270SIM	5
PHTHALATES			
Dimethyl phthalate	SW3550	SW8270SIM	5
Diethyl phthalate	SW3550	SW8270SIM	5
Di-n-butyl phthalate	SW3550	SW8270SIM	5
Butyl benzyl phthalate	SW3550	SW8270SIM	5
Bis(2-ethylhexyl)phthalate	SW3550	SW8270SIM	10
Di-n-octyl phthalate	SW3550	SW8270SIM	5
PHENOLS			
Phenol	SW3550	SW8270SIM	20
2 Methylphenol	SW3550	SW8270SIM	6
4 Methylphenol	SW3550	SW8270SIM	20
2,4-Dimethylphenol	SW3550	SW8270SIM	6
Pentachlorophenol	SW3550	SW8270SIM	50
MISCELLANEOUS EXTRACTABLES			
Benzyl alcohol	SW3550	SW8270SIM	6
Benzoic acid	SW3550	SW8270SIM	100
Dibenzofuran	SW3550	SW8270SIM	10
Hexachloroethane	SW3550	SW8270SIM	10
Hexachlorobutadiene	SW3550	SW8270SIM	10
N-Nitrosodiphenylamine	SW3550	SW8270SIM	10
PESTICIDES			
Total DDT	—	—	—
p,p'-DDE	SW3540	SW8081	1
p,p'-DDD	SW3540	SW8081	1
p,p'-DDT	SW3540	SW8081	1
Aldrin	SW3540	SW8081	1
Chlordane	SW3540	SW8081	1
Dieldrin	SW3540	SW8081	1
Heptachlor	SW3540	SW8081	1
Lindane	SW3540	SW8081	1
Total PCBs *	SW3540	SW8082	67

* Total PCBs BT value in ppm carbon-normalized.



Proposed Sediment Grain-Size Sample Bore Holes

Figure 4-1

URS Anchorage, Alaska

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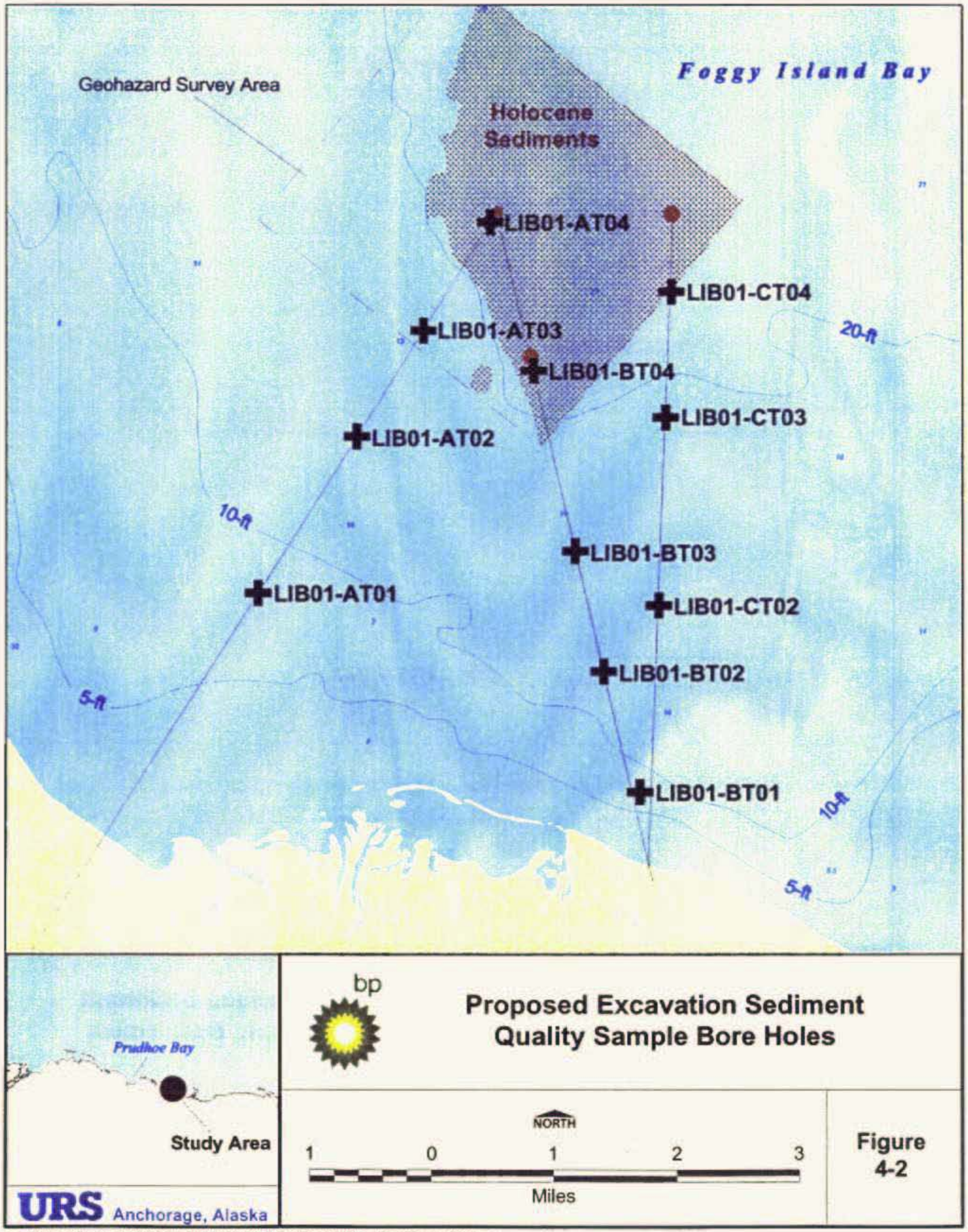

URS Anchorage, Alaska

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Proposed Excavation Sediment Quality Sample Bore Holes

Figure 4-2

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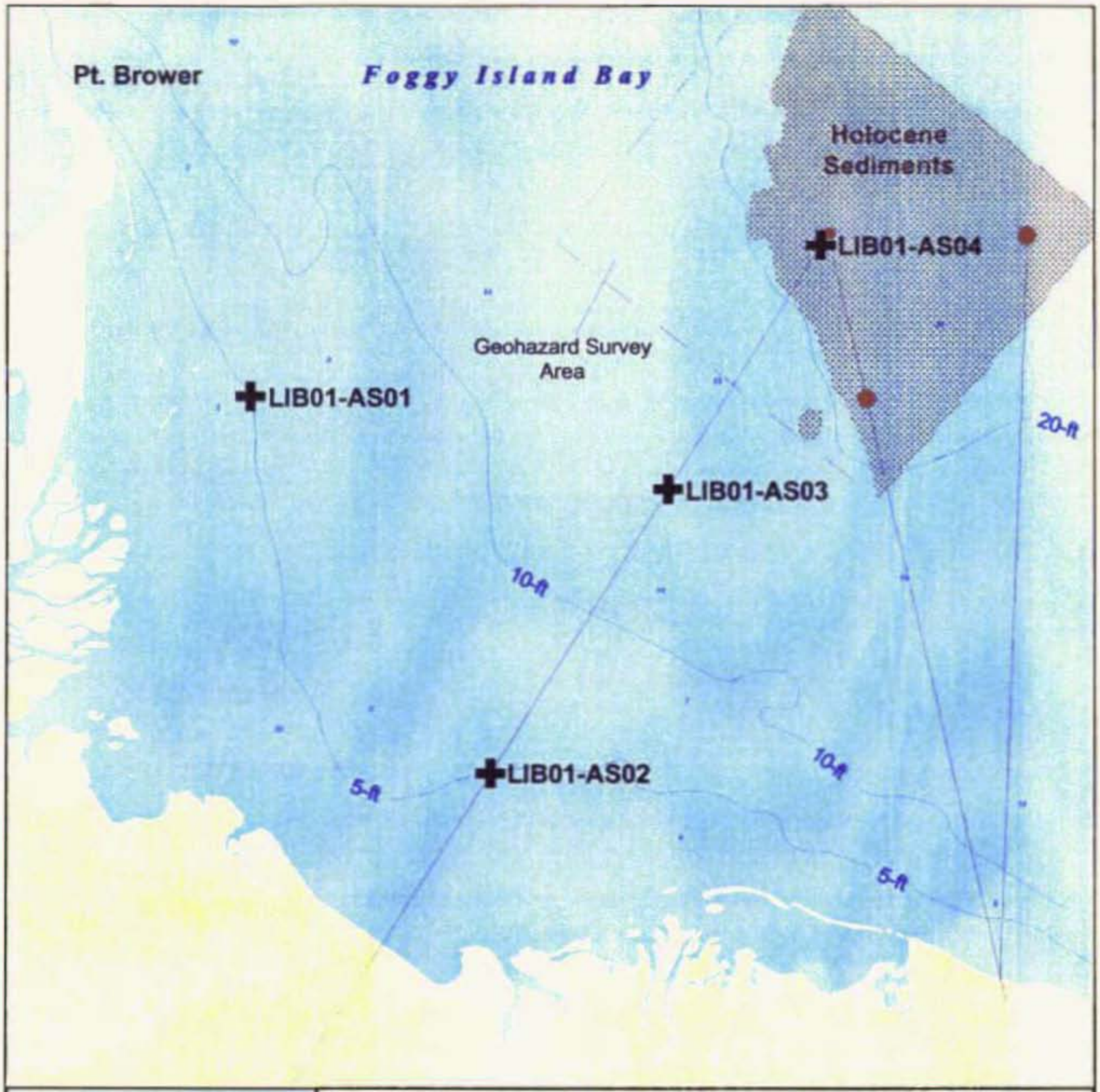

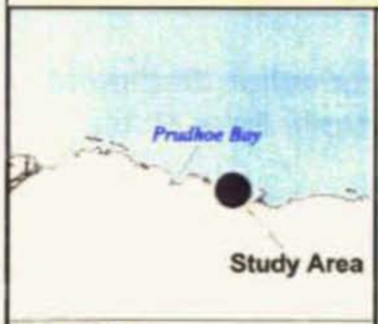

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Proposed Surface Sediment Quality Sample Bore Holes

Figure 4-3

URS Anchorage, Alaska

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5.1 NAVIGATION AND SAMPLE POSITIONS

A specialized arctic off-road vehicle (rollagon) equipped with an autonomous global positioning system (GPS) receiver will be used to navigate across unmarked off-road areas and will be the primary method to survey borehole positions. Horizontal positions will be based on the North American Datum of 1927 (NAD27), using either State Plane Coordinate System (in feet) or latitude/longitude coordinates. The position accuracy is anticipated to be approximately ±30 m.

5.2 SAMPLING METHODS

A drill rig and working deck will be mounted on a sled and enclosed in a fabric structure for towing by a rollagon to sampling locations. Various coring methods are currently under consideration, including a continuous coring option that would use Lexan liners up to 5 ft long. If the continuous coring method is ineffective or inefficient, hollow-stem auger and split-spoon sampling will be considered.

Multiple boreholes may be necessary to collect adequate sediment volume for the required analysis at a specific location. It is envisioned that an initial boring will be completed to 15 ft below the seafloor to provide a visual field description of the soils based on the Unified Soil Classification System (USCS). Grain-size samples will be collected from this boring. A second borehole will be completed approximately 5 to 10 ft away from the initial borehole, along the trench line, for collection of sediment quality samples. It is hoped that continuous cores, at up to 5-ft intervals, will be recovered to a depth of 15 ft below the seafloor. In the event that continuous coring is not effective, split spoon samples will be collected. All of the cores will be capped, labeled, wrapped, and secured in the field. The cores will be allowed to freeze in ambient conditions and stored outside of the enclosed sled.

Because the interior of the sled contains lubricants and is warmed by propane heaters, there is a possibility that contamination of sediment quality samples could occur if the cores are sub-sampled in the field. Consequently, sediment quality sub-sampling will be deferred until it can be conducted in a controlled environment. Arrangements will be made to conduct the sub-sampling under laboratory conditions, probably at the Endicott Development. After the cores thaw, the core will be removed from the liner. If sufficient sediment is recovered, sub-samples will be collected from material that was not in direct contact with the liner or within 1 inch from either end of the core.

5.3 SAMPLE COLLECTION & HANDLING PROCEDURES

The following descriptions and procedures are based on guidance derived and adapted for use in the Beaufort Sea, Alaska from the following:

Dredged Material Evaluation Framework: Lower Columbia River Management Area (Corps et al 1998)

Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissue in Puget Sound (PSEP 1997)

Dredged Material Evaluation and Disposal Procedures – A Users Manual for the Puget Sound Dredged Disposal Analysis (PSDDA) Program (Corps et al 1998)

5.3.1 Sampling Scheme

This is a baseline data collection survey in an area with no known industrial or military activities that could be considered sources of pollution. The goal of the sediment chemistry sampling portion of this study is to describe the natural concentrations and variability of selected physical and chemical parameters within the study area.

Original, field replicate, and split samples will be collected as part of this sampling program. Tables 5-1 and 5-2 summarize the types of samples and field quality control (QC) samples and blanks to be collected for the subsurface and surface sediment quality sampling effort.

Table 5-1 Sample and Field QC Design – Subsurface Sediment Quality Samples

Sample/Blank Type	Study Total	Preferred Pipeline Route	Southern Island Alternate Route	Tern Island Alternate Route
Samples	44	16	16	12
Field Replicates (initial analysis)	4	2	1	1
Field Split (Duplicate) Sample	4	2	1	2
Matrix Spike/Matrix Spike Duplicate	2	1	1	0
Field Blank	4	1	0	0
Rinsate Blank	4	1	1	0
Total Samples	62	23	20	15

Table 5-2 Sample and Field QC Design – Surface Sediment Quality Samples

Sample/Blank Type	Study Total	Preferred Pipeline Route	Background Location
Samples	4	3	1
Field Replicates (initial analysis)	1	1	0
Field Split (Duplicate) Sample	1	1	0
Matrix Spike/Matrix Spike Duplicate	1	1	0
Field Blank	1	1	0
Rinsate Blank	1	1	0
Reference Sample	1	0	1
Total Samples	10	8	2

5.3.2 General Sample Collection Procedures

To minimize the potential for cross-contamination, all samples will be collected using disposable or decontaminated tools. Sampling tools may include, but are not limited to, split spoons, mixing spoons, bowls, and trays. Disposal gloves appropriate for the site contaminants will be worn and changed between sample intervals. Samples will be placed in containers in the order of volatilization sensitivity as outlined in the following table.

Standard Order of Preferred Sample Collection for Typical Baseline Studies

Order	Analyte to be Sampled
1	Volatile organics
2	Total organic halogens, total organic carbon, and total phenols
3	Extractable organics (e.g., semi-volatiles, pesticides, herbicides)
4	Anions, cations (e.g., CN^-, SO_4^{2-}, Cl^-, NO_3^{2-}, and NH_4^{2+})
5	Metals (total and dissolved)
6	Radionuclides

5.3.3 Volatiles and Sulfides Sub-Sampling Procedures

Samples collected for volatile analysis will be undisturbed. The sample material for volatile organic or sulfide compound analysis will be collected first from the soil core; no mixing will be performed. One 2-ounce unpreserved container with septa will be completely filled with sample sediment for volatiles. No headspace should be allowed to remain in the container. Jars should be filled as tightly as possible, eliminating obvious air pockets. Threads on the sample container and lid will be wiped clean prior to closure to prevent leakage. For sulfides sampling, sediment will be placed in a 2-ounce sampling container preserved with zinc acetate.

The volatiles and sulfides sampling containers will be clearly labeled with the project name, sample/composite identification, type of analysis to be performed, date and time, and initials of person(s) preparing the sample, and referenced by entry into the logbook. The sulfides sampling jars will indicate that zinc acetate has been added as a preservative. The sample containers will be refrigerated or stored on ice or blue ice until delivered to the analytical laboratory.

5.3.4 Compositing Procedures

Following the collection of soil samples for volatile analysis, the remaining portion of the sample will be transferred to a large container (i.e., a decontaminated stainless steel mixing bowl) for homogenization before being placed into remaining sample jars for extractable organics, metals, and conventionals analyses. Sample material will be thoroughly homogenized prior to splitting into separate sample containers.

After compositing is performed, sediment will be placed in one 8-ounce unpreserved container for extractable organic analysis. One 16-ounce unpreserved sample container will be filled with sediment for metals and conventional analyses. Both containers will be completely filled to the top with sediment, and will be labeled with the project name, sample/composite identification, type of analysis to be performed, date and time, and initials of person(s) preparing the sample, and referenced by entry into the logbook. The sample containers will be refrigerated or stored on ice or blue ice until delivered to the analytical laboratory.

5.3.5 Field Decontamination Procedures

Field decontamination of sediment sampling equipment and associated utensils will be conducted between sampling intervals. The following sequence of wash and rinses will be used to decontaminate sampling equipment prior to use and between samples.

- Wash with sodium triphosphate or Alconox® solution
- Rinse twice with potable water
- Rinse with de-ionized water
- Air dry in a hydrocarbon-free environment.

5.3.6 Field Quality Control (QC)

The following describes the field QC blanks and samples associated with this project.

Container Blank: A container blank will be prepared at the analytical laboratory by filling one of the sample containers with analyte-free water or organic solvent. The blank will be retained at the laboratory and analyzed along with samples collected in the same batch of containers. Container blank results will be used to evaluate any contamination present in the sample containers.

Field Blank: A field blank is a sample of analyte-free water that is supplied by the laboratory. The field blank will be generated by opening the analyte-free water container at the sampling location and transferring an aliquot to another laboratory-supplied container. The field blank will be analyzed for PAH and metal analytes for which associated samples are being analyzed. Field blank results will be used to measure and document any possible on-site contamination.

Preservation Blank: A preservation blank is a sample of analyte-free water that contains the same preservative used for associated samples and will be analyzed for the same parameters. Analysis of the preservation blank will be used to measure and document any contamination present in the preservative.

Rinsate (Equipment) Blank: A rinsate blank is a sample of analyte-free water that has been used to rinse sampling equipment after prescribed decontamination. The analyte-free water will be supplied by the laboratory. The rinsate blank will be analyzed for PAH and metal analytes for which the samples are being analyzed. Analysis of the rinsate blank will be used to measure and document the effectiveness of field decontamination of sampling equipment and possible carry-over of contamination to samples collected after the rinsate blank.

Temperature Blank: A temperature blank is a plastic container of water that is kept in the sample cooler with analytical samples between sub-sample collection and delivery. The temperature of this water will be measured and recorded when samples are received at the analytical laboratory. Measurement of the temperature blank will be used to indicate whether proper sample temperature was maintained between sample collection and delivery to the analytical laboratory.

Field Split (Duplicate) Sample: A field split sample consists of an actual sample for which twice as much volume as necessary to fill the sample containers has been collected. Aliquots of this sample will be equally distributed in two sets of sample containers. This division results in two (theoretically) equivalent samples collected from one sampling location. The field split sample will be analyzed for the same set of analytes for which the original sample is being analyzed.

Field Replicate Sample: A field replicate consists of additional samples grab(s) that will be collected using the same sampling methods used to obtain the first sample. Two field replicates and a spare replicate samples will be collected at the same sampling station and as soon after the original sample as possible. The field replicate samples will be analyzed for the same set of analytes as the original sample. Analysis of the field replicate is used to measure and document the repeatability of field sampling methods as well as the heterogeneity of the sample matrix. Statistical analysis of numerical analytical results (mean and standard deviation) of the original sample and multiple replicates may also be performed to calculate the likely range of analyte concentrations at a given sampling location.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Sample: A matrix spike is a solution of the target analytes at known concentrations that is spiked into a field sample before sample preparation and analysis. Two aliquots of the sample are spiked for the duplicate analysis. The results of the duplicate spiked samples are used to measure the percent recovery of each spiked compound and compare the recovery between samples, which provides estimates of the accuracy and precision of the method. The frequency for the MS/MSD analysis is five percent of samples analyzed for each method where spikes are performed (i.e., one MS/MSD per analytical batch of 20 samples).

Background/Reference Sample: Typically, a background sample is collected from an area outside, but near to, the area of suspected contamination. Since there has been no industrial or military activity to contaminate the sediments to be collected from the designated sample stations, analytical results from these samples will be considered to reference or baseline samples.

5.3.7 Sample Containers and Labels Procedures

Soil samples will be collected in pre-cleaned glass and/or plastic containers provided by the analytical laboratory. The containers will have screw-type lids to assure adequate sealing of the bottles. The lids will include Teflon® inserts to prevent sample reaction with the lid and to improve the quality of the seal. Table 5.2 summarizes the amount of sediment and types of containers required for different types of analyses. If the same laboratory is to perform a number of the analyses, it is not necessary for each type of analysis to have a separate sediment sample jar. Two or more sediment sub-samples from the same station may be combined in a single sample jar as long as the required container types are the same and the sample preservation methods and maximum holding times are compatible. Table 5.2 identifies which sub-samples are appropriate to combine in the same jar.

Self-adhesive labels will be attached to the outside of all sediment sample containers. The following information will be provided on each sample label in waterproof ink:

- A unique sample number which includes the station identification
- Sampling date and time

- Sampling personnel
- Preservative (if appropriate).

5.3.8 Sample Transport and Chain-of-Custody Procedures

Sample transport and chain-of-custody procedures will include the following guidelines:

- Samples will be packaged and shipped in accordance with U.S. Department of Transportation regulations as specified in 49 CFR 173.6 and 49 CFR 173.24
- Individual sample containers will be packed to prevent breakage and transported in a sealed ice chest or other suitable container
- Ice will be placed in separate plastic bags and sealed, or blue ice used to maintain an ambient sample temperature of approximately 4°C until delivery to the analytical laboratory
- Each cooler or container containing sediment samples for analysis will be shipped to the laboratory within 24 hours of being sealed
- A sealed envelope containing chain-of-custody forms will be enclosed in a plastic bag and taped to the inside lid of the cooler
- Signed and dated chain-of-custody seals will be placed on all coolers prior to shipping
- The shipping containers will be clearly labeled with sufficient information (name of project, time and date container was sealed, person sealing the container and consultant's office name and address) to enable positive identification
- Upon transfer of sample possession to the analytical laboratory, the chain-of-custody form will be signed by the persons transferring custody of the sample containers. The shipping container seal will be broken and the condition of the samples will be recorded by the receiver
- Chain-of-custody forms will be used internally in the lab to track sample handling and final disposition.

Table 5-3 Holding Times and Minimum Container Sizes for Physical and Chemical Analyses

Sample Type	Holding Time	Minimum Sample Size[b]	Container Size	Preservative
Physical/Chemical Analyses[a]				
Grain Size	6 months	100-200 g (75-150ml)	16 oz wide-mouth glass jar	None
Total Solids	14 days	125 g (100 ml)		
Total Volatile Solids	14 days	125 g (100 ml)		
Total Organic Carbon	14 days	125 g (100 ml)		
Ammonia	7 days/extraction 28 days/analyze	25 g (20 ml)		
Metals (except mercury)	6 months (28 days)	125 g (100 ml)		
Total Sulfides	7 days	50 g (40 ml)	2 oz wide-mouth glass jar	Zinc Acetate
Volatile Organic Compounds	14 days	50 g (40 ml)	2 oz wide-mouth jar with septa[c]	None
Semivolatile organic compounds	14 days	150 g (120 ml)	8 oz wide-mouth jar[d]	None
Pesticides	14 days	150 g (120 ml)		
Polynuclear aromatic hydrocarbons	14 days	150 g (120 ml)		
Archive Sample	6 months	300 g (250 ml)	8 oz wide-mouth jar[e]	None

[a] During transport to the analytical laboratory, samples will be stored on ice. The archived samples will be frozen immediately upon receipt at the laboratory.

[b] Recommended field sample sizes (wet weight basis) for one laboratory analysis. If additional laboratory analyses are required (e.g., laboratory replicates, allowance for having to repeat an analysis), the field sample size should be increased accordingly. For some chemical analyses, smaller sample sizes may be used if comparable sensitivity can be obtained by adjusting instrumentation, extract volume, or other factors of the analysis.

[c] No headspace or air pockets should remain.

[d] Container to be filled to the top.

[e] Sample to be frozen at the laboratory. Freezing sample extends hold time for SVOCs, pesticides, and PCBs to 6 months.

5.4 FIELD DOCUMENTATION

The following descriptions and procedures are based on guidance derived and adapted for use in the Beaufort Sea, Alaska from the following:

Dredged Material Evaluation Framework: Lower Columbia River Management Area (Corps et al 1998)

Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissue in Puget Sound (PSEP 1997)

Dredged Material Evaluation and Disposal Procedures – A Users Manual for the Puget Sound Dredged Disposal Analysis (PSDDA) Program (Corps et al 1998)

This section provides guidance for documenting sampling and data gathering activities. The documentation of field activities provides important project information and data that can act as support to data generated by laboratory analyses. Project data validation may require reporting field data to verify sample identification, sampling locations, correct sampling techniques. It may also be necessary to validate results of field analyses and measurements.

Field Notes: Field notes will be maintained for all field activities, whether the collection of samples or the gathering of environmental data. Field notes will be kept on water-resistant paper and all field documentation will be recorded in indelible black ink and errors will be crossed out with a single line, initialed and dated by the data recorder. Information recorded in field notes include, but not be limited to:

- Name of recorder
- Sample and station number
- Data or sample station locator information
- Sample elevation (water depth of the sampler bottle)
- Date and time of sample or data collection (all times should be recorded for multiple sampler deployments)
- Ambient weather conditions such as air temperature, cloud cover, and precipitation
- Sample elevation (water depth above the surface of the sediment)
- Sampling interval (i.e., 0 to 10 cm)
- Positioning information required to calculate the location of the station
- Physical characteristics such as gross particle size distribution, debris, odor or evidence of contamination such as a visible sheen or discoloration
- Record of splits, duplicates and sub-samples taken

Other information that may be recorded in field notes includes sampling methods and any deviations from established sampling protocols. Additional anecdotal information pertaining to observations of unusual sampling events or circumstances may be recorded in field notes. A field book should be unique to the project or, at the very least, to a class of field events, such as marine sediment sampling. It is also advisable to keep record of all personnel involved in each sampling event, including the time each individual boarded and departed the research vessel.

The field sampling program is dependent on the ability to deploy rollagons onto the floating landfast sea ice and grounded sea ice within Foggy Island Bay. Thin ice and/or open water conditions could delay or prohibit sampling this winter. However, typical sea ice conditions allow heavy equipment deployment on or about February 1, lasting for approximately 90 days. It is hoped that sampling can begin as soon as practical after the sea ice conditions permit operations.

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Montgomery Watson. 1997. Liberty Island Route Water/Sediment Sampling. Prepared for BP Exploration (Alaska). April 1997.

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Watson Company 1998b. Liberty Pipeline Route Survey Foggy Island Bay in Stefansson Sound, Alaska. Prepared for BP Exploration (Alaska), Inc. Final Report Volume 1, April 1998.

Watson Company 1998c. Liberty High Resolution Geophysical Survey Foggy Island Bay in Stefansson Sound, Alaska. Prepared for BP Exploration (Alaska), Inc. Addendum to Final Report, November 1998.

Appendix B

Health, Safety, And Environmental Interface Document

HEALTH, SAFETY AND ENVIRONMENTAL (HSE) INTERFACE DOCUMENT

CONTRACTOR: URS Corporation CONTRACT# 1017

WORK SCOPE:

BP Exploration (Alaska) Inc., (BPXA) plans to develop the Liberty oil field in the Beaufort Sea for production and transport of oil to the Trans-Alaska Pipeline system. The field will be developed from a gravel island to be constructed in Foggy Island Bay. The Liberty oil field development will include a sub-sea pipeline construction from the proposed island to a land-based connection with the Badami pipeline.

An environmental evaluation of the Liberty Development is being conducted and includes the evaluations of multiple pipeline routes and production island locations. The construction permits require that physical properties and chemical characteristics of sediment samples related to trench excavation and fill activities be evaluated for potential impacts to the surrounding environment. Since there are no sediment analyses for one of the alternative pipeline routes, additional sampling is required and will be performed as part of this environmental baseline study work scope.

Based on the need to perform sediment sampling in support of construction permits for the proposed Liberty development, additional investigative coring and sampling will be performed in April 2001 along the three proposed pipeline trench routes. The drilling and sampling work will be performed in order to collect sufficient environmental baseline physical (i.e., grain size) and chemical surface and subsurface seafloor sediment data to support the NEPA evaluation and permit applications for the proposed Liberty Development.

TRANSPORATION AND COMMUNICATIONS:

Transportation of field crews and equipment to the various sites will occur via truck along the road system, and via Rolligon beyond the road system. A valid driver's license will be required for truck operation, and Rolligon operations will be conducted by authorized crew members only.

SITE SPECIFIC HEALTH AND SAFETY INFORMATION:

Safety Management Standards (SMSs) for hazards anticipated during this field program are included as Attachment A. The SMSs included in Attachment A are as follows:

- Emergency Action Plan (SMS #3)
- Drilling Safety Guidelines (SMS #056)
- Hand Tools and Portable Equipment (SMS #16)
- Hazardous Waste Operations (SMS #17)
- Heavy Equipment Operations (SMS #19)
- Medical Screening and Surveillance (SMS #24)
- Noise and Hearing Conservation (SMS #26)
- Personal Protective Equipment (SMS #29)
- Remote Travel Health and Safety (SMS #36)
- Subcontractor Health and Safety Requirements (SMS #46)
- Work Over Water (SMS #27)

All field personnel will carefully read and understand this Health and Safety Plan. In addition, the on-site team leader will conduct daily field safety briefings before personnel travel out to the work sites. The meetings will discuss safety concerns and mitigation measures concerning the project. Up-to-date observations of weather, wind chill, and wildlife presence will be discussed among the field team leader and field crew personnel.

Chemical Hazards

The potential chemical hazards associated with this project are minimal. The sediment core samples to be collected during drilling are not likely to be contaminated with diesel, weathered crude oil, or other components of drilling waste. However, there may be an odor of diesel or other hydrocarbons within the enclosed sled work area as a result of drilling activities. Where fumes are strongly evident, where air circulation is not sufficient, or where employees feel uncomfortable with the potential exposure, air monitoring using a Photo-ionization detector (PID) will be conducted (see below). If air monitoring results or physical symptoms (such as headace or nauseau) indicate strong odors are present in the breathing zone, engineering controls (open door to ventilate work area, don respirators) will be put into place. Dermal exposure to contaminated core materials will be minimized through the use of gloves. Eating and drinking will not be allowed during sampling activities.

Physical Hazards

The physical hazards associated with the project scope include working around heavy equipment, being struck by a vehicle or equipment, hypothermia and frostbite associated with cold weather exposure, encounters with wildlife, and slips and falls.

Heavy Equipment and Other Vehicles. Field personnel assigned to this project will not be operating heavy equipment (drill rig). However, a portion of the sampling will take place alongside the drill rig in an enclosed Panacheck sled; therefore the following requirements for rig-based personnel must be met:

- Personnel must wear steel-toed boots and hard hats when working within the Panacheck sled.

- Sampling personnel will stay outside the work zone of the drill rig. If it is necessary for samplers to approach the rig, they must wait until the rig operators have given signal that it is appropriate to approach the rig.

- Ground personnel shall never walk or position themselves between a fixed object and running equipment or between two running pieces of equipment.

Hypothermia and Cold Injuries. Operating Procedure HS-202 (Attachment B) details the symptoms of, treatment for, and how to avoid cold injuries such as frostbite and hypothermia. To avoid cold injuries during sampling activities, workers will wear approved arctic gear including pac boots and mitts. Should the beginning signs of either hypothermia or frost bite be observed, the affected worker will immediately proceed to the vehicle to warm up. Indication of adverse effects includes, but is not limited to:

- Uncontrolled shivering
- Slurring of speech
- Loss of motor skills
- Burning or tingling extremities (frostnip or frostbite).

Should symptoms become significant, the sample team will return to the vehicle and work will be stopped. The affected personnel will be taken to the clinic for medical evaluation.

Encounters with Wildlife. Encounters with polar bears are a hazard for the location and time of year that field activities are planned. Heightened awareness for possible bear encounters will form the basis of personnel control and safety. During day-to-day activities, all personnel will be reminded to be constantly alert to polar bears in the nearby vicinity. Food and other items that might attract bears will be controlled and removed from the site at the end of each day's activities.

If a polar bear is seen or recent bear sign identified, team members will go directly to the vehicle and depart the location, leaving sampling equipment and other personal effects behind if necessary. Personnel will immediately notify the on-site team leader of the bear's location and direction of travel. They will also notify PBOC Security (659-5634) who will be responsible for further notification within BPXA. Work will not continue until an authorized polar bear hazer is on site. A polar bear guard will accompany sampling staff at all times.

Foxes, although not as immediately dangerous as polar bears, are of great concern due to rabies. Any physical contact, as well as the observation of sick animals must be reported to security personnel. If a fox (especially one suspected of having rabies) touches your clothing, do not touch that part of your clothing, as you could become contaminated yourself. Wildlife must not be harassed or harmed.

Slips and Falls. Most falls on the ice occur within 7 feet from exiting a vehicle. Caution should be used when walking on the ice; do not take cold strides and attempt to keep your centerline over your mid-stride. Do not attempt to change direction quickly. Wear ice cleats if necessary.

PERSONAL PROTECTIVE EQUIPMENT:

The initial level for all activities is **Level D.**

INITIAL PPE LEVELS

Activity	Level of Protection	Equipment Requirements
Collection of water and ice/soil core samples during drilling.	D	Arctic Gear consisting of down coveralls or parka and bibs with reflective tape, Arctic grade pac boots or bunny boots, safety glasses, hard hat, hard hat liner, and water resistant arctic mitts with polypropylene or silk liners. Safety goggles. Half or full face respirator with organic vapor cartridges if PID indicates action levels are met or if personnel are affected by diesel fumes. Hearing protection if warranted due to heavy equipment.

EXPOSURE MONITORING:

A PID will be used to monitor the breathing zone at locations as determined by the field team leader/site safety officer. Upgrade to level C will proceed as directed in the following table:

TOXICITY ACTION LEVELS
FUELS OTHER THAN GASOLINE, METHANOL AND JET B
(In PPM)

Instrument	Calibration Gas	Action Upgrade to Level C[1]	Evacuate
Photo-ionization meter (10.0 to 10.2 eV lamp)	HNU calibration gas or Benzene	20	100[2] 600[3]
Photo-ionization meter (10.0 to 10.2 eV lamp)	Isobutylene	35	200[2] 600[3]
Flame ionization meter (OVA-128)	Methane	100	300[2] 600[3]

[1] Sustained in the breathing zone for 1 minute.
[2] For workers wearing half-face respirators.
[3] For workers wearing full-face respirators.

EMERGENCY RESPONSE:

The purpose of this section is to provide guidance in preparing for contingency or emergency situations during field activities. Accidents can, and do, happen. However, with adequate planning and preparedness, resulting consequence can be minimized or prevented.

Emergency preparedness starts with advanced planning. It requires anticipation of potential problems or hazards. Proper emergency preparedness involves use of the project health and safety plan that may address emergency situations. It involves training, site orientation of personnel, medical information of personnel, and availability of emergency equipment and services.

Emergency Action Plan

This section describes the steps to be taken if an emergency occurs.

- Fire – Vehicles are equipped with fire extinguishers. Personnel should first notify someone else of the fire (radio for help) and then if they can fight the fire comfortably, do so. If not, personnel should make sure that they have arctic gear and move to a safe distance to wait for pick up. Do not attempt to walk for help, a burning vehicle draws a lot of attention and will be easily found. Communicate with rescuers using the radio or telephone.

- Medical – All vehicles are equipped with First Aid kits. If the injury requires further medical attention, call for help on the radio. EOA Medical Clinic (located at MCC) can be reached at 659-5239. If an injury occurs in the camp or hotel, go to the desk for assistance All injuries, no matter how small, must be reported for medical attention (see reporting procedures below).

- Environmental Spills – A positive impact on the environment is the goal of all BP EOA participants. A spill is any incident that releases a contaminant into the environment. Nothing may be poured on the tundra and all food and containers must be taken back to the camp area for disposal. If field personnel create or witness an emergency situation, Spill Response (659-5700) must be contacted. Spill Response will then contact the proper departments.

Emergency Equipment/First Aid

The emergency equipment to be located on site in the vehicle or Rolligon includes a first aid kit, air horn, emergency eyewash, an ABC-type fire extinguisher, potable water, anti-bacterial soap, and radio equipment.

Spill and Release Contingencies

If a small spill occurs, the release will be handled using on-site spill containment materials. The spill will be reported to the BPXA ACS Environmental Technician at 659-5800.

Incident Reporting and Investigation

Any work-related incident, accident, injury, illness, exposure, or property loss must be reported to URS and BPXA personnel following the procedures in SMS #049, Incident Injury Reporting (Attachment C), using the contact numbers provided below. The incident will also be reported to the project BP project contact (659-5999). Motor vehicle accidents must also be reported. An incident report form, attached to this plan, must also be filled out and forwarded to the local URS Health and Safety Manager, Ms. Sue Ban, (907) 261-6779. In addition, the incident will be reported to BP HSE Shared Resource through the BP site contact.

BPX CONTRACT ACCOUNTABLE MANAGER	CONTRACTOR'S ACCOUNTABLE MANAGER
DATE: ____________	DATE: ____________

CONTACT LIST

Medical Services	Onsite	PBU-EOA	NOTES
Medical services	Onsite emergency care limited to First Aid.	PBOC Medical Clinic 659-5239	Emergency numbers are · PBU-EOA Emergency 659-5300 · PBU-EOA Security 659-5634
Environmental Services	**Onsite**	**PBU-EOA**	**NOTES**
Routine environmental services including waste management advice, manifesting, fluid transfers, minor spill management.		Additional technical support available through SRT Env. /Waste Techs 659-5800.	Contractor expected to provide cleanup of minor spills. PBOC Env. Tech. will provide guidance on disposal of spill cleanup waste. HSE rep. site contact will provide field spill information to ACS Env. Tech. and to Compliance Advisor for agency reporting.
Emergency environmental services including large controlled or uncontrolled spills.		PBOC Emergency Spill Hotline 659-5700	
Emergency Response Services	**Onsite**	**PBU-EOA**	**NOTES**
Fire/exposure protection	Incipient response	PBOC activated with BP resources deployed as needed	Emergency numbers are · PBU-EOA Emergency 659-5300 · PBU-EOA Security 659-5634
Rescue/extraction	Initial response as possible	Additional support as needed	Emergency numbers are · PBU-EOA Emergency 659-5300 · PBU-EOA Security 659-5634
HazMat response team	Initial response as possible	Additional support as needed	Emergency numbers are · PBU-EOA Emergency 659-5300 · EOA Spill Hotline 659-5700

ATTACHMENT A

SAFETY MANAGEMENT STANDARDS

ATTACHMENT B
OPERATING PROCEDURE HS-202
COLD STRESS

OPERATING PROCEDURE NO. HS-202

202.0 COLD STRESS

202.1 PURPOSE

The purpose of this Operating Procedure is to provide information on cold stress and the procedures for preventing and dealing with cold stress. Adverse climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability.

202.2 TYPES OF COLD STRESS EFFECTS

202.2.1 Frostbite

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite can be categorized into:

- **Frost Nip or Initial Frostbite:** (1st degree frostbite) Characterized by blanching or whitening of skin.
- **Superficial Frostbite:** (2nd degree frostbite) Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient. Blistering and peeling of the frozen skin will follow exposure.
- **Deep Frostbite:** (3rd degree frostbite) Tissues are cold, pale, and solid; extremely serious injury with possible amputation of affected area.

Frostbite can occur without hypothermia when the extremities do not receive sufficient heat. The toes, fingers, cheeks, and ears are the most commonly affected. Frostbite occurs when there is freezing of the fluids around the cells of the affected tissues. The first symptom of frostbite is an uncomfortable sensation of coldness, followed by numbness. There may be tingling, stinging, or cramping. Contact by the skin with tools or other metal objects below 20°F (-7°C) may result in contact frostbite.

The prevention of frostbite includes early recognition of problems, adequate protective clothing, recognizing the combination of wind and low temperature (see Table 202-1 Windchill Index), adequate fluids, work-rest regimens with heated rest areas, and use of controls such as wind-breaks and heaters.

The initial treatment for frostbite includes bringing the individual to a warm location, removal of clothing in the affected area, and placing the affected parts in warm (100-105°F) water. Do not massage or rub the frostbite area. After the initial treatment, wrap the affected area loosely in sterile gauze and seek medical attention.

202.2.2 Hypothermia

Hypothermia results when the body loses heat faster than it can be produced. When this situation first occurs, blood vessels in the skin constrict in an attempt to conserve vital internal heat. Hands and feet are first affected. If the body continues to lose heat, involuntary shivers begin. This is the body's way of attempting to produce more heat, and it is usually the first real warning sign of hypothermia. Further heat loss produces speech difficulty, confusion, loss of manual dexterity, collapse, and finally death. Wet clothes or immersion in cold water greatly increases the hypothermia risk. The progressive clinical presentation of hypothermia may be seen in Table 202-2.

Prevention of hypothermia includes planning for outside work in winter conditions, particularly work over water. Planning will include adequate layers of clothing, training employees in recognizing hypothermia in themselves and others, recognition of the combination of wind and temperature (see Windchill Index in Table 202-1), use of controls such as wind-breaks and heaters, a work-rest schedule, and adequate fluid intake.

Fatal exposure to cold among workers has usually resulted from immersion in low temperature water. Water transmits body heat over 200 times faster than air. Wetsuits or drysuits are recommended for work over water with water temperatures below 45°F. Individuals who fall into cold water without wetsuits or drysuits may not be able to swim due to the rapid onset of hypothermia.

Prompt treatment of hypothermia is essential. Once the body temperature drops below 95°F, the loss of temperature control occurs, and the body can no longer rewarm itself. Initial treatment includes reducing heat loss by moving the individual out of the wind and cold, removal of wet clothing, applying external heat (such as a pre-warmed sleeping bag, electric blanket, or body-heat from other workers) and follow-up medical attention.

202.4 EXPOSURE LIMITS

The American Conference of Governmental Industrial Hygienists (ACGIH) has adopted Threshold Limit Values (TLVs) for cold stress. These limits set maximum work periods based on a combination of wind and temperature.

202.5 REFERENCES

American Conference of Governmental Industrial Hygienists, Documentation of Threshold Limit Values, 1984

EPA, Standard Operating Safety Guides, 1992, pages 95-100.

ATTACHMENT C

SAFETY MANAGEMENT STANDARD #049:
INCIDENT REPORTING

HSE "SHORT FORM" INTERFACE DOCUMENT

1. CONTRACTOR: URS Corporation **2. CONTRACT #: 1017**

3. WORK SCOPE (materials & services, organization, personnel & supervision, location(s), customer(s), etc.):
The work performed by URS Corporation consists of drilling oversight and seafloor sediment sampling along three proposed pipeline trenches in Foggy Island Bay. The purpose of this task is to collect sufficient environmental baseline sediment data to support a NEPA evaluation and permit applications for the proposed construction of a gravel-filled island within Foggy Island Bay. The proposed island would serve as a production facility for the Liberty Development. The drilling and sampling work will be performed during the winter season on floating land-fast sea ice using a conventional drill rig and coring equipment.

The duration of the project is expected to be approximately 10 days. The URS field team will consist of four employees. The employees will have attended NSTC training prior to deployment. All field personnel will have full arctic gear and safety gear including: Arctic Parka, Arctic Bibs, Pack Boots or Bunny Boots, Mittens, Face Mask/Balaclava, Hard Hat Liner, Hard Hat, Respirator and Cartridges, Ski Goggles and Safety Glasses. The work will be conducted in April and May 2001.

4. COMMUNICATION:

BPXA: Tony Zamora
(907) 564-5496

URS Corporation: Sharon Sullivan
(907) 261-9745 or (907) 529-0642

BPXA: Dave Tomasko, Project Manager
(907) 564-5039

5. SPECIFIC HSE HAZARDS:
With the exception of drilling mud and cuttings discharged immediately adjacent to Tern Island during exploration drilling in the early 1980s and 1997, there are no other known chemical hazards within the study area ice, water, and sediments. Cold stress and cold injuries associated with working on the ice in the arctic during the winter. Physical hazards associated with working around heavy machinery. Hazards associated with encountering wild animals such as polar bears.

6. ASSURANCE SYSTEMS:
URS Corporation Health and Safety Program
Site Specific Health and Safety Plan (Attached)

7. SIGNATURES:
The contents of this document are the product of a desktop hazard assessment by management. The undersigned agree that to the best of their knowledge this document is an accurate depiction of the scope of work provided by the contractor, health, safety and environmental risks known about that work scope and management systems in place to mitigate risks. This document also identifies additional actions to further mitigate risks and the undersigned agree to review these and implement as appropriate.

BPX(A) Project Manager Date

URS Health and Safety Officer Date

			Interfaces		
Category	**Hazard/Activity**	**Safeguards in Place to Manage the Hazard/Activity**	**Management System**	**Whose System**	**Responsible Person**
NORTH SLOPE SAFETY HAZARDS	1. Remote Camp hazards 2. Fire hazards 3. Cold Related Injuries 4. Foul Weather 5. Travel by Vehicle on Ice roads and trails on land-fast sea ice. 6. Noise exposure 7. Bear and other wildlife encounters 8. Working around heavy equipment.	1. North Slope Orientation Training (NSTC: Unescorted) for all field personnel. Site/Facility Orientation 2. Fire extinguishers available at camp and on vessels; training in use of extinguishers and evacuation procedures. 3. Use of appropriate cold-weather gear; training in signs of hypothermia and frostbite. Stop-work if symptoms present. 4. Stop work, follow evacuation procedures prescribed by Emergency Response Plan. 5. Radio, flares, signal horn and first aid kit carried on vehicle.	BPX(A) "Alaska Safety Handbook" within operated areas. Asset Policy, Recommended Practices, and SOPs Handbook: North Slope Field Guide for Visitors and Contractors	BPX(A) within operated areas.	Contractor CAM responsible to ensure their personnel receive required orientation training and follow BPX(A) rules and procedures applicable to their work scope.
		6. Hearing Conservation Program. Use of Ear Protection if warranted by noise levels. 7. Bear Training. Bear observation notification procedures. Bear guard available.	Contractor's HSE Management System	Contractor	Contractor CAM

			Interfaces		
Category	**Hazard/Activity**	**Safeguards in Place to Manage the Hazard/Activity**	**Management System**	**Whose System**	**Responsible Person**
NORTH SLOPE SAFETY HAZARDS (cont.)		8. Notify operators that team will be present. Stay out of the way of all heavy machinery. Maintain eye contact with operator when crossing the work area. Use of orange/ reflective clothing. Situational awareness.	Contractor's HSE Management System	Contractor	Contractor CAM
PERMIT AND PROCEDURE CONTROLLED HAZARDS	1. Work within BPX(A) operated areas 2. Flammable and Combustible Fluid Transfer(engine oils, gasoline)	1. North Slope Orientation Training for all personnel before initiating work. 2. Asset Fluid Transfer Procedure	BPX(A) "Alaska Safety Handbook" within operated areas. Asset Policy, Recommended Practices, and FOPs	BPX(A) within operated areas.	Contractor CAM responsible for ensuring personnel receive training and follow rules and procedures applicable to their activities.
ENVIRON-MENTAL IMPACT HAZARDS	1. Spills (fluid transfer, improper liner use etc.) 2. Wildlife Encounters 3. Waste Management and Disposal	1. Training on fluid transfer procedure (NS Orientation). 2. Personnel to avoid all contact with wildlife. 3. Contractor to minimize, segregate, containerize, and label solid waste, and ensure personnel are trained appropriately. All solid waste to be removed from site and properly disposed.	BPX(A) "Alaska Safety Handbook" within operated areas. Asset Policy, Recommended Practices, and FOPs	BPX(A)	Contractor CAM responsible for ensuring personnel receive training and follow rules and procedures applicable to their activities.

			Interfaces		
Category	**Hazard/Activity**	**Safeguards in Place to Manage the Hazard/Activity**	**Management System**	**Whose System**	**Responsible Person**
EMERGENCY AND MEDICAL	1. First Aid, Medical Treatment, Medevac	1. Contractor personnel to be First Aid/CPR trained. For serious accidents/illnesses, BPX(A)/AAI North Slope to provide medical stabilization or treatment and medevac to Anchorage (reimbursed by contractor).	BPX(A)	BPX(A)	
EMERGENCY AND MEDICAL (cont.)	2. Incident Reporting and Investigation a)Investigation of Incidents b)Emergency Response 3. Reporting HSE Data to CAM as required. 4. Return to work after illness/injury. 5. Fitness 6. OSHA Documentation	2. Report all incidents to Asset. Asset to investigate incidents per FOP (contractor to participate). BPX will report environmental incidents occurring on BPX operated areas. 3. Contract Language 4. Contractors Return to Work Policy. 5. Contractors Medical surveillance program. Medical monitoring, pre-job physicals, Doctor release. 6. OSHA 200 Log	Asset HSE Plan Asset Emergency Management Plan BPX Contingency Plans Contractor's HSE Management System	BPX(A) Contractor	Contractor CAM responsible for ensuring personnel receive training and follow rules and procedures applicable to their work Contractor CAM

			Interfaces		
Category	**Hazard/Activity**	**Safeguards in Place to Manage the Hazard/Activity**	**Management System**	**Whose System**	**Responsible Person**
MANAGEMENT SYSTEMS	1. Communications: points of contact with Asset 2. Competency (HSE and Work Program) 3. Roles and Responsibilities 4. Safety management 5. Fatigue 6. Drug and alcohol program	1. Site Specific HSE plan 2. Training Programs, Competency System, Performance Evaluations, Continuing Education 3. Job descriptions 4. Contractor Safety Management Policy and Procedures Manual 5. Budget 12 hour days 6. Contractor's program	Contractor defines points of contact within the Asset and AIC. Contractor's HSE Management System as provided Contractor	Contractor	Contractor CAM to ensure personnel receive site orientation and contact list
WORK PRACTICES AND CONTROLS	1. Work Programs and Procedures 2. Pre-work Risk Assessment 3. Management of Change (design, equipment, chemical, procedure) 4. Information/ Documentation	1. Written work procedures, standards, drawings 2. Contractors pre-work HSE plan 3. Contractors Management of Change procedure 4. Information reporting and documentation to management (daily, job, etc.)	Contractor BPXA CAM agree to all Contractor's HSE Management System Contract Language	Shared Contractor	CAM's agree to work scope and written work procedures before commencing work

			Interfaces		
Category	**Hazard/Activity**	**Safeguards in Place to Manage the Hazard/Activity**	**Management System**	**Whose System**	**Responsible Person**
CONTRACTOR SUPPLIED EQUIPMENT	1. Hand-tools 2. Trucks/Vehicles 3. Materials and Services in compliance with applicable industry standards and specifications. 4. Maintenance and operability of equipment	1. Inspection program. 2. Licenses, driver - competency. 3. Inspection program, record keeping. 4. Inspection and records.	Contractors Work Plan Contractor's HSE Management System	Contractor	Contractor management to ensure personnel receive briefing on Safety Plan and Work Plan.

Appendix C

Field Activity Report

LIBERTY DEVELOPMENT 2001 SEDIMENT QUALITY STUDY:
Field Activity Report
June 14, 2001

Prepared by URS Corporation
for
BP Exploration (Alaska), Inc.

INTRODUCTION

BP Exploration (Alaska), Inc. (BPXA) applied for permit applications associated with the construction and operations of the Liberty Development–an offshore oil production facility located in Foggy Island Bay. Construction permits administered by the U.S. Army Corps of Engineers, Alaska District (Corps) and U.S. Environmental Protection Agency (EPA) require that physical properties (e.g., grain-size distribution) and chemical characteristics of sediment samples related to trench excavation and fill activities be evaluated for potential impacts to the surrounding environment and for possible ocean disposal of spoils. Samples were collected in 1997 and 1998; however, the EPA and Corps required additional sample collection to satisfy regulatory evaluations for the marine segments of the preferred and alternative pipeline routes.

BPXA secured the services of URS Corporation (URS) to design and conduct a marine sediment sampling study to support permitting activities associated with the Liberty Development. The goal of this study was to collect representative sediment chemistry and sediment physical properties (grain-size) samples along the preferred and alternative pipeline alignments within Foggy Island Bay (Figure 1). Field activities based on the approved *Liberty Development 2001 Sediment Quality Study Work Plan* developed by URS were conducted between April 25th and May 8th, 2001.

The field team successfully collected a representative sample set based on statistical performance criteria noted in the Work Plan. Approximately 94 percent of the sediment chemistry samples and 61 percent of the grain-size samples were collected. Sampling methods and other field protocols were completed as described in the Work Plan (URS 2001). This report serves to provide a summary of the field activities, including a description of other operations that affected the field program.

FIELD SAMPLING STRATEGY

The field program collected samples in the following order to assure that a representative sample set was collected to describe the sediment chemistry and grain-size distribution for all three pipeline alternatives:

1. Subsurface sediment chemistry and associated grain-size samples.
2. Surface sediment chemistry and associated grain-size samples.
3. Remaining grain-size samples.

The field team departed from the road that connects the Endicott Development with the Prudhoe Bay in-field road system and moved along the coast on the grounded sea ice until reaching the westernmost sample stations that coincide with Transect A, the applicant's preferred pipeline route (Figure 1). Subsurface chemistry and associated grain-size sampling commenced at the nearest station along Transect A and progressed toward the eastern side of the study area. Due to travel restrictions related to seal structures, the field team followed a path cleared by seal-sniffing dogs that corresponded with the three pipeline route alternatives. The only deviations from this route were detours up to 5-miles to avoid crossing geophone cables related with an ongoing seismic survey. As the field team reached the location of the proposed Liberty Island at the north end of Transect A, progress continued southeast along Transect B (South Island alternative). Upon completion of Transect B sampling, the field team sampled the adjacent station on Transect C (Tern Island alternative) and moved north toward the Tern Island shoal until all of the subsurface sediment and associated grain-size samples were collected.

Upon completion of the subsurface sediment chemistry and associated grain-size samples, the field team moved back to the west side of the study area to collect the surface sediment chemistry and grain-size samples. Once the background and three Transect A sediment chemistry and associated grain-size samples were collected, the field team started collecting the remaining grain-size samples, starting at the nearest station on Transect A and moved toward the north. Field sampling ceased prior to the collection of the remaining grain-size samples located along Transects B and C.

DAILY ACTIVITIES

The following table presents a daily summary of significant events and accomplishments related to field activities. Daily Field Activities Reports (Appendix A) were submitted by the field team and identifies the field personnel, contacts, sampling activities, significant events, and other accomplishments for a given day.

Table 1. Significant Field Events

Day	Planned Activities, Significant Field Events, and Accomplishments
April 25	***Planned Activities*** • Setup of field sampling equipment, mobilization of the CATCO rollagon and drilling sled. • All field personnel attended the Authorization to Proceed (ATP) meeting facilitated by Tony Zamora (BPXA). ***Significant Field Events*** • Bryan Trimm (URS) and Sharon Sullivan (URS) discussed the potential impact of tundra travel closure to the sampling effort. Bryan Trimm (URS) decided that if Sharon Sullivan (URS) determined that tundra travel was imminent, that sub-surface sediment samples and associated grain-size samples were top priority. Second priority samples were surface sediment chemistry and associated grain-size, with the remaining grain-size samples comprising the third tier of sampling. • At 4:30 PM, Tony Zamora (BPXA) informed Sharon Sullivan, the URS field manager, and the field party that the field program was placed on stand-by until BPXA determined that the appropriate field sampling permits and authorizations were in place.
April 26	***Planned Activities*** • Field preparation and mobilization continued from the following day. • Rollagon and drilling sled transferred to the first sample station (LIB01-AGR01) late in the afternoon. ***Significant Field Events*** • At 10:00 am, Tony Zamora (BPXA) authorized URS to proceed with the sampling program. • Additional protocols were implemented related to polar bear awareness and harassment prevention. • Due to time constraints related to tundra travel closure and inclement weather conditions, Sharon Sullivan (URS) declared that subsurface sediment chemistry and associated grain-size samples were priority and thus were to be the first samples collected. This prioritization strategy was implemented to collect the minimum number of samples based on the statistical performance criteria noted in the Work Plan. As time allowed, surface chemistry and associated grain-size samples were selected to be the second priority, with the remaining grain-size samples as the third priority. • LGL was requested to supply the seal structure GPS positions.
April 27	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect A (preferred pipeline route) ***Significant Field Events*** • Western GeCo, a seismic acquisition firm, deployed geophone cables in an orientation that increased the one-way travel time by 3 hours. • Multiple orange survey lath (stakes) installed by Western GeCo overlapped with the seal structure stakes installed by LGL, and the CATCO rollagon trail markers. Since the field team could not distinguish between Western GeCo and seal structure markers, all stakes were avoided, thus, slowing progress. • The presence of Western GeCo geophone cables prohibited CATCO from blazing trails that would have increased travel time throughout the study area. CATCO policy is not to cross deployed geophone cables. • BPXA Endicott personnel prohibited LGL from deploying the seal sniffing dogs (to identify seal structures) because LGL did not have a Letter of Authorization (LOA) from USFWS. • Bryan Trimm (URS) approved changes to sample station identifications along Transect C (Tern Island route) so that the southernmost station was identified as LIB-CT01.
April 28	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect A (preferred pipeline route). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • LGL completed the seal structure survey, which identified 15 structures. • Travel restrictions as noted on April 27th associated with the geophysical survey continue to cause unforeseen delays.
April 29	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect A (preferred pipeline route). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Travel restrictions as noted on April 27th associated with the geophysical survey continue to cause unforeseen delays. • Low recovery at Station LIB01-AT03 required an offset of 10 feet core to collect sufficient sediment.
April 30	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect A (preferred pipeline route) and Transect B (South Island Alternative). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Travel restrictions as noted on April 27th associated with the geophysical survey continue to cause unforeseen delays. • Station LIB01-AT04 (co-located with LIB01-AGR09) required an offset of about 400 feet north along the transect to collect the samples due to the presence of a seal structure. • Sampler and rod were lost during the coring at LIB01-AT04. Drilling commenced after the sampling equipment was recovered and relocation of the drilling rig 10-feet from the original position.
May 1	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect B (South Island Alternative). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Deteriorating (nearly whiteout) weather conditions resulted in increased travel time. • Travel restrictions as noted on April 27th associated with the geophysical survey continue to cause unforeseen delays. • Heaving sands at LIB01-BGR05/BT03 resulted in poor recovery. Insufficient material was recovered at the 13-foot deep interval for sample analysis.
May 2	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect B

Day	Planned Activities, Significant Field Events, and Accomplishments
	(South Island Alternative). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Fog with drifting snow resulted in increased travel time. • Travel restrictions as noted on April 27th associated with the geophysical survey continue to cause unforeseen delays. • Heaving and completely saturated sands were encountered resulting in use of a split spoon sampler.
May 3	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect B (South Island Alternative) and Transect C (Tern Island Alternative). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Travel time was improved as Western GeCo departed area.
May 4	***Planned Activities*** • Sediment chemistry and associated grain-size sample collection along Transect C (Tern Island Alternative). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Completed subsurface sediment chemistry and associated grain-size sample collection effort.
May 5	***Planned Activities*** • Surface sediment chemistry and grain-size samples were collected along Transect A (preferred pipeline route). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Completed surface sediment chemistry and associated grain-size sample collection effort.
May 6	***Planned Activities*** • Grain-size samples were along Transect A (preferred pipeline route). • Sub-sampling of cores in controlled laboratory environment. ***Significant Field Events*** • Last day of drilling activities. • Completed grain-size sample collection effort along Transect A. • Remove markers identifying seal structures from area.
May 7	***Planned Activities*** • Complete sub-sampling cores. • Demobilize field equipment.
May 8	***Planned Activities*** • Demobilize field equipment. • Last shipment of samples forwarded to laboratory. • Remaining field personnel return to Anchorage.

Sample Coverage

Table 2 summarizes the number of planned versus actual samples collected for grain-size distribution, surface sediment chemistry, and subsurface sediment chemistry. Also, complete list of the samples by type are provided in Tables 3-5 along with associated maps presenting the sample locations (Figures 2-4).

Table 2. Comparison between the planned and actual number of samples collected

Sample Type	Sample Collection[†]		Percent Collected
	Planned	Actual	
Subsurface chemistry	54	51	94 percent[‡]
Surface chemistry	4	4	100 percent
Grain-size distribution	112	68	61 percent
Totals	170	123	72 percent

[†] Sample numbers include quality control (QC) samples.
[‡] Subsurface sediment sampling completed but heaving sands prevented collection at specific locations and depths.

Table 3. Subsurface chemistry sample stations

Sample Station	Transect	Latitude (NAD27 Decimal Degrees)	Longitude (NAD27 Decimal Degrees)
LIB01-CT04	C	70.269689	147.498355
LIB01-CT03	C	70.254608	147.5001609
LIB01-AT03	A	70.264822	147.5846120
LIB01-BT04	B	70.260126	147.5459550
LIB01-AT02	A	70.252080	147.6079420
LIB01-CT02	C	70.232102	147.5021930
LIB01-BT01	B	70.209745	147.5084140
LIB01-BT02	B	70.224120	147.5211500
LIB01-BT03	B	70.238567	147.5311260
LIB01-AT01	A	70.233249	147.6418800
LIB01-AT04	A	70.277790	147.5612560

Table 4. Surface chemistry sample stations

Sample Station	Transect	Latitude (NAD27 Decimal Degrees)	Longitude (NAD27 Decimal Degrees)
LIB01-AS01	None	70.261402	147.7361710
LIB01-AS02	A	70.222127	147.6618790
LIB01-AS03	A	70.252080	147.6079420
LIB01-AS04	A	70.277790	147.561256

Table 5. Grain-size distribution sample stations

Sample Station	Transect	Latitude (NAD27 Decimal Degrees)	Longitude (NAD27 Decimal Degrees)
LIB01-AS01	None	70.261402	147.736171
LIB01-AS02	A	70.222127	147.661879
LIB01-AGR01	A	70.227042	147.653133
LIB01-AGR02	A	70.233249	147.64188

Sample Station	Transect	Latitude (NAD27 Decimal Degrees)	Longitude (NAD27 Decimal Degrees)
LIB01-AGR03	A	70.239565	147.630578
LIB01-AGR04	A	70.245880	147.619263
LIB01-AGR05	A	70.252080	147.607942
LIB01-AS03	A	70.252080	147.607942
LIB01-AGR06	A	70.258394	147.596279
LIB01-AGR07	A	70.264822	147.584612
LIB01-AGR08	A	70.271478	147.572604
LIB01-AGR09	A	70.277790	147.561256
LIB01-AS04	A	70.277780	147.561256
LIB01-BGR01	B	70.209745	147.508414
LIB01-BGR02	B	70.217208	147.516119
LIB01-BGR03	B	70.224199	147.52115
LIB01-BGR04	B	70.231383	147.526304
LIB01-BGR05	B	70.238567	147.531126
LIB01-BGR06	B	70.245778	147.536283
LIB01-BGR07	B	70.253077	147.541113
LIB01-BGR08	B	70.260126	147.545955
LIB01-CGR01	C	70.217022	147.503657
LIB01-CGR02	C	70.224676	147.503095
LIB01-CGR03	C	70.232102	147.502193
LIB01-CGR04	C	70.239528	147.501627
LIB01-CGR05	C	70.247068	147.500726
LIB01-CGR06	C	70.254608	147.500161
LIB01-CGR07	C	70.262263	147.49926
LIB01-CGR08	C	70.269689	147.498355
LIB01-CGR09	C	70.277344	147.497453

APPENDIX A
URS Daily Field Activities Report
(April 25 to May 6, 2001)

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: WEDNESDAY, 25 APRIL 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 25 April 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

URS personnel (Sharon, Claude, Dana, Tracy) *Duane Miller & Associates* staff (Walt Phillips), *Discovery Drilling* crew (*Ralph Newland, Greg Turner*), *CATCO* crew (*Bill Kuper, Dan Stewart*), *Mehrdad Nadem (BPXA)*, and *Rick English (BPXA)* attended an ATP meeting led by *Tony Zamora* (*BPXA*) at PBOC. At the conclusion of the ATP meeting, BPXA directed URS and the other contractors to stand by until a decision was made regarding whether to proceed without the LOA permit in hand. Contractors left meeting and prepared for field activities.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

LOA Permit may not be in hand until Monday 30 April, 2001.

ACTIVITIES TO BE PERFORMED:

Continue to prepare for field effort and await BP go/no go decision.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: THURSDAY, 26 APRIL 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 26 April 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

Sharon, Claude, Dana, and Tracy continued to prepare for the field and packed sled with sampling equipment. *Discovery Drilling* crew prepared rig for field effort. *CATCO* operator was assigned to another project for the day. *BP* directed URS to go ahead and initiate the field program without LOA in hand using the following procedures: heightened awareness of bear presence (use of binoculars while traveling and working, multiple bear spotters in place while traveling, etc.) and bear harassment prevention (i.e., rig shutdown) in the event a bear was spotted. *CATCO* and *Discovery Drilling* crews brought the sled and rig to the first grain-size sampling station (LIB01-AGR01) late in the afternoon.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

Need to obtain GPS coordinates for seal structures from *LGL* to avoid structures in the event stakes are not visible in poor weather conditions. Due to time constraints related to potential deteriorating weather conditions, priority sampling will be performed first to collect subsurface chemistry and associated grain-size sediment samples, then collect surface samples, then collect remainder of grain-size only samples.

ACTIVITIES TO BE PERFORMED:

Begin drilling program. Will start on station LIB01-AGR01 to run through grain size sampling procedures.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: FRIDAY, 27 APRIL 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 27 April 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:
Claude, Dana, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site from CATCO's base in Deadhorse to begin drilling and sampling. Sharon and Tracy prepped staging area for sampling and tracked down information including LGL seal structure coordinates, permit information, etc. *BP* faxed permits (including LOA e-mail authorization) to URS. Field crew drilled and sampled along Transect A (preferred route) at the following grain size sampling stations: LIB01-AGR01 and LIB01-AGR02. Sharon and Tracy met with LGL crew in the evening to obtain latest maps and coordinates of seal structures.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:
Travel to site took 3 hours to complete (one way) due to coastline trail (seal avoidance) and seismic line interference from Western GeCo. Multiple orange painted stakes present in area due to Western GeCo staking seismic locations, CATCO staking trail locations, and LGL staking seal locations. All stakes were avoided which increased travel time between stations. LGL caught up with rig and mentioned they were on second pass of transects. BPXA Endicott personnel would not allow LGL to start seal sniffing program because LGL did not have an LOA in place (2-day delay). Presence of Western GeCo seismic lines prevented CATCO from blazing trail ahead of time between stations to improve travel time with rig between stations. URS must fuel at Endicott, not PBOC, due to AFE Number. Fuelling at Endicott reduces effective sub-sampling time at field staging area (2 hour delay to travel to and from fueling station).

ACTIVITIES TO BE PERFORMED:
Continue drilling program. Will collect chemistry core at Station LIB01-AT01. Plan to drive to Endicott Causeway to meet Rolligon to try and reduce travel time to site.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: SATURDAY, 28 APRIL 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 28 April 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:
Claude, Dana, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site from Endicott Causeway to begin drilling and sampling. Sharon and Tracy performed sub-sampling of grain-size sediments and established sample control procedures. Field crew drilled and sampled along Transect A (preferred route) at the following sampling stations: LIB01-AT01, LIB01-AT02, LIB01-AGR05. LGL completed seal structure searches and notified rig personnel when they were leaving the area. Sharon left the North Slope to return to town.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:
15 seal structures were identified during LGL's searches. Travel continues to be slow to and from the site and between sampling stations due to coastline route and Western GeCo seismic lines.

ACTIVITIES TO BE PERFORMED:
Continue drilling program. Will continue to collect chemistry cores along Transect A.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: SUNDAY, 29 APRIL 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 29 April 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

Claude, Dana, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to begin drilling and sampling. Tracy performed sub-sampling of grain-size and chemistry sediments and performed sample control tasks. Field crew drilled and sampled along Transect A (preferred route) at the following sampling stations: LIB01-AT03 and LIB01-AGR07.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

Problems with recovery at Station LIB01-AT03 required additional step-out sampling to collect sufficient quantity of material for analysis. Travel time to the site from Endicott Causeway takes 1.5 hours one-way.

ACTIVITIES TO BE PERFORMED:

Continue drilling program. Plan to complete chemistry cores along Transect A and begin drilling and sampling along Transect B.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: MONDAY, 30 APRIL 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 30 April 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

Claude, Dana, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to continue drilling and sampling. Tracy performed sub-sampling of grain-size and chemistry sediments, performed sample control tasks, and shipped samples to lab. Field crew moved to LIB01-AGR09 (co-located with LIB01-AT04) but original location was within 50 meters of seal structure (LIB10) so rig was moved 150 meters from seal structure (~400 feet from original location). Drilling was completed along Transect A (preferred route) and was initiated along Transect B at the following locations: LIB01-AGR09, LIB01-AT05, and LIB01-BGR08.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

Began to drill analytical core at LIB01-AT04 then lost sampler and some rod in hole. Lost time to recover equipment. Rig was moved to an offset location and collected LIB01-AT04.

Western GeCo is still in the area but moving to the east. However, the jump off point at Endicott is still impacted by their seismic lines. As a result of the Western GeCo seismic lines, the rolligon cannot use drag pipe to improve trail so travel time between the sample stations cannot be improved.

ACTIVITIES TO BE PERFORMED:

Continue drilling program. Plan to continue chemistry cores along Transect B and begin with collecting analytical core at LIB01-BT04, move to LIB01-BGR05/BT03 and collect grain-size and analytical samples. Sub-sampling will continue to be performed at the field staging area and samples will be shipped to the lab.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: TUESDAY, 01 MAY 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 01 May 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:
C. Denver, D. Strength, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to continue drilling and sampling. T. Lewis performed sub-sampling of grain-size and chemistry sediments, performed sample control tasks, and shipped samples to lab. Field crew moved to LIB01-BT04 and collected chemical cores, then moved to LIB01-BGR05/BT03 and collected grain size samples and chemical cores. Rig was moved to LIB01-BGR03/BT02 before departing the site.

Samples collected on 5/01/01: LIB01-BT04A, LIB01-BT04B, LIB01-BT04C, LIB01-BT04D, LIB01-BGR05A, LIB01-BGR05B, LIB01-BGR05C, LIB01-BGR05D, LIB01-BT03A, LIB01-BT03B, LIB01-BT03C.

Sampling Progress as of 5/01/01 (Day 6 of Drilling):

Sample Type	Planned Samples*	Samples Collected	Percent Complete
Subsurface Sediment	52	31	60%
Surface Sediment	6	0	0%
Grain Size	112	32	29%
Totals	170	63	37%

* Number of samples includes duplicate and replicate samples

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:
Heaving sands present at LIB01-BGR05/BT03. Sample recovery was difficult; crew switched over to split spoon sampler for grain size sampling to try and increase recovery. Switch over caused some delay. Recovery was still poor with split spoon sampler so logging had to be performed from material in sampler shoe. Poor recovery also occurred during chemical coring. Not enough material was recovered for the deepest sample interval (13 feet) at LIB01-BT03 in order for a sample to be collected and submitted for analysis.

Western GeCo seismic lines continue to block access to transect paths via coastline route. Travel to site continues to be diverted around the lines which increases travel time.

Weather conditions are poor (near whiteout conditions) which increases travel time to and from the transects and between sampling stations.

ACTIVITIES TO BE PERFORMED:
Continue drilling program. Plan to finish sampling subsurface sediments and associated grain size samples at Transect B.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: WEDNESDAY, 02 MAY 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 02 May 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:
C. Denver, D. Strength, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to continue drilling and sampling. T. Lewis performed sub-sampling of grain-size and chemistry sediments, performed sample control tasks, and shipped samples to lab. Drill rig already set up on LIB01-BGR03/BT02. Field crew collected grain size samples and chemical cores at LIB01-BGR03/BT02, then moved to LIB01-BGR01/BT01 and collected grain size samples. Rig was moved to LIB01-BGR03/BT02 before departing the site.

Samples collected on 5/02/01: LIB01-BT02A, LIB01-BT02B*, LIB01-BT03A, LIB01-BT03B, LIB01-BGR01A, LIB01-BGR01B, LIB01-BGR01C, LIB01-BGR01D.

*No recovery for chemical analysis for LIB01-BT02C or LIB01-BT02D

Sampling Progress as of 5/02/01 (Day 6 of Drilling):

Sample Type	Planned Samples**	Samples Collected	Percent Complete
Subsurface Sediment	52	35	67%
Surface Sediment	6	0	0%
Grain Size	112	36	32%
Totals	170	71	42%

** Number of samples includes duplicate and replicate samples

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:
Heaving, fluid sands (completely saturated) present. At the 2- to 15-foot depth sediment is too fine for sand catcher, limited if any recovery. Multiple sampling methods used (split spoon sampler, 3-inch core barrel, 5-inch core barrel) to improve recovery with limited success.

Weather is pea soup fog with drifting snow – travel time to site from drop off point took 3 hours one-way.

Western GeCo seismic lines continue to block access to transect paths via coastline route. Travel to site continues to be diverted around the lines which increases travel time.

ACTIVITIES TO BE PERFORMED:
Continue drilling program. Plan to start sampling subsurface sediments and associated grain size samples at Transect C.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: THURSDAY, 03 MAY 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 03 May 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

C. Denver, D. Strength, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to continue drilling and sampling. T. Lewis performed sub-sampling of grain-size and chemistry sediments, performed sample control tasks, and shipped samples to lab. Drill rig already set up on LIB01-BT01. Field crew collected chemical cores at LIB01-BT01, moved to LIB01-CGR03/CT01 and collected grain size samples and chemical cores, then moved to LIB01-CGR06/CT02 and collected grain size samples.

Samples collected on 5/03/01:

LIB01-BT01A, LIB01-BT01B, LIB01-BT01C, LIB01-BT01D,
LIB01-CGR03A, LIB01-CGR03B, LIB01-CGR03C, LIB01-CGR03D,
LIB01-CT01A, LIB01-CT01B, LIB01-CT01C, LIB01-CT01D,
LIB01-CGR06A, LIB01-CGR06B, LIB01-CGR06C, LIB01-CGR06D.

Sampling Progress as of 5/03/01 (Day 7 of Drilling):

Sample Type	Planned Samples*	Samples Collected	Percent Complete
Subsurface Sediment	52	43	83%
Surface Sediment	6	0	0%
Grain Size	112	44	39%
Totals	170	87	51%

* Number of samples includes duplicate and replicate samples

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

- Flowing sands and irregular recovery hampered clear demarkation of lithologic boundaries in logging core.
- T. Lewis met with V. Pokryfki (EOA Health and Safety Specialist) and C. McNab (CATCO Rollagon Operator) to assist in ATP briefing of C. McNab who will begin work on the program on 5/4/01. Site specific and general safety issues were covered, including travel and wildlife issues.
- Crew worked an extended day (14-hour shift) to drill and sample an additional borehole.
- Western GeCo work in the vicinity of the Liberty project area was completed and crew and equipment left site on 5/3/01.

ACTIVITIES TO BE PERFORMED:

Continue drilling program. Plan to finish subsurface sediment sampling and prep for surface sediment sampling.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: FRIDAY, 04 MAY 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 04 May 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

C. Denver, D. Strength, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to continue drilling and sampling. T. Lewis performed sub-sampling of grain-size and chemistry sediments, performed sample control tasks, and shipped samples to lab. Drill rig already set up on LIB01-CGR06/CT02 on Transect C. Field crew collected chemical cores at LIB01-CT02, moved to LIB01-CGR08/CT03 and collected grain size samples, chemical cores, and additional samples for QC. After completing subsurface sampling, crew moved to Transect A and set rig up on a surface scrape sampling station then traveled back to PBOC.

Samples collected on 5/04/01:

LIB01-CT02A, LIB01-CT02B, LIB01-CT02C, LIB01-CT02D,
LIB01-CGR08A, LIB01-CGR08B, LIB01-CGR08C, LIB01-CGR08D,
LIB01-CT03A, LIB01-CT03B, LIB01-CT03C, LIB01-CT03D.

Sampling Progress as of 5/04/01 (Day 8 of Drilling):

Sample Type	Planned Samples*	Samples Collected	Percent Complete
Subsurface Sediment	52	51	98%**
Surface Sediment	6	0	0%
Grain Size	112	48	43%
Totals	170	99	58%

* Number of samples includes duplicate and replicate samples.
** Subsurface sediment sampling completed but some core recovery was not possible; therefore some planned samples could not be collected and submitted for analysis.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

Completed priority subsurface sampling and associated grain size sampling.

ACTIVITIES TO BE PERFORMED:

Continue drilling program. Plan to begin surface sediment sampling on Transect A.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: SATURDAY, 05 MAY 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 05 May 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

C. Denver, D. Strength, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to continue drilling and sampling. T. Lewis performed sub-sampling of grain-size and chemistry sediment samples and performed sample control tasks. Field crew collected surface sediment scrapes at three stations along Transect A (LIB01-AS02 through LIB01-AS04) and at one background location (LIB01-AS01).

Samples collected on 5/05/01:

LIB01-AS01, LIB01-AS02, LIB01-AS03, and LIB01-AS04 (includes grain size samples).

Sampling Progress as of 5/05/01 (Day 9 of Drilling):

Sample Type	Planned Samples*	Samples Collected	Percent Complete
Subsurface Sediment	54	51	94%**
Surface Sediment	4	4	100%
Grain Size	112	52	46%
Totals	170	107	63%

* Number of samples includes duplicate and replicate samples. QC samples were redistributed to subsurface samples instead of surface samples due to anticipated material recovery problems with surface sediment sampling.
** Subsurface sediment sampling completed but some core recovery was not possible; therefore some planned samples could not be collected and submitted for analysis.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

Completed surface sediment sampling and associated grain size sampling. Crew worked an extended day.

ACTIVITIES TO BE PERFORMED:

Continue drilling program. Plan to collect as many standalone grain size samples beginning with grain size sampling stations along Transect A.

URS DAILY FIELD ACTIVITIES REPORT

TO: TONY ZAMORA
FROM: CLAUDE DENVER
SUBJECT: LIBERTY SEDIMENT SAMPLING
DATE: SUNDAY, 06 MAY 2001
CC: SHARON SULLIVAN

This report documents activities performed by the URS field crew on 06 May 2001. Italicized names of field crew members indicate non-URS staff.

DAILY LOG:

D. Strength, *Duane Miller & Associates*, *Discovery Drilling*, and *CATCO* crew traveled to the site to continue drilling and sampling. C. Denver and T. Lewis performed sub-sampling of grain-size and chemistry sediment samples, performed sample control tasks, and shipped samples to laboratory for analysis. Field crew collected grain size samples along Transect A. URS personnel demobed equipment from rig at the end of the day. C. Denver traveled to Anchorage in the evening.

Samples collected on 5/06/01:

LIB01-AGR03A, LIB01- AGR03B, LIB01- AGR03C, LIB01- AGR03D,
LIB01-AGR04A, LIB01- AGR04B, LIB01- AGR04C, LIB01- AGR04D,
LIB01-AGR06A, LIB01- AGR06B, LIB01- AGR06C, LIB01- AGR06D,
LIB01-AGR08A, LIB01- AGR08B, LIB01- AGR08C, LIB01- AGR08D.

Sampling Progress as of 5/06/01 (Day 10 of Drilling):

Sample Type	Planned Samples*	Samples Collected	Percent Complete
Subsurface Sediment	54	51	94%**
Surface Sediment	4	4	100%
Grain Size	112	68	61%
Totals	170	123	72%

* Number of samples includes duplicate and replicate samples. QC samples were redistributed to subsurface samples instead of surface samples due to anticipated material recovery problems with surface sediment sampling.
** Subsurface sediment sampling completed but some core recovery was not possible; therefore some planned samples could not be collected and submitted for analysis.

SIGNIFICANT FINDINGS AND ACTIVITIES PERFORMED:

Completed grain size sampling along Transect A. Drilling program has been terminated due to time constraints. All subsurface and surface sediment sampling was completed; however, some grain size sampling along Transect B and Transect C was not performed. In addition, all seal structure stakes have been removed from the area.

ACTIVITIES TO BE PERFORMED:

Plan to complete sub-sampling and sample control tasks, ship remaining samples to the laboratory for analysis, and begin demobing activities.

Appendix D

Grain-Size Soil Sampling Report

Duane Miller & Associates *Arctic & Geotechnical Engineering*
1041 East 76th Avenue, Unit A
Anchorage, AK 99518-3215
(907) 644-0510, Fax 644-0507

June 22, 2001

URS Corporation
3501 Denali Street, Ste. 101
Anchorage, AK 99503

Attention: Bryan Trimm

Subject: Liberty Development Project
Grain-size Soil Sampling Program-2001
Foggy Island Bay, Alaska
DM&A Job No. 4119.30

Between April 25, and May 6, 2001, Duane Miller & Associates provided support to a URS program designed to collect representative, near-surface samples from Foggy Island Bay in the vicinity of the proposed Liberty Project. The purpose of the soil sample collection program was to help document baseline conditions in the area prior to development of the Liberty Project. The role of Duane Miller & Associates was to supervise the drilling of shallow boreholes, identify the soil types encountered and collect samples which are representative of the upper 15 feet of the sea-floor sediments.

The stated purpose for identifying soil types and collecting grain-size soil samples was to give URS field guidance in selecting intervals for chemical analyses. The "geotechnical" aspect of this program will also provide useful site-specific soils information to supplement existing information to be used in the design and construction of Liberty Island and the associated pipeline.

The Spring 2001 soil investigation was limited to three potential pipeline routes: "A"-line, the preferred route from the proposed Liberty Island Site southwest to the shore; "B"-line, the route from the Southern Island Alternative southward to the shore; and "C"-line, the route from the Tern Island location southwestward to the shore. Drilling and sampling was conducted only in unfrozen soils, from floating sea ice. Areas of bottom-fast ice, near shore, where seasonally frozen soils or permafrost might have been encountered, were avoided.

The crew arrived in Prudhoe Bay on the morning of April 25th and a project meeting was held that afternoon. Mr. Tony Zamora, BP Project Manager conducted the meeting with assistance from URS Project Manager Ms. Sharon Sullivan. Additionally, representatives from BP-Environmental, Duane Miller & Associates, Discovery Drilling and CATCO were in attendance. During the night of the 26th, the drill carrier was deployed to Foggy Island Bay on a Rolligon tractor-trailer and on the morning of the 27th fieldwork commenced.

A CME-75 drill specifically configured for soils exploration work was used to drill the test holes. The drill (Owned and operated by Discovery Drilling of Anchorage) was equipped to drill with an 8-inch O.D. continuous flight auger. The drill was mounted on an enclosed sled equipped with a generator and heater. An 8-bag Rolligon (RD-85), owned and operated by CATCO, was used to move the drill sled within the project area. The Rolligon also served as the onsite personnel carrier. The field crew consisted of two URS personnel (Mr. Claude Denver and Mr. Dana Strength), a Duane Miller & Associates geologist (Mr. Walter Phillips, P.G.), two drillers and a Rolligon Driver.

URS personnel working with the CATCO operator positioned the drill in the field at predetermined hole locations. "As drilled" grain-size hole locations (latitude and longitude), as determined using a hand held GPS unit, are shown on the field log of each hole. Schematic locations of each drill site sites are shown on Plate 1.

In all, 16 "grain-size" holes were drilled; nine along the preferred "A"-line alignment, four along the "B"-line and three along the "C"-line. The target depth of each hole was 15 feet below mud-line. As drilled depths varied from 13.5 to 17.5 feet.

As each hole was being drilled, Mr. Phillips recorded the thickness of sea ice, the ocean depth and the soil conditions encountered. Representative samples were collected as the holes were advanced. Initially, only four representative samples from each hole were to be collected but because of a desire by URS to specifically match chemical sample intervals with grain-size sample intervals, the sampling regime was changed to be much more inclusive. 157 individual grain size samples were collected as noted in the following table.

Test Hole Number	Test Hole Depth (ft)	Ice thickness (ft)	Water & Ice Depth (ft)	Grain-size Samples (#)	Date Sampled
AGR 01	16.0	5.0	6.0	10	27-Apr-01
AGR 02	16.0	5.5	7.0	10	27-Apr-01
AGR 03	15.0	4.5	12.0	14	06-May-01
AGR 04	15.0	5.0	14.5	10	06-May-01
AGR 05	13.5	4.8	16.5	6	28-Apr-01
AGR 06	15.0	5.0	17.5	12	06-May-01
AGR 07	16.0	4.8	17.0	8	29-Apr-01
AGR 08	15.0	4.5	20.0	14	06-May-01
AGR 09	16.0	5.0	21.0	14	30-Apr-01
BGR 01	15.5	5.0	6.5	4	02-May-01
BGR 03	17.5*	4.7	10.7	5	02-May-01
BGR 05	14.5	4.5	18.0	8	01-May-01
BGR 08	17.5**	5.0	19.5	14	30-Apr-01
CGR 03	14.5	4.0	17.0	7	03-May-01
CGR 06	16.0	4.0	19.0	7	03-May-01
CGR 08	14.5	4.5	21.5	14	04-May-01
				157	

* 13.5' to 17.5' from adjacent "TO" hole

** 15.0' to 17.5' from adjacent "TO" hole

Most of the grain-size samples were collected in an 18 -inch long by 3-inch ID tube inserted in the auger while drilling. This "auger coring" provided excellent recovery in fine grained and organic-rich soils. Auger core samples are designate as "Cc" on the drafted logs. In clean granular soils the auger core system was supplemented with drive samples. The drive samples were obtained in a 3-inch OD by 2.5-inch ID split barrel sampler driven into the ground with a 300-pound automatic drop hammer mounted on the CME-75. Blow counts for each 6-inch increment of the drive were recorded. Samples obtained by drive sampling are designated "Sh" on the drafted logs.

After an initial field evaluation, each grain-size sample was placed in a sealed container to prevent the loss of natural moisture. The hole number and depth of sample interval was shown on each sample container. Also the date and approximate time of sampling was noted. The samples were then packed in a container (without temperature control) for transport. The samples remained in the custody of Duane Miller & Associates until they were delivered to the URS field lab in Prudhoe Bay at the end of each shift. The samples and a copy of the field log of the corresponding borehole were then handed directly to the URS Field Laboratory Supervisor, Ms. Tracey Lewis.

After specific samples had been selected for grain size testing by URS, the remaining samples were reconveyed to Duane Miller and Associates. These remnant samples, sealed in Zip-Lock type bags and packed in plastic buckets, were then transported to the Duane Miller Soils Lab in Anchorage.

A graphic log of each boring is presented on Plates 2 through 17. The soils have been classified in accordance with the Unified Soil Classification System presented on Plate 18. The boring logs show the type of sampler used and, for drive samples, the blow counts required to drive the sampler the last 12 inches.

Columbia Analytical Services of Kelso, Washington provided testing services under contract to URS. Samples were analyzed for grain-size analysis and natural moisture content. Edited results of their testing are presented on the drafted logs and summarized on a hole-by-hole basis on Plates 18 through 34.

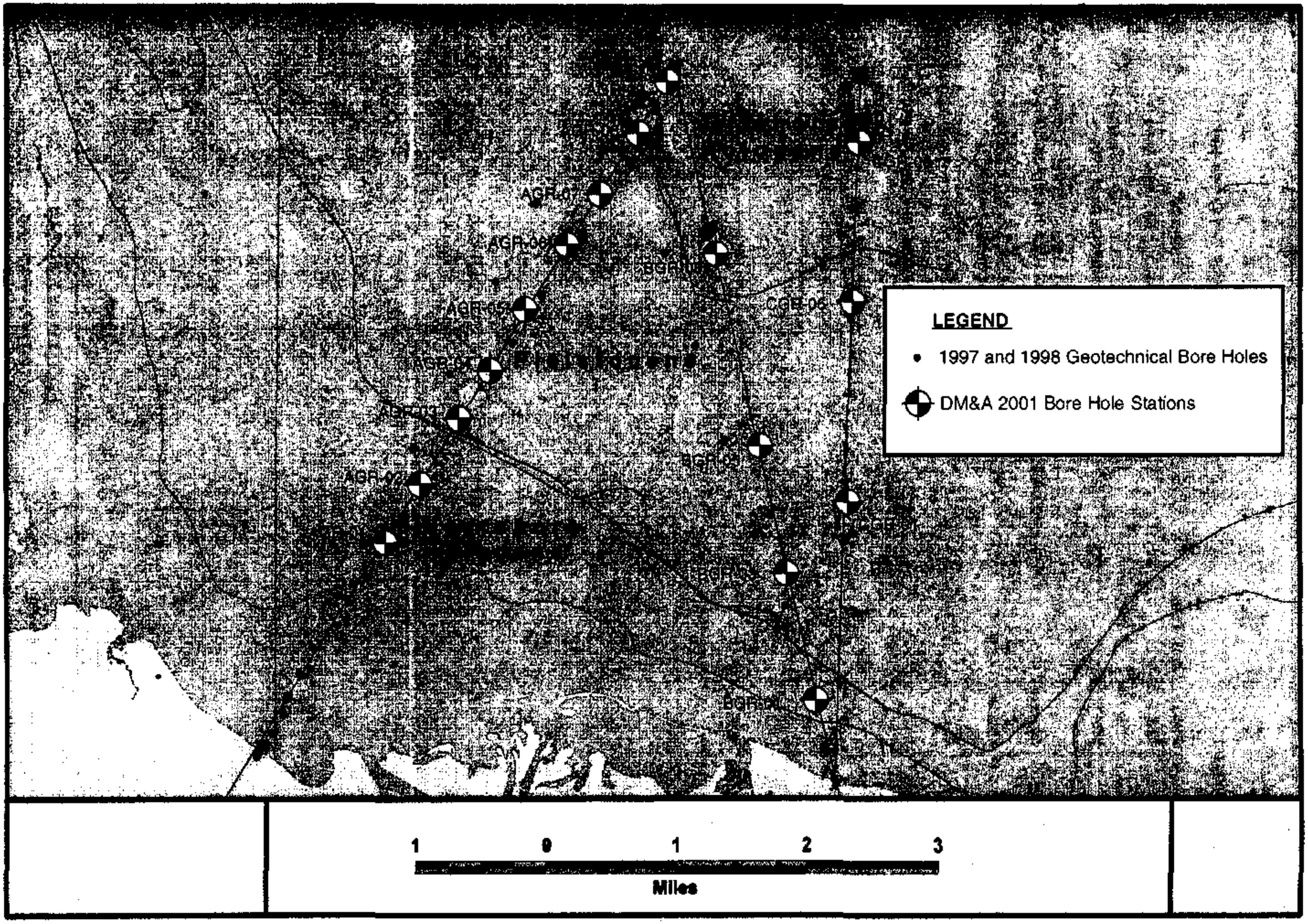
Soils encountered in the Liberty 2001 sampling program were consistent with those found in previous geotechnical studies in the area. Offshore, soft Holocene silt and organic silt generally overlies firmer Pleistocene deposits. Near shore, sandy zones are more prevalent and in some cases dominant.

Please call Duane Miller or me if you have questions regarding this submittal.

Very truly yours,

Walter T. Phillips, P.G.

Attachments:	Borehole Locations	Plate 1
	Borehole Logs	Plates 2 through 17
	Soil Classification & Key to Data	Plate 18
	Particle Size and Moisture Data	Plates 19 through 34



Duane Miller & Associates
Arctic & Geotechnical Engineering
Job No.: 4119.30
Date : June 2001

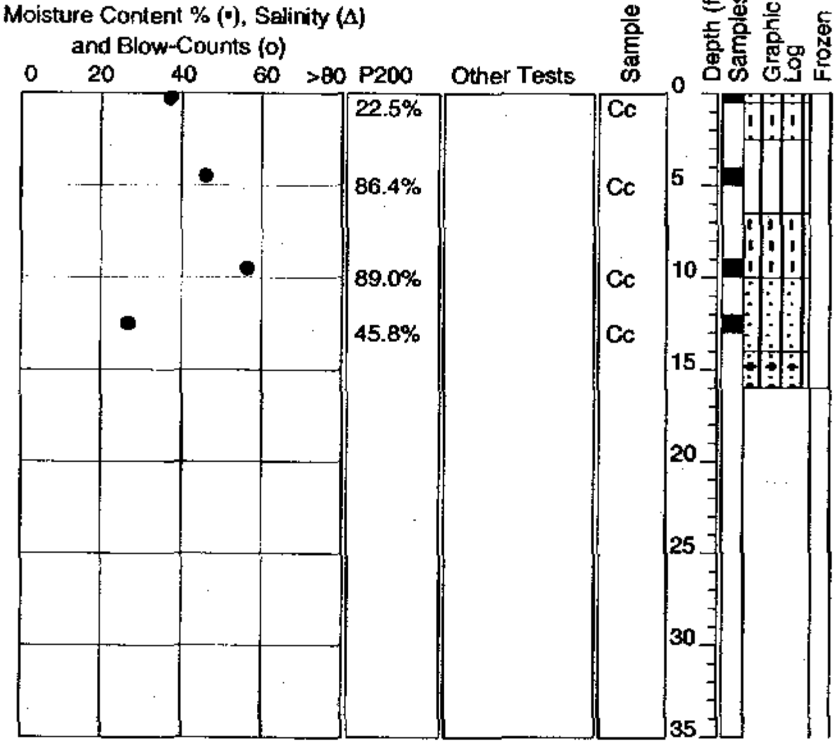
BORING LOCATIONS
Liberty Project
Foggy Island Bay, Alaska

Plate
1

DUANE MILLER & ASSOCIATES
Project: **Liberty 2001**
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-01
Date Drilled: April 27, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 6 ft

N 70° 13.615' W 147° 39.163'



P200	Other Tests	Sample type
22.5%		Cc
86.4%		Cc
89.0%		Cc
45.8%		Cc

Description

- SILTY SAND: (SM) Dark gray
- ORGANIC SILT: (OL) Dark gray with some amorphous peat (Pt)
- SILT: (ML) Gray, with thin interbedding of organic silt (OL) and amorphous peat (Pt)
- ORGANIC SILT: (OL) Dark gray to black with amorphous peat (Pt)
- SILTY SAND: (SM) Interbedded with fine sand (SP), dark peat (Pt) and organic silt (OL). Scattered pebbles and increased sand 11' -11.5'
- SILTY GRAVEL: (GM) Gray with 1/2" layers of sand and pebbley sand (SM)

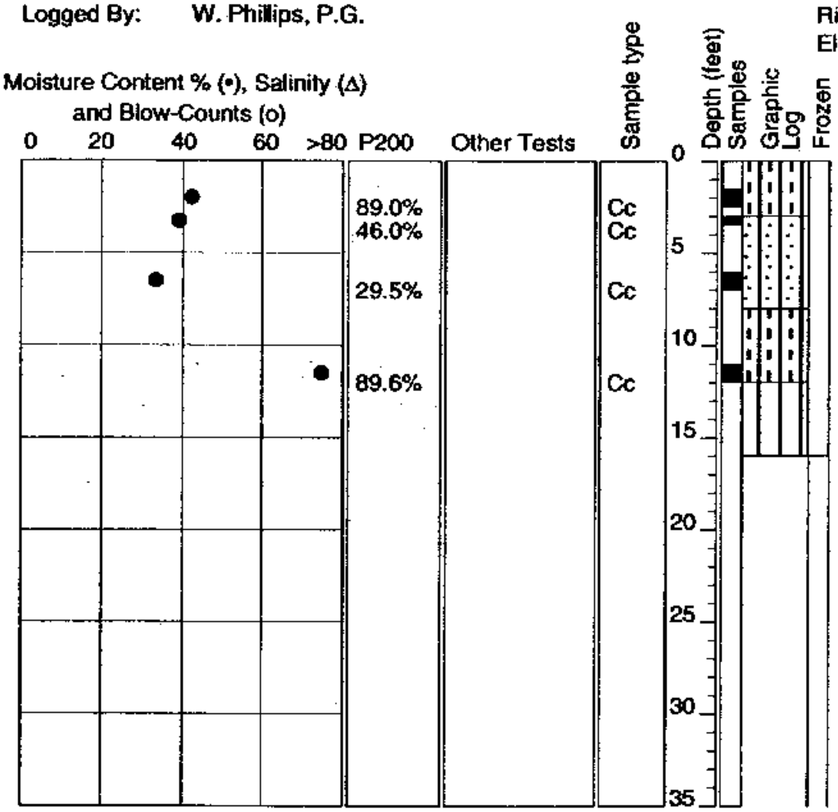
DUANE MILLER & ASSOCIATES

Project: Liberty 2001
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-02

Date Drilled:	April 27, 2001
Contractor:	Discovery Drilling
Rig Type:	Sled-mounted CME-75 w/ hollow stem
Elevation:	- 7 ft

N 70° 13.989' W 147° 38.529'



P200	Sample type
89.0%	Cc
46.0%	Cc
29.5%	Cc
89.6%	Cc

Description

ORGANIC SILT: (OL) With interbedded organic material (Pt)

SILTY SAND: (SM) Gray with trace organics, some sand with trace silt (SP-SM) below 6'

ORGANIC SILT: (OL) Dark gray with interbedded black amorphous peat (Pt)

SILT: (ML) Gray with interbedded organic silt (OL) and thin layers of fibrous peat

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Job No.: 4119.30
Date : June 2001

LOG OF HOLE AGR-02
Liberty Development
Foggy Island Bay, Alaska

Plate
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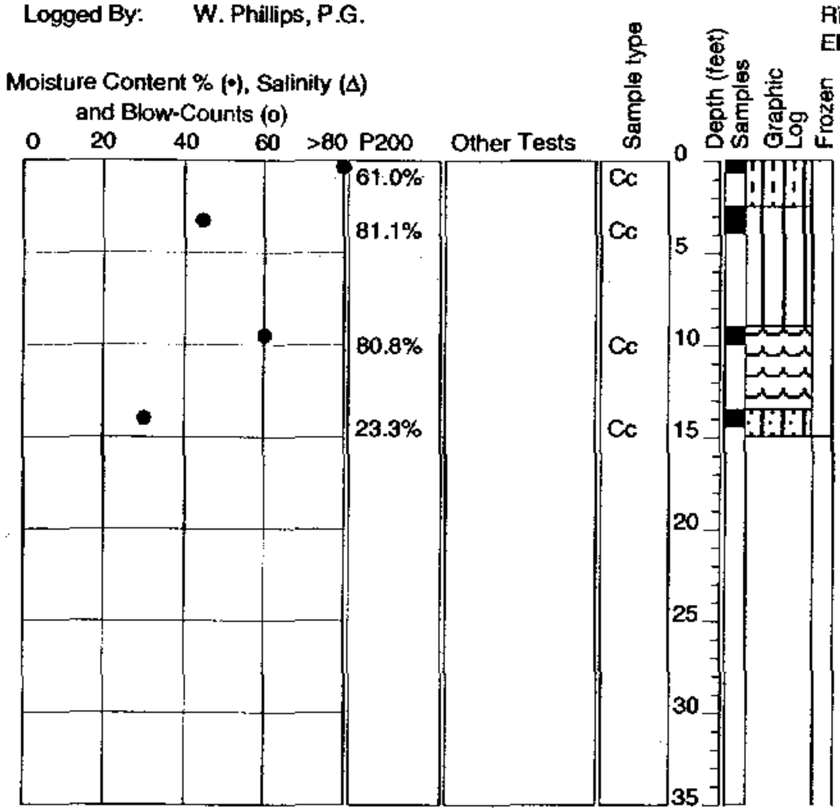
DUANE MILLER & ASSOCIATES
Project: **Liberty 2001**
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-03
Date Drilled: May 6, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 12 ft

N 70° 14.376' W 147° 37.826'



Description

ORGANIC SILT: (OL) Dark gray

SILT: (ML) Gray with interbedded dark gray to black organic silt (OL) and thin streaks of organic material (Pt)

PEAT: (Pt) Gray-green amorphous peat with trace organic silt, zones of fibrous peat. Several layers of gray silt (ML) interbedded between 10.0' and 11.5'

SILTY SAND: (SM) Gray, with some gravel (pebbles), sand is fine to medium, pebbles < 1/2"

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Date : June 2001

LOG OF HOLE AGR-03
Liberty Development
Foggy Island Bay, Alaska

Plate
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DUANE MILLER & ASSOCIATES

Project: Liberty 2001

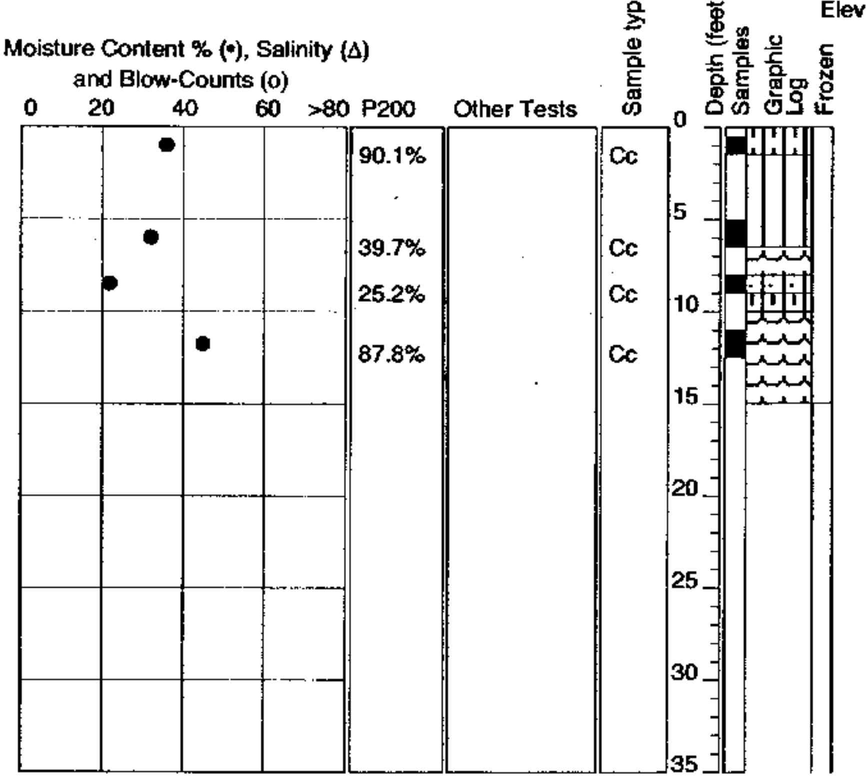
DM&A Job No. :4119.30

Logged By: W. Phillips, P.G.

Log of HOLE : AGR-04

Date Drilled:	May 6, 2001
Contractor:	Discovery Drilling
Rig Type:	Sled-mounted CME-75 w/ hollow stem
Elevation:	- 14.5 ft

N 70° 14.742' W 147° 37.146'



Description

ORGANIC SILT: (OL) Dark gray with trace sand, mottled with black organics (Pt) below 0.5'

SILT: (ML) Dark gray interbedded with gray medium sand (SM)

PEAT: (Pt) Gray green amorphous and fibrous peat with trace organic silt and sand

SILTY SAND: (SM) Dark gray to black with some gravel. Sand is medium, gravel is fine

ORGANIC SILT: (OL) Dark gray

PEAT: (Pt) Gray green, with trace sand and interbedded silt (ML), woody below 13'

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Arctic & Geotechnical Engineering
Job No.: 4119.30
Date : June 2001

LOG OF HOLE AGR-04
Liberty Development
Foggy Island Bay, Alaska

Plate
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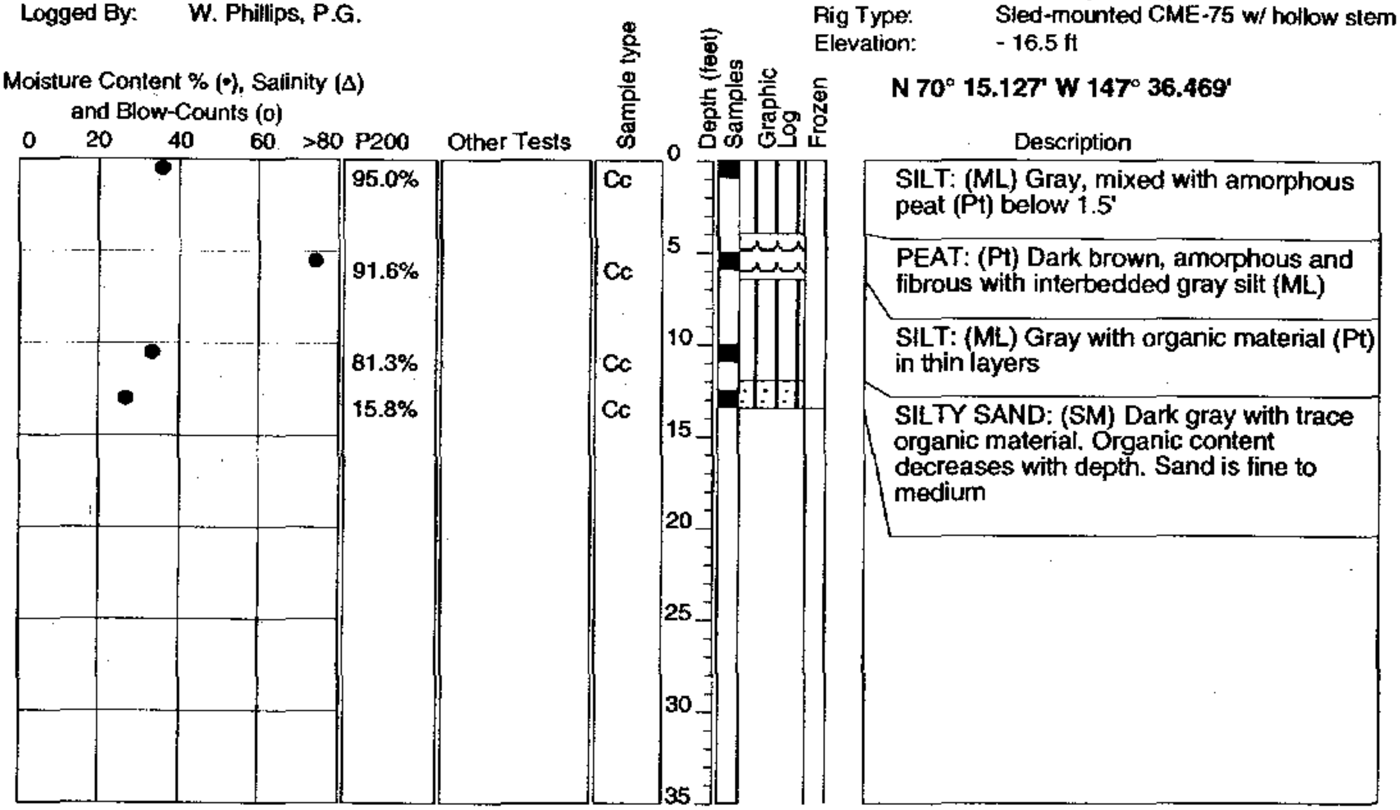
DUANE MILLER & ASSOCIATES

Project: **Liberty 2001**
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-05

Date Drilled:	April 28, 2001
Contractor:	Discovery Drilling
Rig Type:	Sled-mounted CME-75 w/ hollow stem
Elevation:	- 16.5 ft

N 70° 15.127' W 147° 36.469'



P200	Sample type
95.0%	Cc
91.6%	Cc
81.3%	Cc
15.8%	Cc

SILT: (ML) Gray, mixed with amorphous peat (Pt) below 1.5'

PEAT: (Pt) Dark brown, amorphous and fibrous with interbedded gray silt (ML)

SILT: (ML) Gray with organic material (Pt) in thin layers

SILTY SAND: (SM) Dark gray with trace organic material. Organic content decreases with depth. Sand is fine to medium

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Arctic & Geotechnical Engineering
Job No.: 4119.30
Date : June 2001

LOG OF HOLE AGR-05
Liberty Development
Foggy Island Bay, Alaska

Plate
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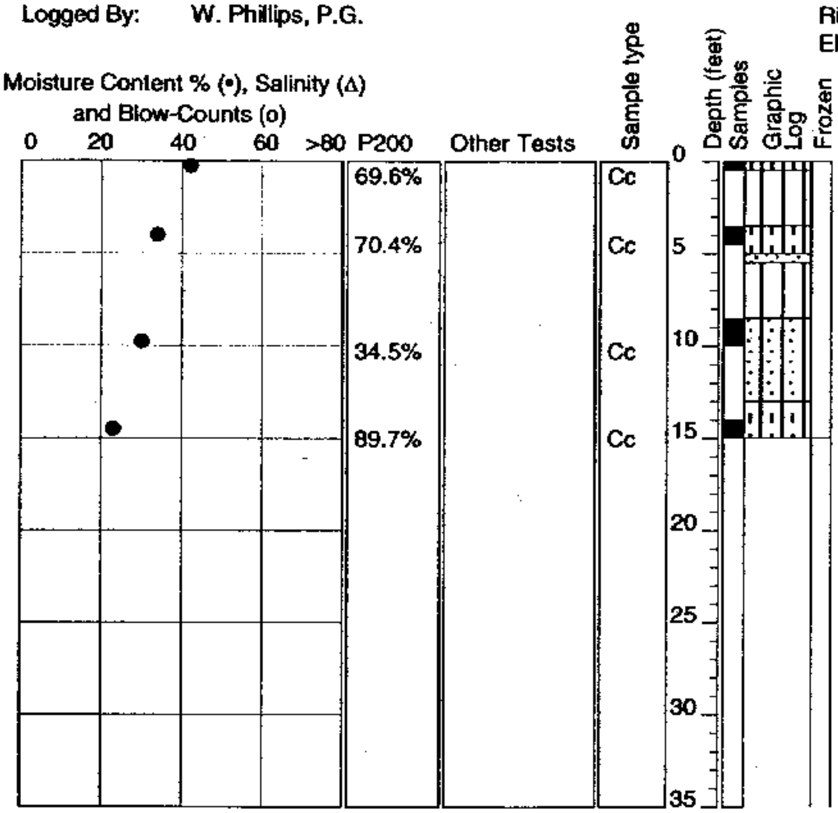
DUANE MILLER & ASSOCIATES
Project: Liberty 2001
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-06
Date Drilled: May 6, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 17.5 ft



Description

ORGANIC SILT: (OL) Dark gray, soft, saturated

SILT: (ML) Gray with trace organic material. Silt is coarse, medium stiff

ORGANIC SILT: (OL) Gray

GRAVELLY SAND: (SP) Gray, medium

SILT: (ML) Gray Interbedded with black organic silt (OL) and gray green amorphous to slightly fibrous peat (Pt)

SILTY SAND: (SM) Gray, with trace organic material. Sand is fine to medium

ORGANIC SILT: (OL) Dark gray interbedded with black organic material (Pt), stiff

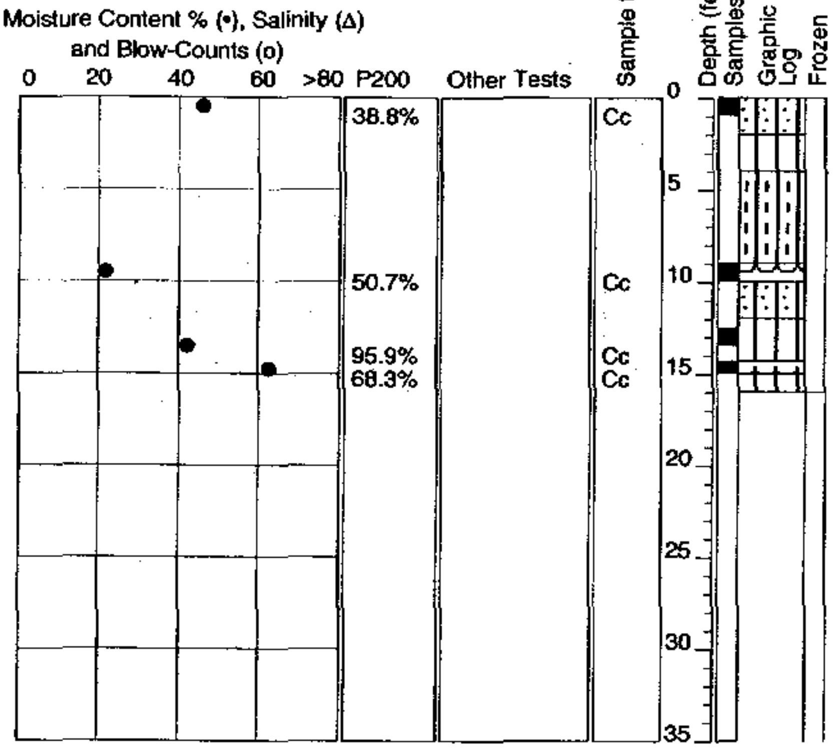
DUANE MILLER & ASSOCIATES

Project: **Liberty 2001**
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-07

Date Drilled:	April 29, 2001
Contractor:	Discovery Drilling
Rig Type:	Sled-mounted CME-75 w/ hollow stem
Elevation:	- 17 ft

N 70° 15.890' W 147° 35.078'



Description

SILTY SAND: (SM) Gray, with thin interbeds of organic silt (OL) below ≈ 0.8'. Sand is fine.

SILT: (ML) Dark gray interbedded with organic silt (OL), varve-like

ORGANIC SILT: (OL) Gray

PEAT: (Pt) Brown, fibrous

SILTY SAND: (SM) Gray, fine

SILT: (ML) Dark gray with some organic silt (OL)

PEAT: (Pt)

SILT: (ML) Gray silt with mottled streaks of organic material (Pt), scattered shell fragments and small pebbles, firm, plastic

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Job No.: 4119.30
Date : June 2001

LOG OF HOLE AGR-07
Liberty Development
Foggy Island Bay, Alaska

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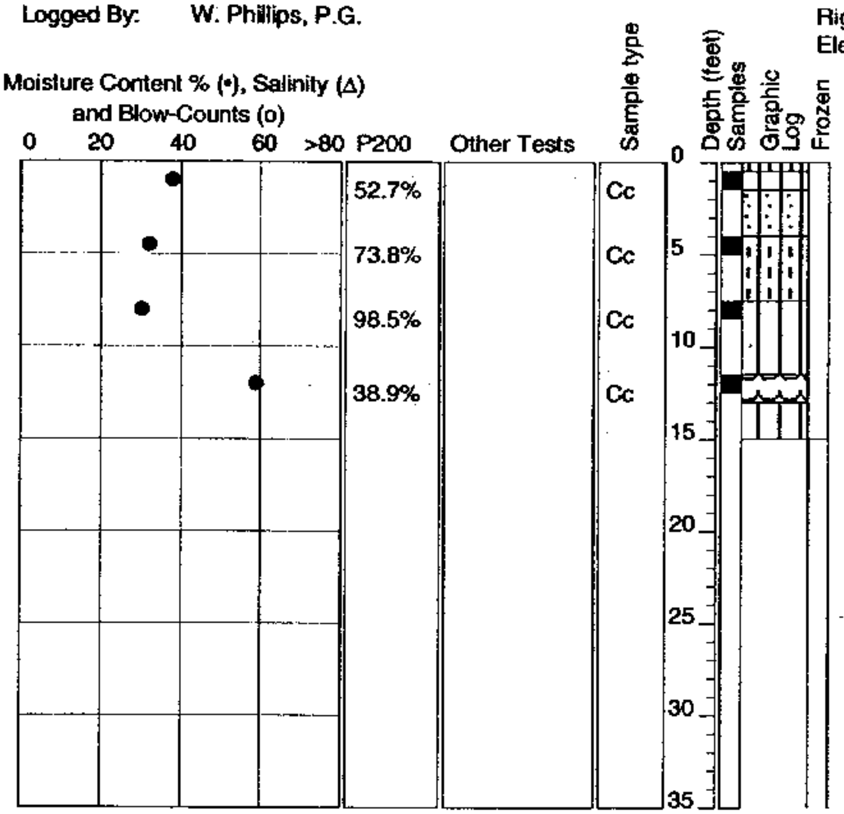
DUANE MILLER & ASSOCIATES

Project: **Liberty 2001**
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-08

Date Drilled: May 6, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 20 ft

N 70° 16.293' W 147° 34.324'



Description

- ORGANIC SILT: (OL) Brown
- SILT: (ML) Gray sandy silt with interbedded layers of black organic material (Pt)
- SILTY SAND: (SM) Gray with pebbles and shells
- ORGANIC SILT: (OL) Black, interbedded gray silt (ML)
- SILT: (ML) Brown, with trace organic material
- PEAT: (Pt) Green gray fibrous peat interbedded with silty sand (SM)
- SILT: (ML) Gray, with trace organic material in thin layers

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Arctic & Geotechnical Engineering
Job No.: 4119.30
Date : June 2001

LOG OF HOLE AGR-08
Liberty Development
Foggy Island Bay, Alaska

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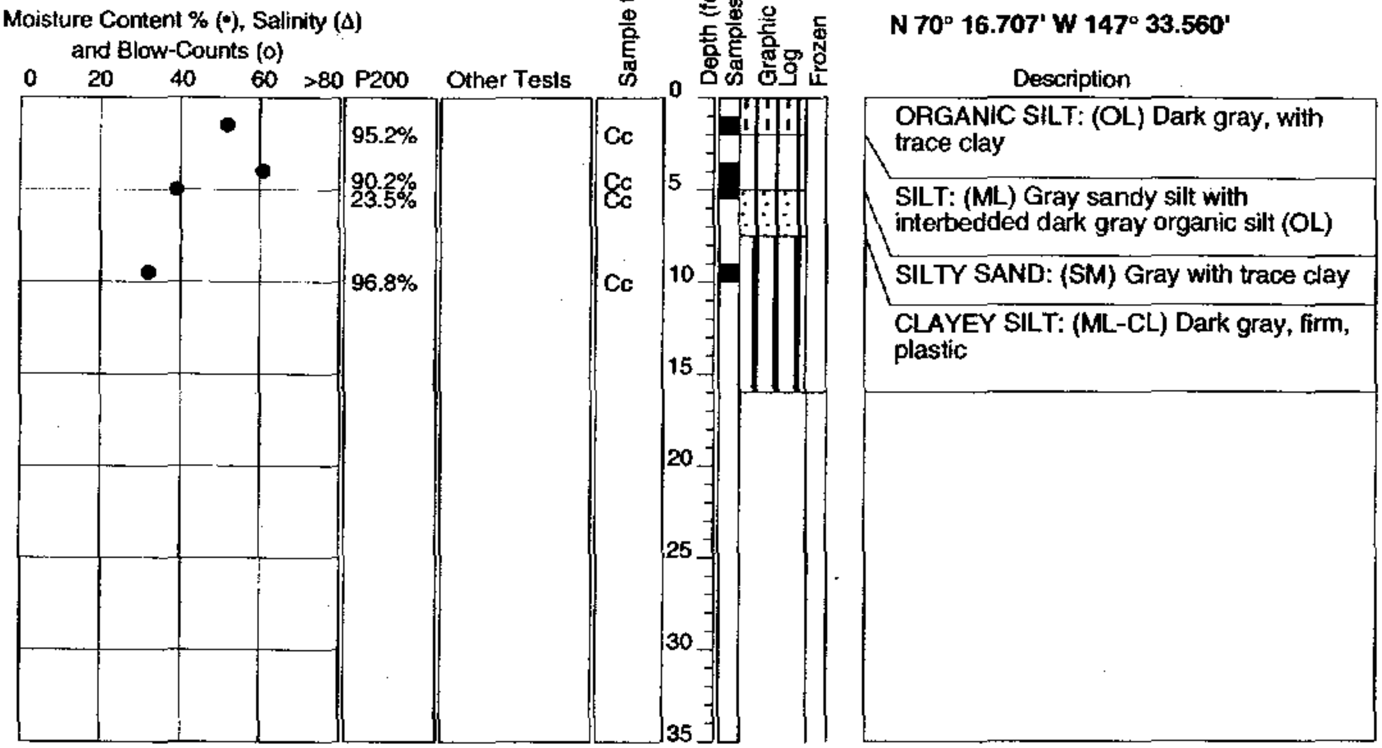
DUANE MILLER & ASSOCIATES

Project: **Liberty 2001**
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : AGR-09

Date Drilled: April 30, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 21 ft

N 70° 16.707' W 147° 33.560'



ORGANIC SILT: (OL) Dark gray, with trace clay

SILT: (ML) Gray sandy silt with interbedded dark gray organic silt (OL)

SILTY SAND: (SM) Gray with trace clay

CLAYEY SILT: (ML-CL) Dark gray, firm, plastic

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Arctic & Geotechnical Engineering
Job No.: 4119.30
Date : June 2001

LOG OF HOLE AGR-09
Liberty Development
Foggy Island Bay, Alaska

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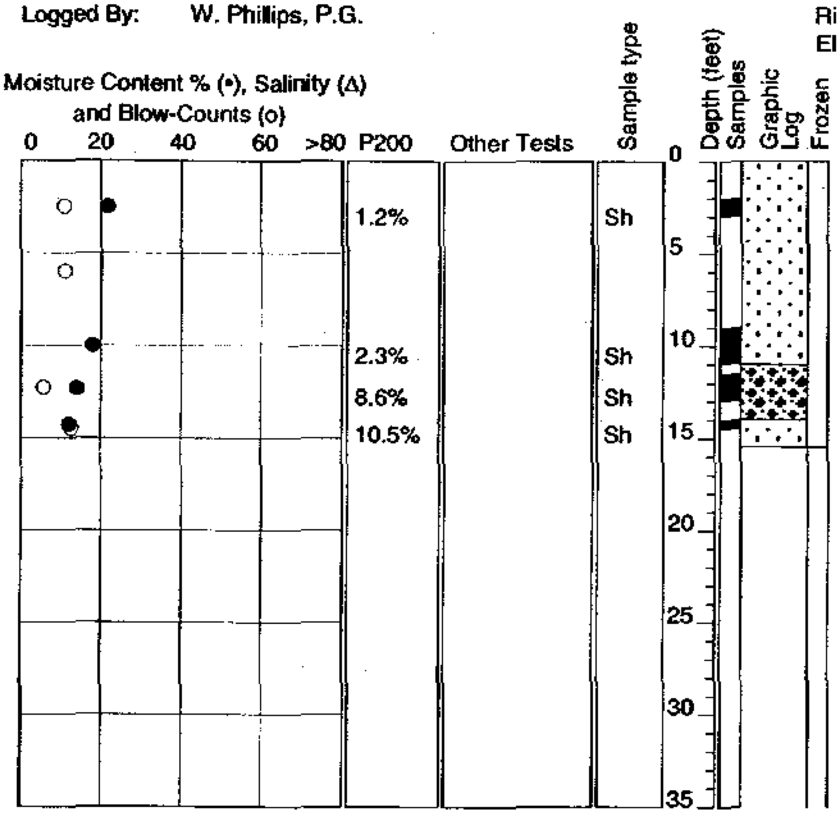
DUANE MILLER & ASSOCIATES

Project: Liberty 2001
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : BGR-01

Date Drilled: May 2, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 6.5 ft

N 70° 12.582' W 147° 30.504'



Description

SAND: (SP) Gray sand grading to gravelly sand (SW)

GRAVEL: (GP-GM) Gray brown sandy gravel with trace silt

SAND: (SP-SM) Gray brown, with interbedded layers of dark gray to black organic silt (OL) with gravel

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Date : June 2001

LOG OF HOLE BGR-01
Liberty Development
Foggy Island Bay, Alaska

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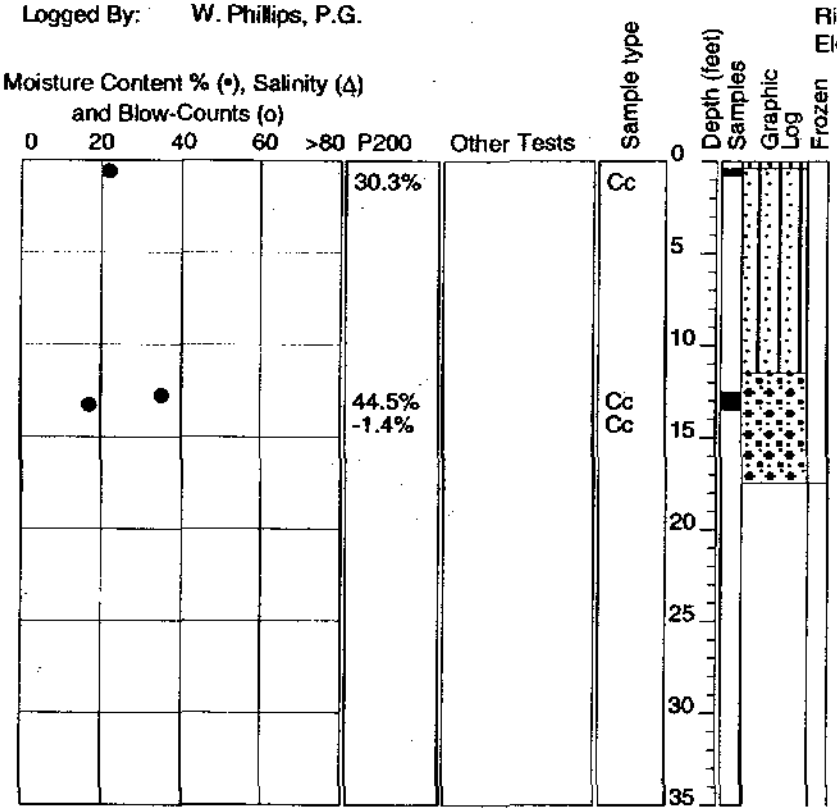
DUANE MILLER & ASSOCIATES

Project: Liberty 2001
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : BGR-03

Date Drilled: May 2, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 10.7 ft

N 70° 13.453' W 147° 31.270'



Description

ORGANIC SILT: (OL) Dark gray to black, medium stiff

SILTY SAND: (SM) Gray with trace clay

SANDY GRAVEL: (GP) Gray brown with gravelly sand (SP) and thin silty layers (SM)

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Date : June 2001

LOG OF HOLE BGR-03
Liberty Development
Foggy Island Bay, Alaska

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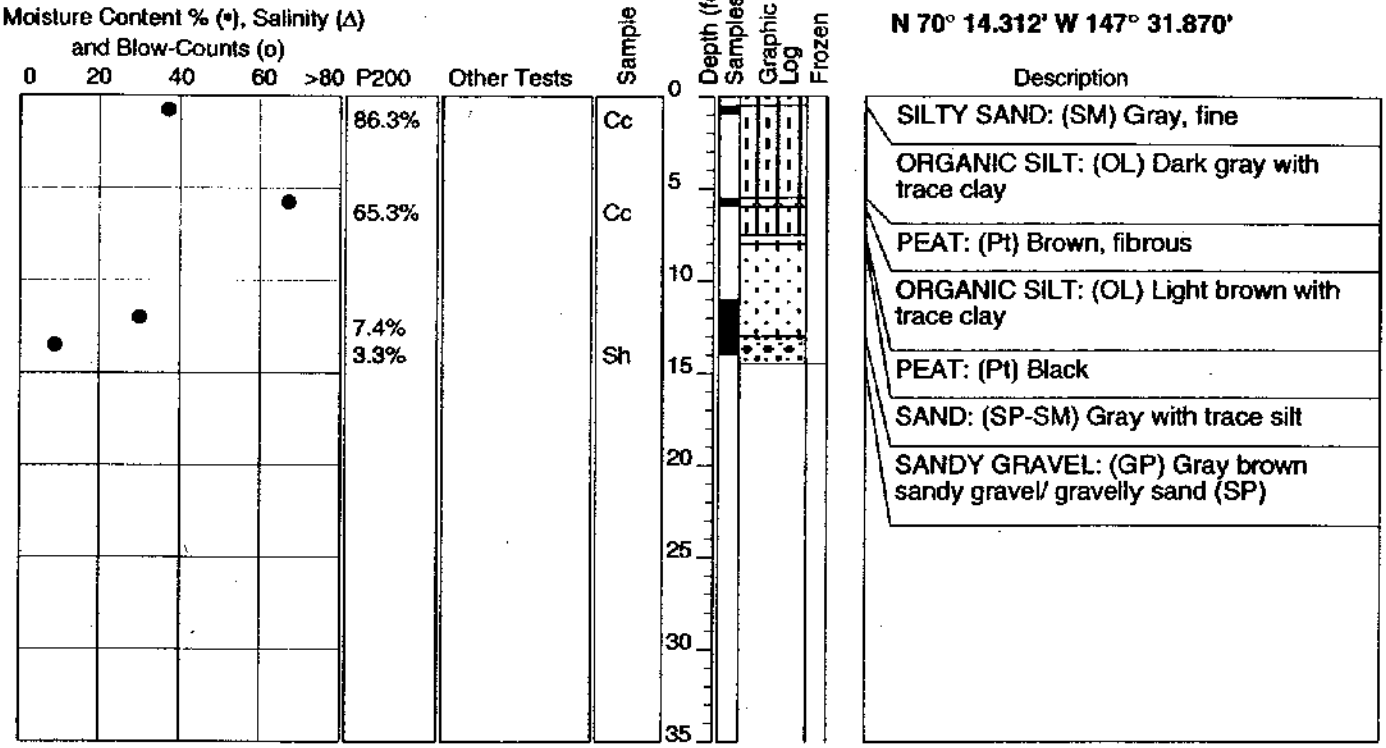
DUANE MILLER & ASSOCIATES

Project: **Liberty 2001**
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : BGR-05

Date Drilled: May 1, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 18 ft

N 70° 14.312' W 147° 31.870'



SILTY SAND: (SM) Gray, fine

ORGANIC SILT: (OL) Dark gray with trace clay

PEAT: (Pt) Brown, fibrous

ORGANIC SILT: (OL) Light brown with trace clay

PEAT: (Pt) Black

SAND: (SP-SM) Gray with trace silt

SANDY GRAVEL: (GP) Gray brown sandy gravel/ gravelly sand (SP)

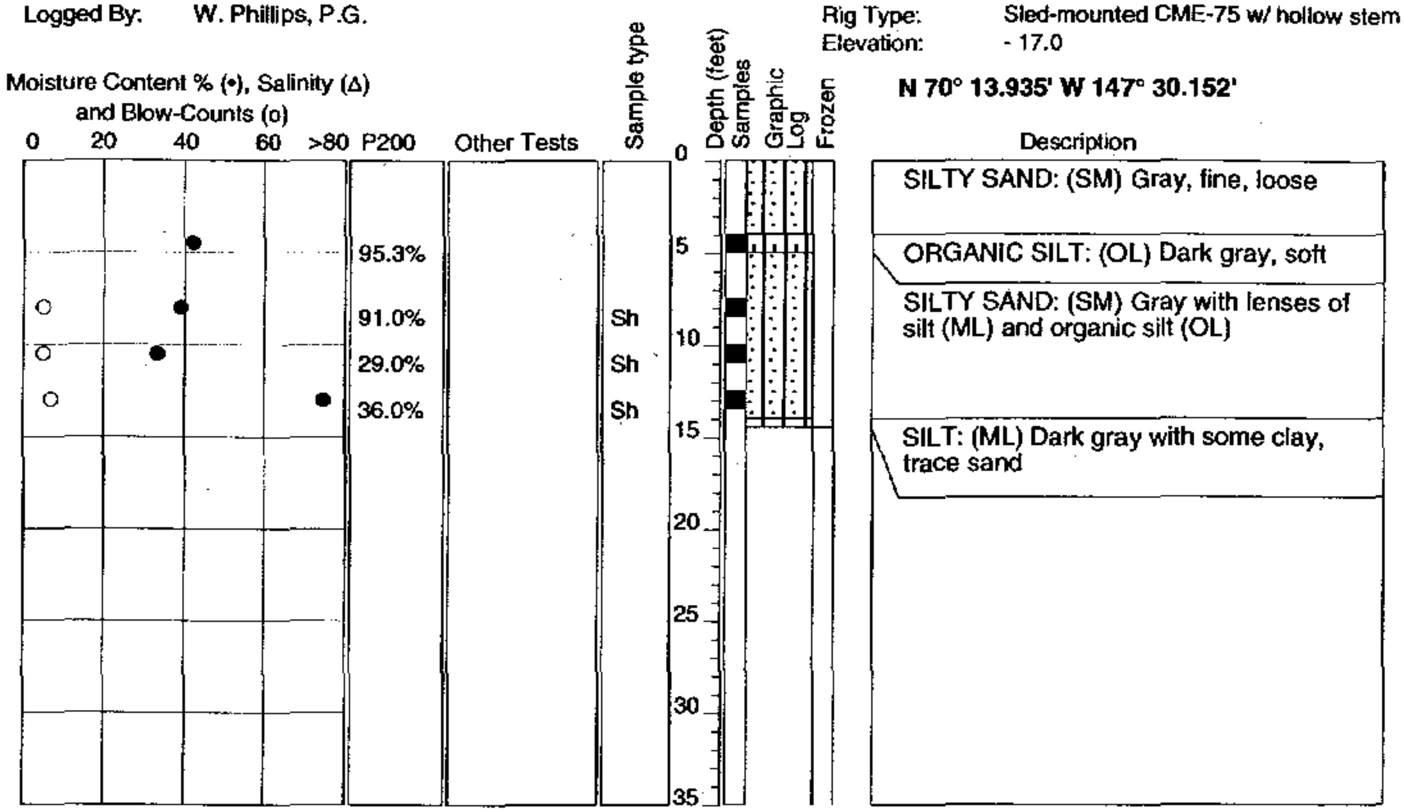
DUANE MILLER & ASSOCIATES

Project: Liberty 2001
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : CGR-03

Date Drilled: May 3, 2001
Contractor: Discovery Drilling
Rig Type: Sled-mounted CME-75 w/ hollow stem
Elevation: - 17.0

N 70° 13.935' W 147° 30.152'



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Job No.: 4119.30
Date : June 2001

LOG OF HOLE CGR-03
Liberty Development
Foggy Island Bay, Alaska

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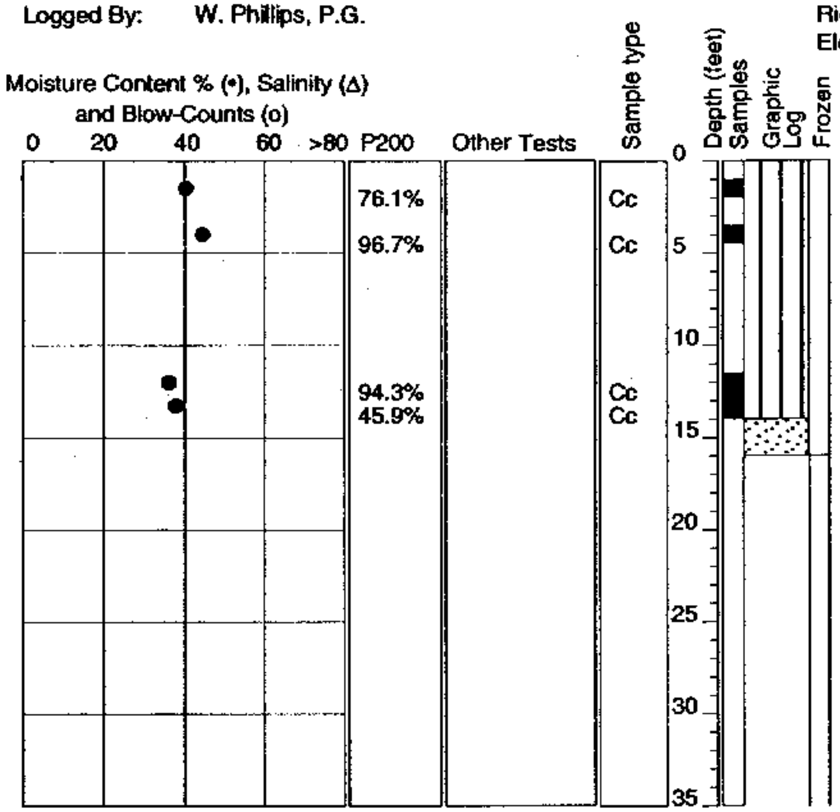
DUANE MILLER & ASSOCIATES

Project: Liberty 2001
DM&A Job No. :4119.30
Logged By: W. Phillips, P.G.

Log of HOLE : CGR-06

Date Drilled:	May 3, 2001
Contractor:	Discovery Drilling
Rig Type:	Sled-mounted CME-75 w/ hollow stem
Elevation:	- 19.0

N 70° 15.272' W 147° 30.015'



Description

SILT: (ML) Gray with some clay and trace sand and organic material, interbedded with silty sand (SM) below 10.5', sand is medium grained, medium dense

GRAVELLY SAND: (SP-SM) Gray with trace silt. Fine sand, dense to medium dense

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Job No.: 4119.30
Date : June 2001

LOG OF HOLE CGR-06
Liberty Development
Foggy Island Bay, Alaska

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DUANE MILLER & ASSOCIATES

Project: **Liberty 2001**

DM&A Job No. :4119.30

Logged By: W. Phillips, P.G.

Log of HOLE : CGR-08

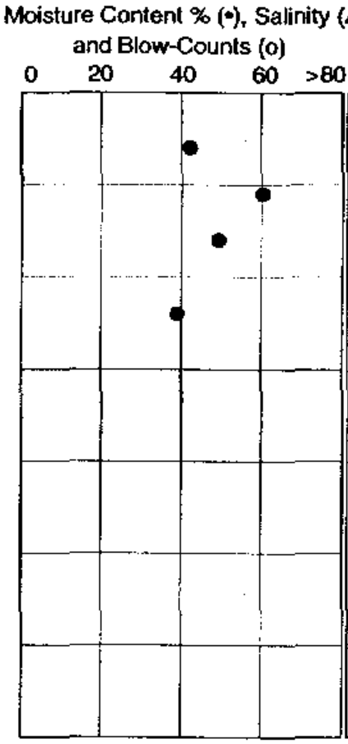
Date Drilled: May 4, 2001

Contractor: Discovery Drilling

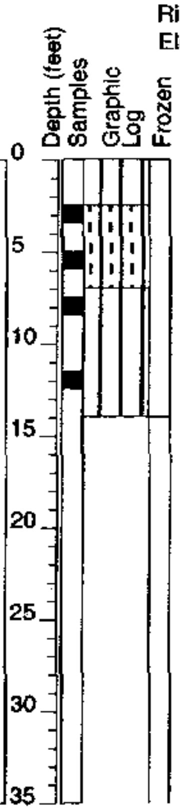
Rig Type: Sled-mounted CME-75 w/ hollow stem

Elevation: - 21.5

N 70° 16.189' W 147° 29.896'



P200	Other Tests	Sample type
97.0%		Cc
95.9%		Cc
91.2%		Cc
92.5%		Cc



Description

SILT: (ML) Dark gray with trace organic material and scattered pebbles

ORGANIC SILT: (OL) Dark gray to black with trace clay, soft to medium stiff

SILT: (ML) Dark gray with trace to some sand, interbedded with black organic silt (OL), stiff to medium stiff to 11', with some clay and very stiff below 13.5'

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Job No.: 4119.30

Date : June 2001

LOG OF HOLE CGR-08

Liberty Development

Foggy Island Bay, Alaska

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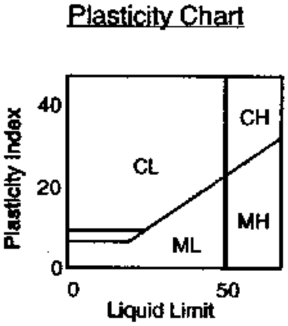
MAJOR DIVISIONS			SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS >50% larger than #200 sieve, 75µm	**GRAVELS** More than half of the coarse fraction is larger than #4 sieve size, > 4.75 mm.	Clean gravels with little or no fines	GW	Well graded gravels, sandy gravel
			GP	Poorly graded gravels, sandy gravel
		Gravels with more than 12% fines	GM	Silty gravels, silt sand gravel mixtures
			GC	Clayey gravels, clay sand gravel mixtures
	SANDS More than half of the coarse fraction is smaller than #4 sieve size	Clean sands with little or no fines	SW	Well graded sand, gravelly sand
			SP	Poorly graded sands, gravelly sand
		Sands with more than 12% fines	SM	Silty sand, silt gravel sand mixtures
			SC	Clayey sand, clay gravel sand mixtures
FINE GRAINED SOILS >50% finer than #200 sieve, 75µm		**SILTS and CLAYS** Liquid limit less than 50	ML	Inorganic silt and very fine sand, rock flour
			CL	Inorganic clay, gravelly and sandy clay, silty clay
			OL	Organic silts and clay of low plasticity
		SILTS and CLAYS Liquid limit greater than 50	MH	Inorganic silt
			CH	Inorganic clay, fat clay
			OH	Organic silt and clay of high plasticity
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soil

UNIFIED SOIL CLASSIFICATION SYSTEM

KEY TO TEST DATA

Dd = Dry Density (pcf)
TC = Thaw Consolidation
TCf = Thaw Consolidation (field)
LL = Liquid Limit
PL = Plastic Limit
PI = Plastic Index
SpG = Specific Gravity
SA = Sieve Analysis
MA = Sieve and Hydrometer Analysis
OLI = Organic Loss
TXUU = Unconsolidated Undrained Triaxial
TXCU = Consolidated Undrained Triaxial
TXCD = Consolidated Drained Triaxial
XXX (YYY)
XXX=$(\sigma1-\sigma3)/2$
YYY=$\sigma3$

KEY TO SAMPLE TYPE

Ag = Auger grab
Ab = Auger bulk
Ac = Air chip
Cc = Auger Core
Ss = 1.4" ID split barrel w/ 140 lb. manual hammer
Sh = 2.5" ID split barrel w/ 340 lb. manual hammer
Sha= 2.5" ID split barrel w/ 340 lb. automatic hammer
Tw = Shelby tube

GROUP	ICE VISIBILITY	DESCRIPTION		SYMBOL	
N	Segregated ice not visible by eye	Poorly bonded or friable		Nf	
		Well bonded	No excess ice	Nb	Nbn
			Excess microscopic ice		Nbe
V	Segregated ice is visible by eye and is one inch or less in thickness	Individual ice crystals or inclusions		Vx	
		Ice coatings on particles		Vc	
		Random or irregularly oriented ice		Vr	
		Stratified or distinctly oriented ice		Vs	
ICE	Ice greater than one inch in thickness	Ice with soil inclusions		ICE + soil type	
		Ice without soil inclusions		ICE	

ICE CLASSIFICATION SYSTEM

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Arctic & Geotechnical Engineering
Job No.: 4119.30
Date: June 2001

SOIL and ICE CLASSIFICATION and KEY TO DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
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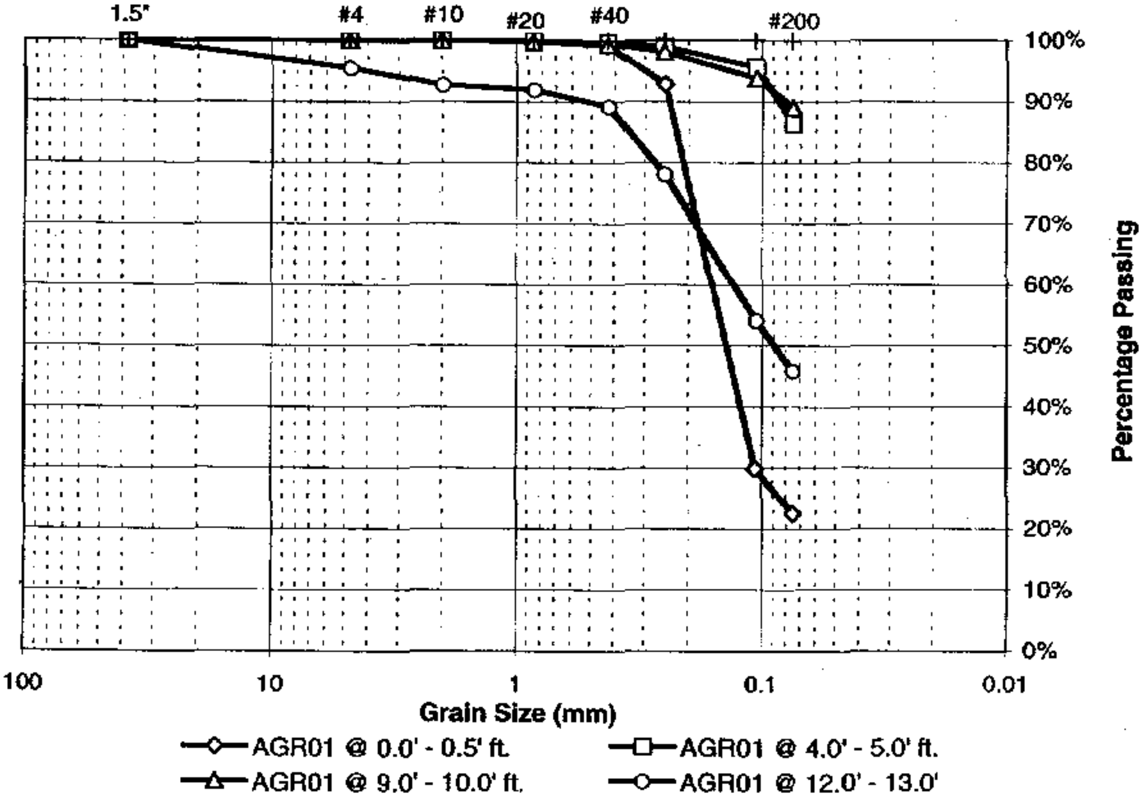
Boring =>	AGR01	AGR01	AGR01	AGR01
Sample Number =>	AGR01A	AGR01B	AGR01C	AGR01D
Depth =>	0.0' - 0.5'	4.0' - 5.0'	9.0' - 10.0'	12.0' - 13.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	95%
#10 =>	100%	100%	100%	93%
#20 =>	100%	100%	100%	92%
#40 =>	99%	100%	99%	89%
#60 =>	93%	99%	98%	78%
#140 =>	30%	96%	94%	54%
#200 =>	22.5%	86.4%	89.0%	45.8%
Wt Rcvd	50.1371	36.75	26.5311	30.6139
Wt Oven Dried	36.6502	25.1967	16.9534	24.0625
Moisture Content =>	36.8%	45.9%	56.5%	27.2%
Analysis of Data				
D10 size =>				
D30 size =>				
D50 size =>				0.089 mm
D60 size =>				0.131 mm
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	5%
AASHTO Gravel (+#10) =	0.1%	0.0%	0.0%	7.3%
Sand percentage =	77.5%	13.6%	11.0%	49.7%
Fines percentage =	22.5%	86.4%	89.0%	45.8%
Unified Soil MLass Symbol =	**SM**	**ML**	**ML**	**SM**

U



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Job No. 4119.30
June 2001

PARTICLE SIZE DATA
Liberty Development
Foggy Island Bay, Alaska

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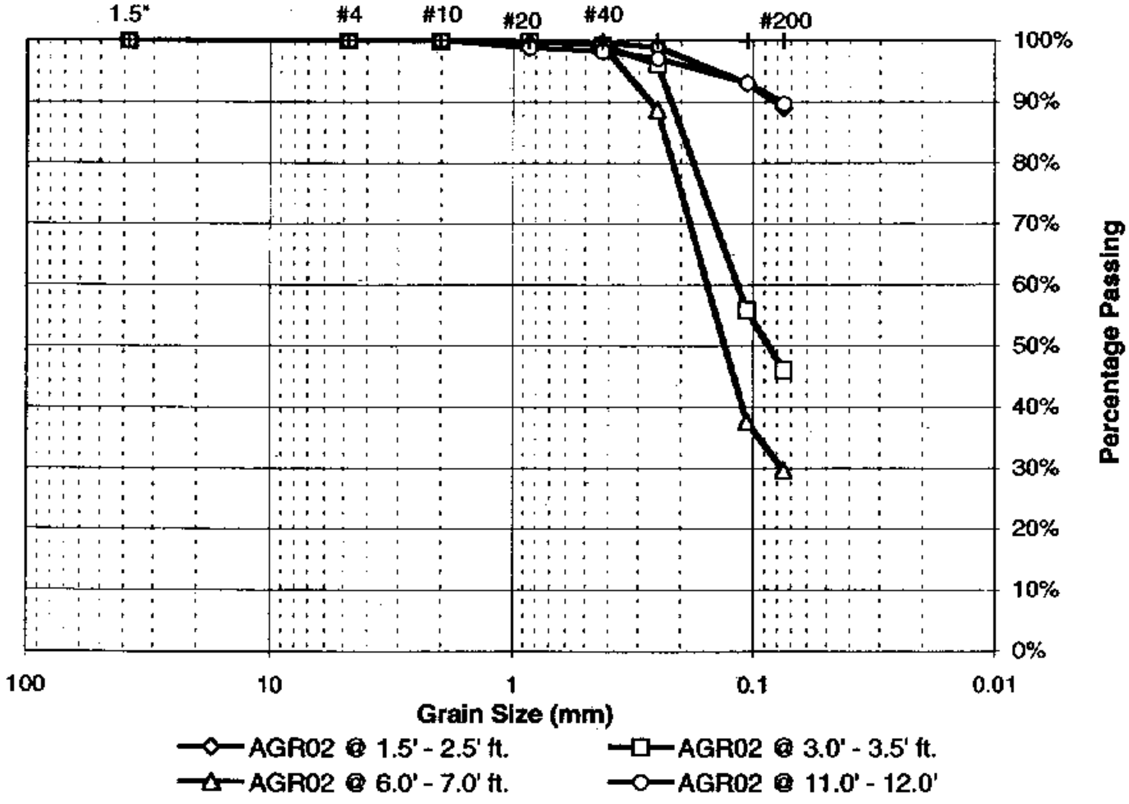
Boring =>	AGR02	AGR02	AGR02	AGR02
Sample Number =>	AGR02A	AGR02B	AGR02C	AGR02D
Depth =>	1.5' - 2.5'	3.0' - 3.5'	6.0' - 7.0'	11.0' - 12.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	100%	100%	100%	100%
#20 =>	100%	100%	100%	99%
#40 =>	100%	99%	99%	98%
#60 =>	99%	96%	89%	97%
#140 =>	93%	56%	38%	93%
#200 =>	89.0%	46.0%	29.5%	89.6%
Wt Rcvd	28.5458	38.612	29.9706	25.4502
Wt Oven Dried	20.1248	27.8779	22.5079	14.5066
Moisture Content =>	41.8%	38.5%	33.2%	75.4%
Analysis of Data				
D10 size =>				
D30 size =>			0.077 mm	
D50 size =>		0.086 mm	0.131 mm	
D60 size =>		0.116 mm	0.155 mm	
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	0%
AASHTO Gravel (+#10) =	0.0%	0.1%	0.0%	0.0%
Sand percentage =	11.0%	54.0%	70.5%	10.4%
Fines percentage =	89.0%	46.0%	29.5%	89.6%
Unified Soil MLass Symbol =	**ML**	**SM**	**SM**	**ML**



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June 2001

PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
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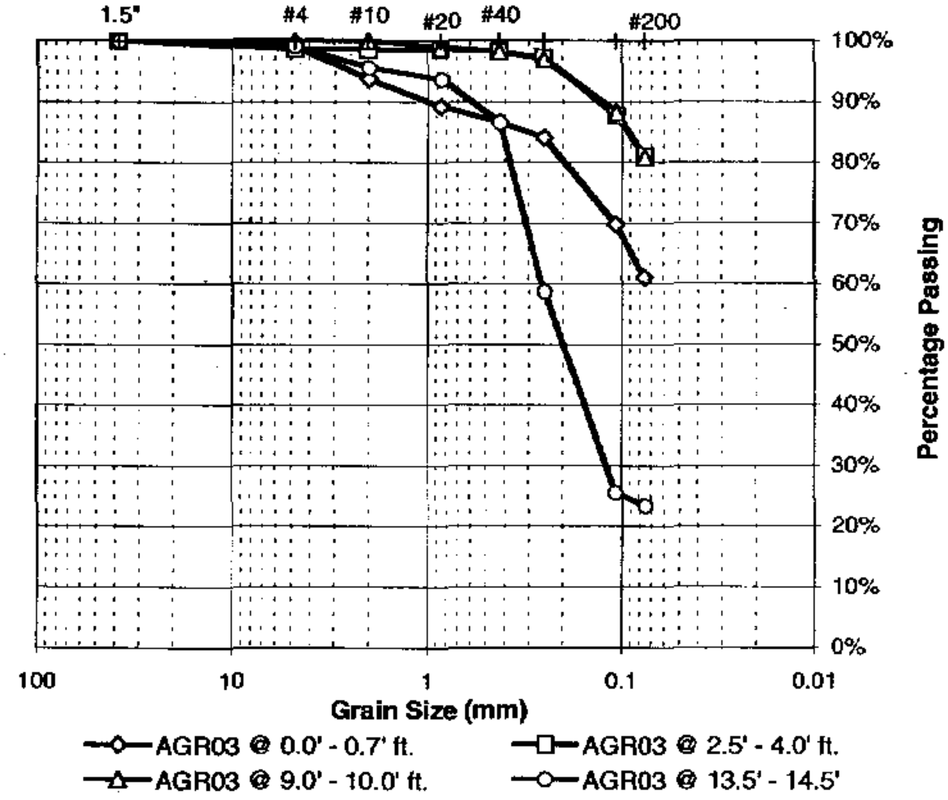
Boring =>	AGR03	AGR03	AGR03	AGR03
Sample Number =>	AGR03A	AGR03B	AGR03C	AGR03D
Depth =>	0.0' - 0.7'	2.5' - 4.0'	9.0' - 10.0'	13.5' - 14.5'
1 1/2" =>	100%	100%	100%	100%
#4 =>	99%	99%	100%	99%
#10 =>	94%	99%	100%	96%
#20 =>	89%	98%	99%	94%
#40 =>	87%	98%	98%	87%
#60 =>	84%	97%	97%	59%
#140 =>	70%	88%	88%	26%
#200 =>	61.0%	81.1%	80.8%	23.3%
Wt Rcvd	77.1085	32.2165	55.2914	79.3833
Wt Oven Dried	42.641	22.165	34.5018	61.1251
Moisture Content =>	80.8%	45.3%	60.3%	29.9%
Analysis of Data				
D10 size =>				
D30 size =>				0.119 mm
D50 size =>				0.200 mm
D60 size =>				0.256 mm
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	1%	1%	0%	1%
AASHTO Gravel (+#10) =	6.3%	1.4%	0.0%	4.4%
Sand percentage =	38.1%	17.6%	19.2%	75.9%
Fines percentage =	61.0%	81.1%	80.8%	23.3%
Unified Soil MLass Symbol =	**ML**	**ML**	**ML**	**SM**



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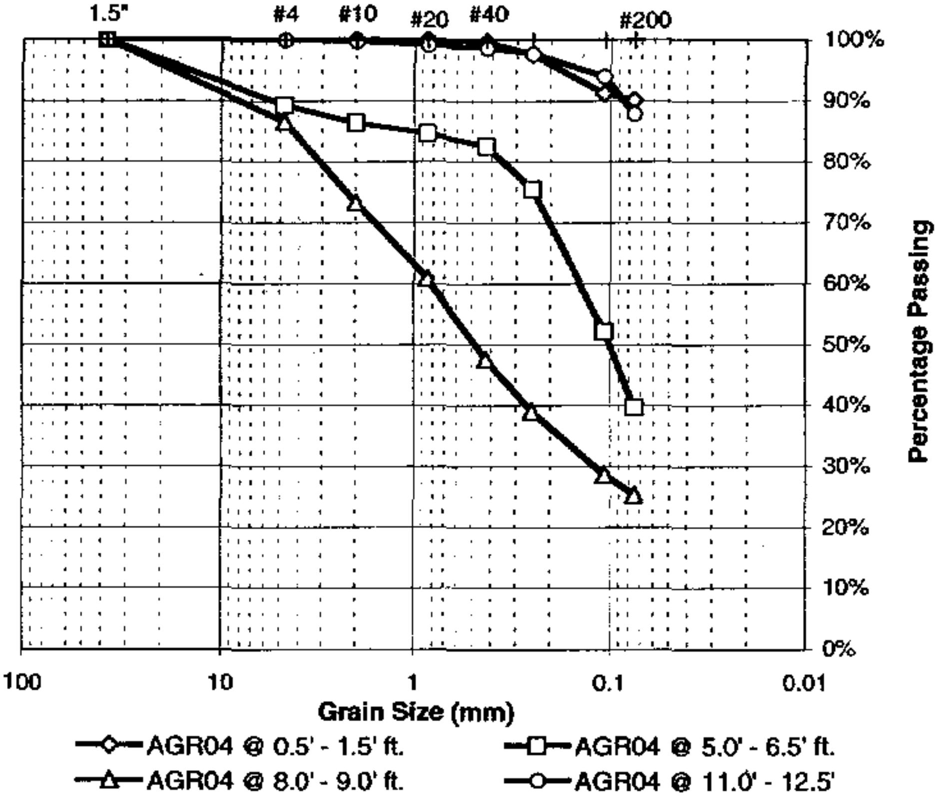
June 2001

PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
21

Boring =>	AGR04	AGR04	AGR04	AGR04
Sample Number =>	AGR04A	AGR04B	AGR04C	AGR04D
Depth =>	0.5' - 1.5'	5.0' - 6.5'	8.0' - 9.0'	11.0' - 12.5'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	89%	87%	100%
#10 =>	100%	86%	73%	100%
#20 =>	100%	85%	61%	99%
#40 =>	100%	83%	48%	99%
#60 =>	98%	76%	39%	98%
#140 =>	91%	52%	29%	94%
#200 =>	90.1%	39.7%	25.2%	87.8%
Wt Rcvd	36.3069	32.6201	49.1978	49.0218
Wt Oven Dried	26.7582	24.6934	40.3422	33.8741
Moisture Content =>	35.7%	32.1%	22.0%	44.7%
Analysis of Data				
D10 size =>				
D30 size =>			0.119 mm	
D50 size =>		0.100 mm	0.484 mm	
D60 size =>		0.141 mm	0.811 mm	
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	11%	13%	0%
AASHTO Gravel (+#10) =	0.0%	13.7%	26.7%	0.3%
Sand percentage =	9.9%	49.6%	61.4%	12.2%
Fines percentage =	90.1%	39.7%	25.2%	87.8%
Unified Soil MLass Symbol =	**ML**	**SM**	**SM**	**ML**



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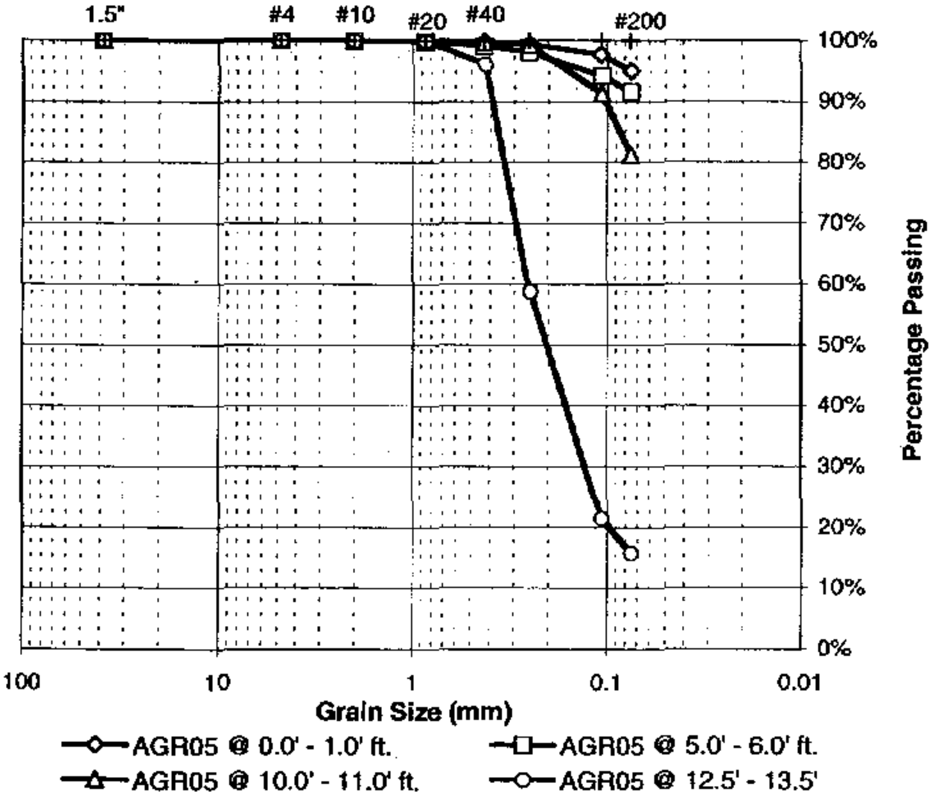
PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
22

Boring =>	AGR05	AGR05	AGR05	AGR05
Sample Number =>	AGR05A	AGR05B	AGR05C	AGR05D
Depth =>	0.0' - 1.0'	5.0' - 6.0'	10.0' - 11.0'	12.5' - 13.5'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	100%	100%	100%	100%
#20 =>	100%	100%	100%	100%
#40 =>	100%	99%	100%	96%
#60 =>	99%	98%	99%	59%
#140 =>	98%	94%	91%	21%
#200 =>	95.0%	91.6%	81.3%	15.8%
Wt Rcvd	36.3607	25.2745	30.3386	75.4575
Wt Oven Dried	26.7251	14.5076	22.7843	59.536
Moisture Content =>	36.1%	74.2%	33.2%	26.7%
Analysis of Data				
D10 size =>				
D30 size =>				0.129 mm
D50 size =>				0.204 mm
D60 size =>				0.254 mm
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	0%
AASHTO Gravel (+#10) =	0.0%	0.0%	0.0%	0.0%
Sand percentage =	5.0%	8.4%	18.8%	84.3%
Fines percentage =	95.0%	91.6%	81.3%	15.8%
Unified Soil MLass Symbol =	**ML**	**ML**	**ML**	**SM**



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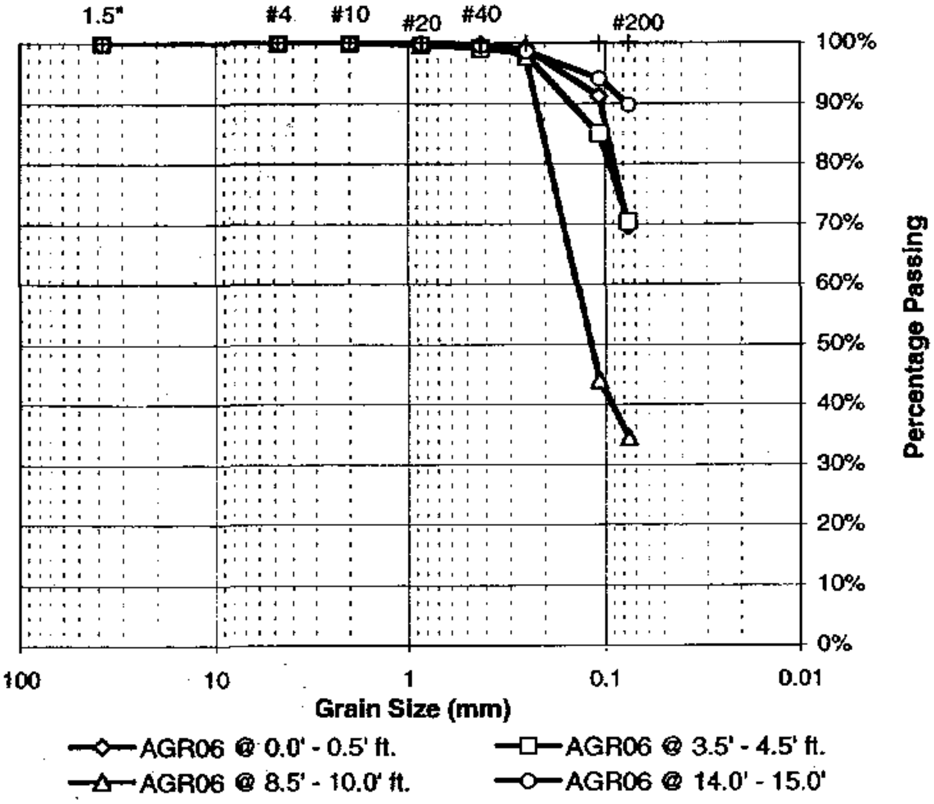
PARTICLE SIZE DATA
Liberty Development
Foggy Island Bay, Alaska

Plate
23

Boring =>	AGR06	AGR06	AGR06	AGR06
Sample Number =>	AGR06A	AGR06B	AGR06C	AGR06D
Depth =>	0.0' - 0.5'	3.5' - 4.5'	8.5' - 10.0'	14.0' - 15.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	100%	100%	100%	100%
#20 =>	100%	100%	100%	100%
#40 =>	100%	99%	100%	100%
#60 =>	99%	98%	98%	99%
#140 =>	91%	85%	44%	94%
#200 =>	69.6%	70.4%	34.5%	89.7%
Wt Rcvd	36.5551	50.1497	49.7774	47.4901
Wt Oven Dried	25.6982	37.512	38.4282	38.467
Moisture Content =>	42.2%	33.7%	29.5%	23.5%
Analysis of Data				
D10 size =>				
D30 size =>				
D50 size =>			0.117 mm	
D60 size =>			0.137 mm	
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	0%
AASHTO Gravel (+#10) =	0.0%	0.0%	0.0%	0.0%
Sand percentage =	30.5%	29.7%	65.5%	10.3%
Fines percentage =	69.6%	70.4%	34.5%	89.7%
Unified Soil MLass Symbol =	**ML**	**ML**	**SM**	**ML**



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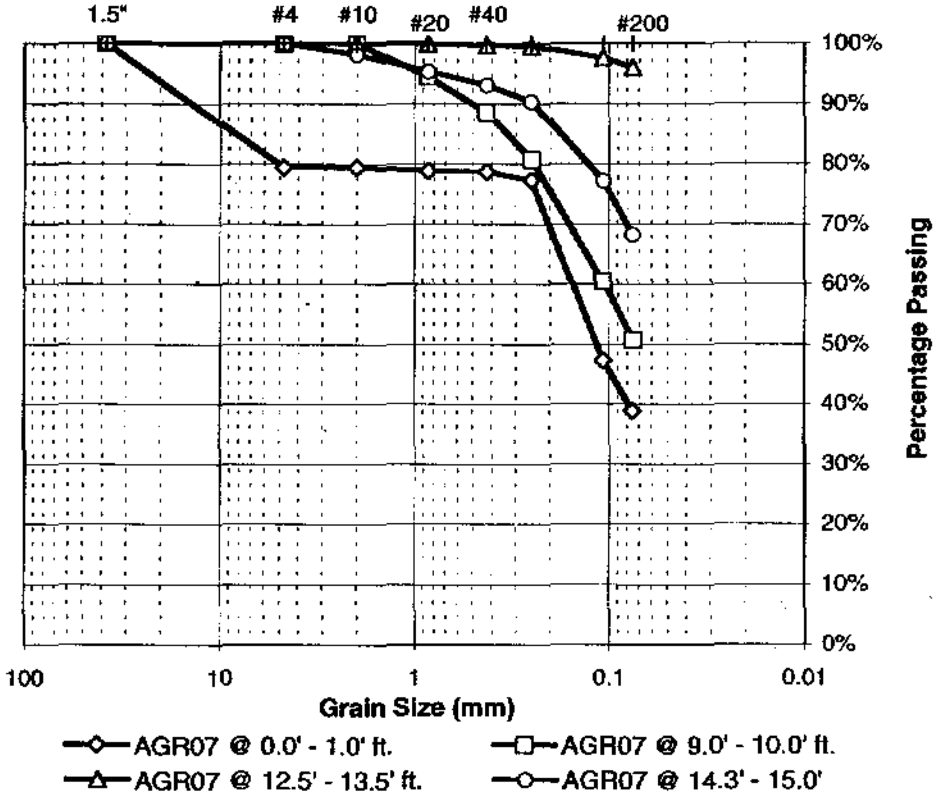
PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
24

Boring =>	AGR07	AGR07	AGR07	AGR07
Sample Number =>	AGR07A	AGR07B	AGR07C	AGR07D
Depth =>	0.0' - 1.0'	9.0' - 10.0'	12.5' - 13.5'	14.3' - 15.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	79%	100%	100%	100%
#10 =>	79%	100%	100%	98%
#20 =>	79%	94%	100%	95%
#40 =>	79%	89%	100%	93%
#60 =>	77%	81%	99%	90%
#140 =>	47%	60%	98%	77%
#200 =>	38.8%	50.7%	95.9%	68.3%
Wt Rcvd	37.7227	37.7952	38.6373	44.0262
Wt Oven Dried	25.84	17.0078	27.2393	26.9881
Moisture Content =>	46.0%	122.2%	41.8%	63.1%
Analysis of Data				
D10 size =>				
D30 size =>				
D50 size =>	0.115 mm			
D60 size =>	0.153 mm	0.104 mm		
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	21%	0%	0%	0%
AASHTO Gravel (+#10) =	20.6%	0.0%	0.0%	1.8%
Sand percentage =	40.6%	49.3%	4.1%	31.8%
Fines percentage =	38.8%	50.7%	95.9%	68.3%
Unified Soil MLass Symbol =	**SM**	**ML**	**ML**	**ML**



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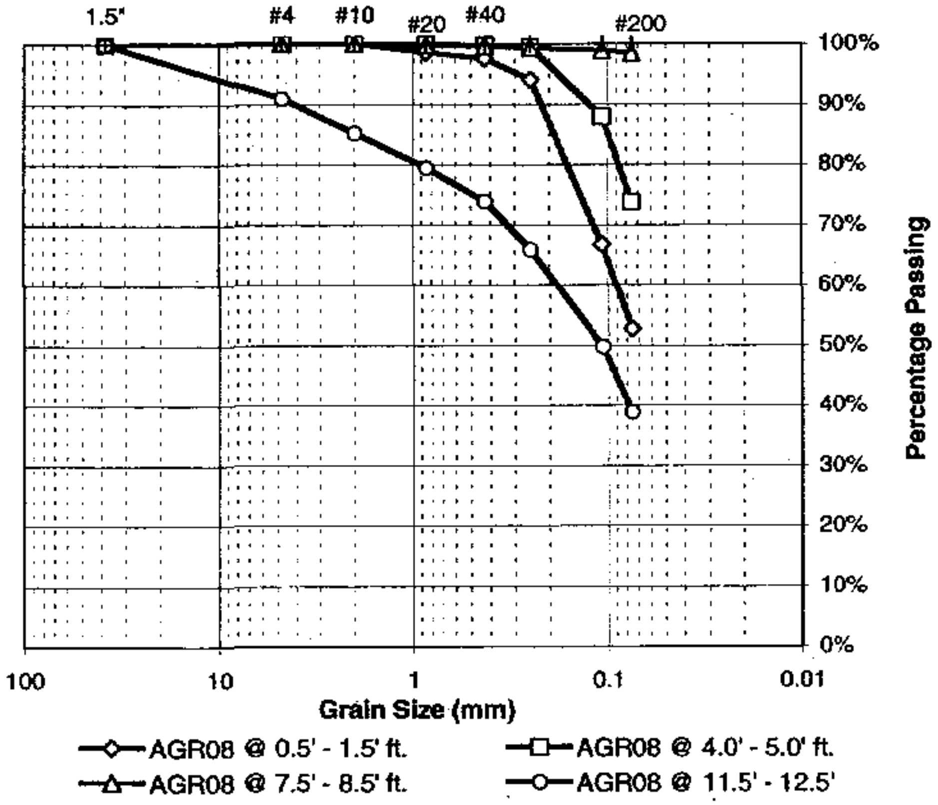
PARTICLE SIZE DATA
Liberty Development
Foggy Island Bay, Alaska

Plate
25

Boring =>	AGR08	AGR08	AGR08	AGR08
Sample Number =>	AGR08A	AGR08B	AGR08C	AGR08D
Depth =>	0.5' - 1.5'	4.0' - 5.0'	7.5' - 8.5'	11.5' - 12.5'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	91%
#10 =>	100%	100%	100%	85%
#20 =>	99%	100%	100%	80%
#40 =>	98%	100%	100%	74%
#60 =>	94%	99%	99%	66%
#140 =>	67%	88%	99%	50%
#200 =>	52.7%	73.8%	98.5%	38.9%
Wt Rcvd	47.3332	37.6902	20.6135	37.6417
Wt Oven Dried	34.3639	28.4561	15.8724	14.5297
Moisture Content =>	37.7%	32.5%	29.9%	159.1%
Analysis of Data				
D10 size =>				
D30 size =>				
D50 size =>				0.108 mm
D60 size =>	0.090 mm			0.183 mm
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	9%
AASHTO Gravel (+#10) =	0.0%	0.0%	0.0%	14.7%
Sand percentage =	47.3%	26.2%	1.5%	52.1%
Fines percentage =	52.7%	73.8%	98.5%	38.9%
Unified Soil MLass Symbol =	**ML**	**ML**	**ML**	**SM**



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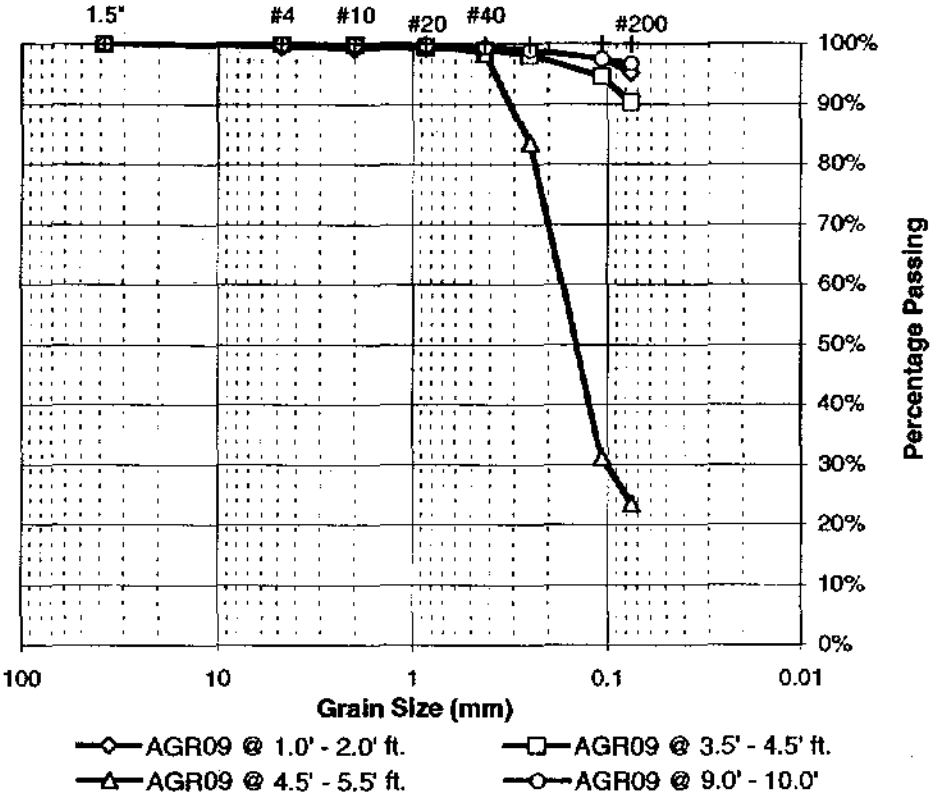
PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
26

Boring =>	AGR09	AGR09	AGR09	AGR09
Sample Number =>	AGR09A	AGR09B	AGR09C	AGR09D
Depth =>	1.0' - 2.0'	3.5' - 4.5'	4.5' - 5.5'	9.0' - 10.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	99%	100%	100%	100%
#20 =>	99%	99%	100%	100%
#40 =>	99%	99%	98%	100%
#60 =>	99%	98%	84%	99%
#140 =>	98%	95%	31%	97%
#200 =>	95.2%	90.2%	23.5%	96.8%
Wt Rcvd	25.0089	26.0971	53.3723	26.2669
Wt Oven Dried	16.4559	16.2063	38.5348	19.8315
Moisture Content =>	52.0%	61.0%	38.5%	32.5%
Analysis of Data				
D10 size =>				
D30 size =>			0.101 mm	
D50 size =>			0.144 mm	
D60 size =>			0.170 mm	
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	1%	0%	0%	0%
AASHTO Gravel (+#10) =	0.8%	0.1%	0.1%	0.0%
Sand percentage =	4.3%	9.8%	76.5%	3.2%
Fines percentage =	95.2%	90.2%	23.5%	96.8%
Unified Soil MLass Symbol =	**ML**	**ML**	**SM**	**ML**



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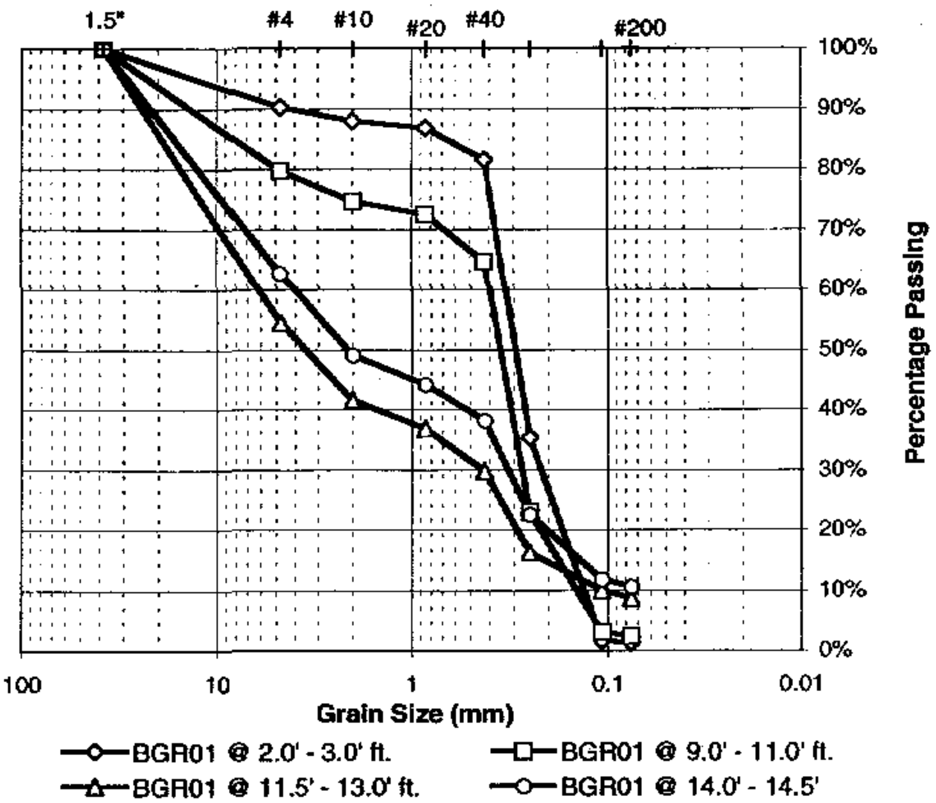
PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Boring =>	BGR01	BGR01	BGR01	BGR01
Sample Number =>	BGR01A	BGR01B	BGR01C	BGR01D
Depth =>	2.0' - 3.0'	9.0' - 11.0'	11.5' - 13.0'	14.0' - 14.5'
1 1/2" =>	100%	100%	100%	100%
#4 =>	90%	80%	54%	63%
#10 =>	88%	75%	42%	49%
#20 =>	87%	72%	37%	44%
#40 =>	82%	65%	30%	38%
#60 =>	35%	23%	16%	23%
#140 =>	2%	3%	10%	12%
#200 =>	1.2%	2.3%	8.6%	10.5%
Wt Rcvd	106.8232	103.4753	103.7884	100.319
Wt Oven Dried	87.595	88.0575	91.3338	89.8858
Moisture Content =>	22.0%	17.5%	13.6%	11.6%
Analysis of Data				
D10 size =>	0.131 mm	0.143 mm	0.107 mm	
D30 size =>	0.218 mm	0.274 mm	0.436 mm	0.322 mm
D50 size =>	0.296 mm	0.353 mm	3.536 mm	2.131 mm
D60 size =>	0.332 mm	0.401 mm	6.134 mm	4.026 mm
Coeff. of Uniformity, Cu =	2.53	2.80	57.47	
Coeff. of Curvature, Cc =	1.09	1.30	0.29	
Gravel (+#4) percentage =	10%	20%	46%	37%
AASHTO Gravel (+#10) =	12.1%	25.4%	58.5%	51.0%
Sand percentage =	89.1%	77.4%	45.8%	52.1%
Fines percentage =	1.2%	2.3%	8.6%	10.5%
Unified Soil MLass Symbol =	**SP**	**SP**	**SP-SM**	**SP-SM**



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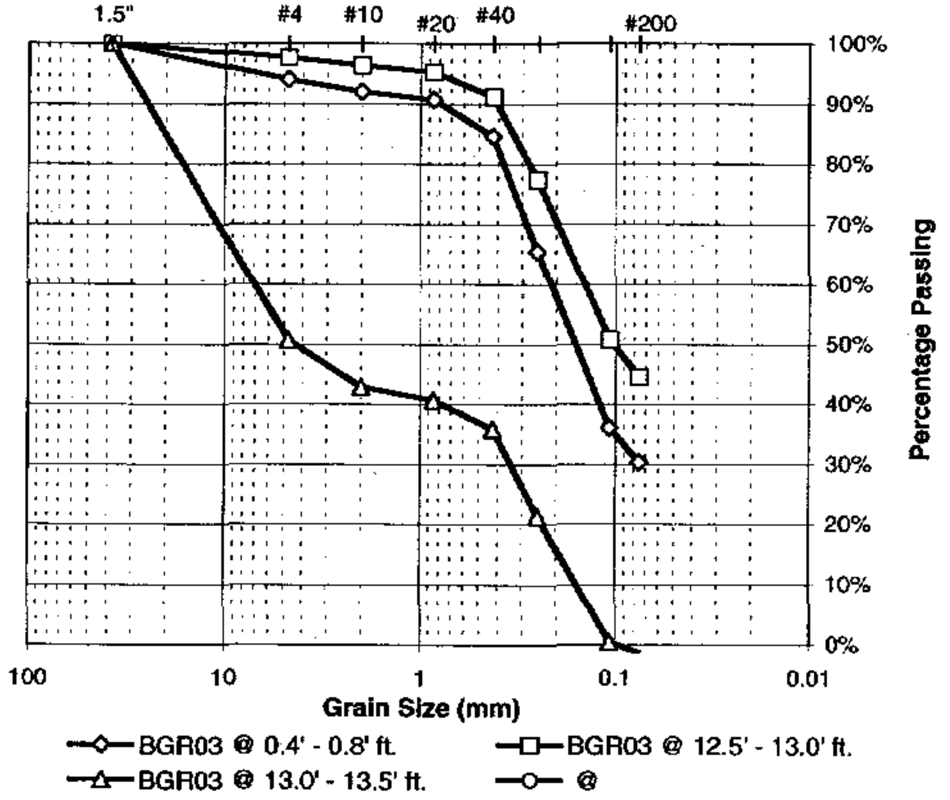
PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
28

Boring =>	BGR03	BGR03	BGR03
Sample Number =>	BGR03A	BGR03B	BGR03C
Depth =>	0.4' - 0.8'	12.5' - 13.0'	13.0' - 13.5'
1 1/2" =>	100%	100%	100%
#4 =>	94%	98%	51%
#10 =>	92%	96%	43%
#20 =>	91%	95%	41%
#40 =>	85%	91%	36%
#60 =>	65%	77%	21%
#140 =>	36%	51%	0%
#200 =>	30.3%	44.5%	-1.4%
Wt Rcvd	48.6006	31.2386	82.547
Wt Oven Dried	39.9497	23.1478	70.7428
Moisture Content =>	21.7%	35.0%	16.7%
Analysis of Data			
D10 size =>			0.157 mm
D30 size =>			0.343 mm
D50 size =>	0.159 mm	0.102 mm	4.396 mm
D60 size =>	0.214 mm	0.143 mm	7.035 mm
Coeff. of Uniformity, Cu =			44.84
Coeff. of Curvature, Cc =			0.11
Gravel (+#4) percentage =	6%	2%	49%
AASHTO Gravel (+#10) =	8.0%	3.7%	57.1%
Sand percentage =	63.7%	53.2%	52.1%
Fines percentage =	30.3%	44.5%	-1.4%
Unified Soil MLass Symbol =	**SM**	**SM**	**SP**



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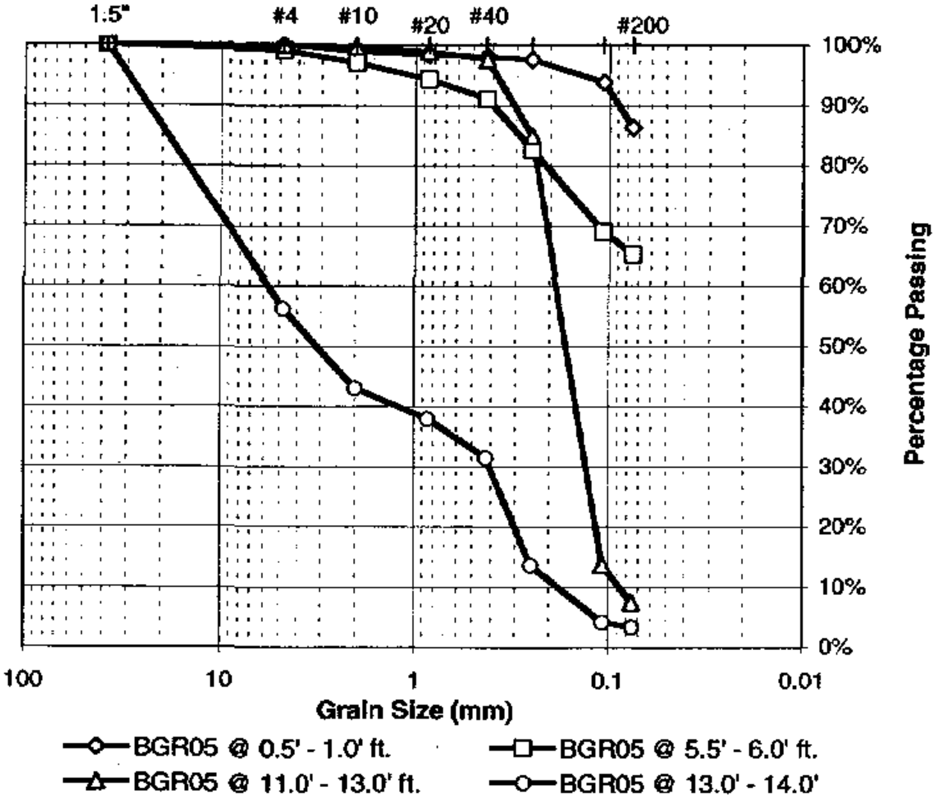
PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
29

Boring =>	BGR05	BGR05	BGR05	BGR05
Sample Number =>	BGR05A	BGR05B	BGR05C	BGR05D
Depth =>	0.5' - 1.0'	5.5' - 6.0'	11.0' - 13.0'	13.0' - 14.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	99%	100%	56%
#10 =>	99%	97%	100%	43%
#20 =>	98%	94%	99%	38%
#40 =>	98%	91%	98%	32%
#60 =>	98%	83%	85%	14%
#140 =>	94%	69%	14%	4%
#200 =>	86.3%	65.3%	7.4%	3.3%
Wt Rcvd	37.7369	40.7818	60.5221	100.9106
Wt Oven Dried	27.5479	24.4691	46.602	92.535
Moisture Content =>	37.0%	66.7%	29.9%	9.1%
Analysis of Data				
D10 size =>			0.087 mm	0.180 mm
D30 size =>			0.129 mm	0.407 mm
D50 size =>			0.164 mm	3.164 mm
D60 size =>			0.185 mm	5.690 mm
Coeff. of Uniformity, Cu =			2.14	31.53
Coeff. of Curvature, Cc =			1.04	0.16
Gravel (+#4) percentage =	0%	1%	0%	44%
AASHTO Gravel (+#10) =	1.1%	2.9%	0.3%	57.0%
Sand percentage =	13.8%	33.8%	92.6%	52.9%
Fines percentage =	86.3%	65.3%	7.4%	3.3%
Unified Soil MLass Symbol =	**ML**	**ML**	**SP-SM**	**SP**



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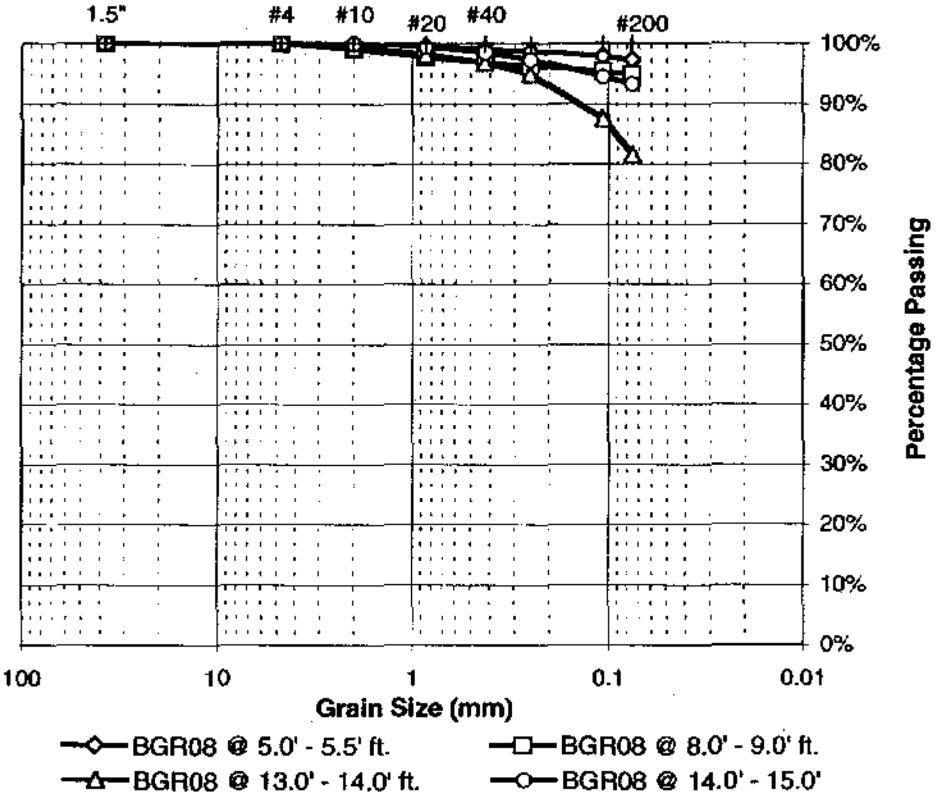
PARTICLE SIZE DATA
Liberty Development
Foggy Island Bay, Alaska

Plate
30

Boring =>	BGR08	BGR08	BGR08	BGR08
Sample Number =>	BGR08A	BGR08B	BGR08C	BGR08D
Depth =>	5.0' - 5.5'	8.0' - 9.0'	13.0' - 14.0'	14.0' - 15.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	100%	99%	99%	100%
#20 =>	100%	98%	98%	99%
#40 =>	99%	97%	97%	99%
#60 =>	99%	96%	95%	97%
#140 =>	98%	95%	87%	95%
#200 =>	97.3%	94.8%	81.5%	93.3%
Wt Rcvd	24.8691	27.6801	26.9168	25.3288
Wt Oven Dried	17.5327	19.0439	14.9657	20.567
Moisture Content =>	41.8%	45.3%	79.9%	23.2%
Analysis of Data				
D10 size =>				
D30 size =>				
D50 size =>				
D60 size =>				
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	0%
AASHTO Gravel (+#10) =	0.0%	0.9%	0.7%	0.0%
Sand percentage =	2.7%	5.2%	18.5%	6.7%
Fines percentage =	97.3%	94.8%	81.5%	93.3%
Unified Soil MLass Symbol =	**ML**	**ML**	**ML**	**ML**



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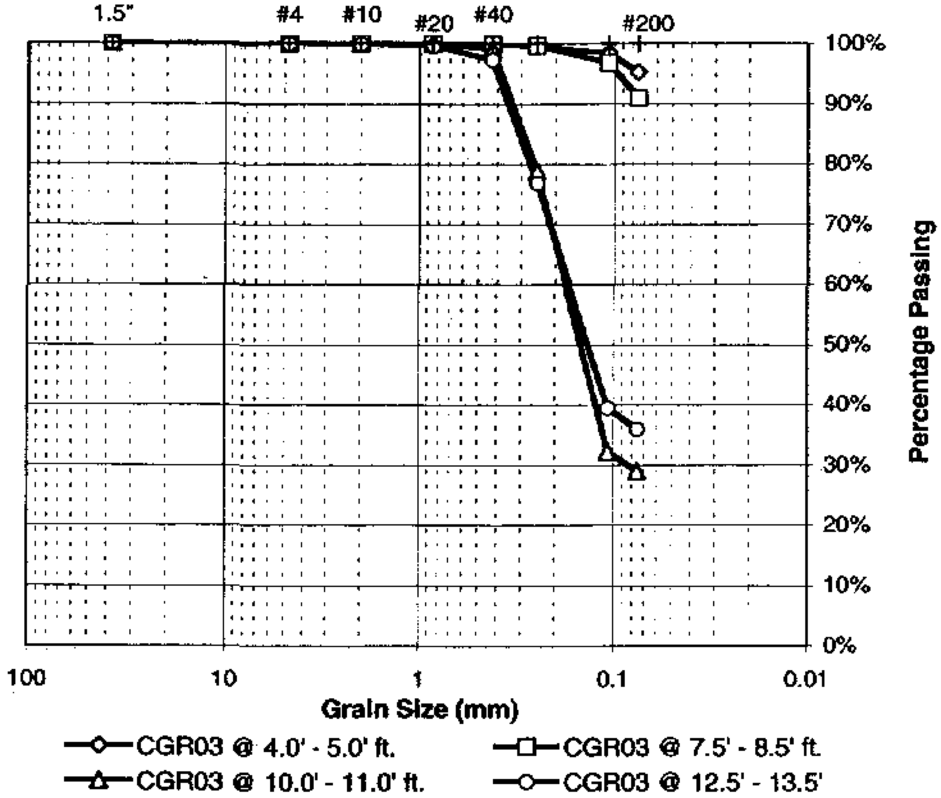
PARTICLE SIZE DATA
Liberty Development
Foggy Island Bay, Alaska

Plate
31

Boring =>	CGR03	CGR03	CGR03	CGR03
Sample Number =>	CGR03A	CGR03B	CGR03C	CGR03D
Depth =>	4.0' - 5.0'	7.5' - 8.5'	10.0' - 11.0'	12.5' - 13.5'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	100%	100%	100%	100%
#20 =>	100%	100%	100%	100%
#40 =>	100%	100%	99%	97%
#60 =>	100%	100%	79%	77%
#140 =>	98%	97%	32%	40%
#200 =>	95.3%	91.0%	29.0%	36.0%
Wt Rcvd	28.5458	38.612	29.9706	25.4502
Wt Oven Dried	20.1248	27.8779	22.5079	14.5066
Moisture Content =>	41.8%	38.5%	33.2%	75.4%
Analysis of Data				
D10 size =>				
D30 size =>			0.084 mm	
D50 size =>			0.147 mm	0.135 mm
D60 size =>			0.177 mm	0.170 mm
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	0%
AASHTO Gravel (+#10) =	0.0%	0.0%	0.0%	0.1%
Sand percentage =	4.7%	9.0%	71.0%	64.0%
Fines percentage =	95.3%	91.0%	29.0%	36.0%
Unified Soil MLass Symbol =	**ML**	**ML**	**SM**	**SM**



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PARTICLE SIZE DATA
Liberty Development
Foggy Island Bay, Alaska

Plate
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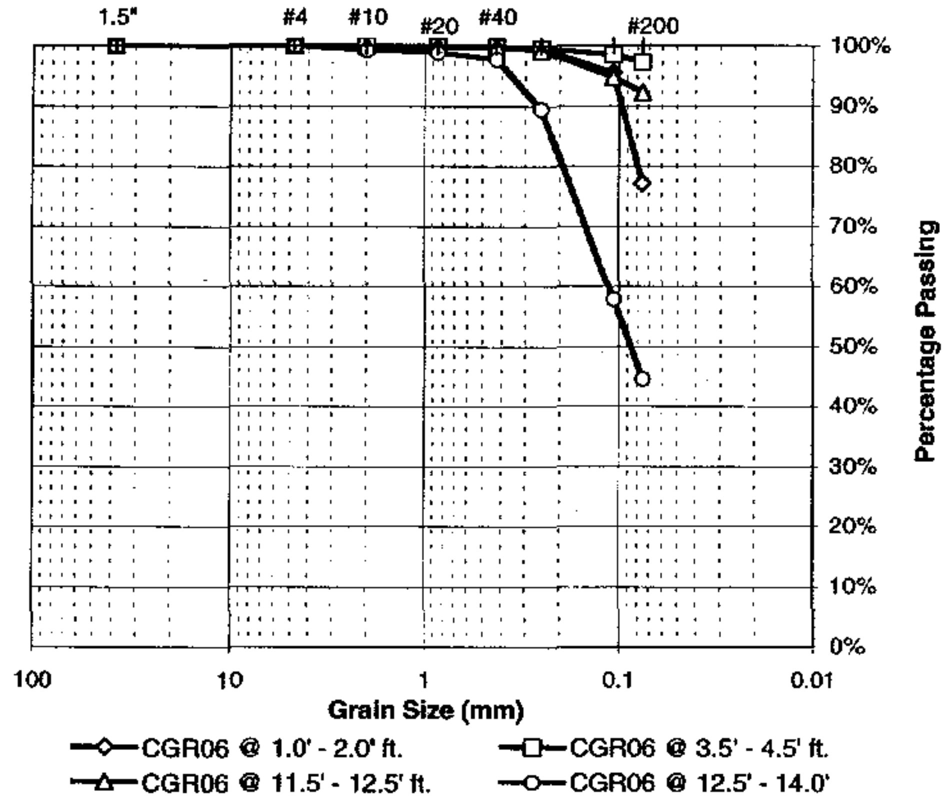
Boring =>	CGR06	CGR06	CGR06	CGR06
Sample Number =>	CGR06A	CGR06B	CGR06C	CGR06D
Depth =>	1.0' - 2.0'	3.5' - 4.5'	11.5' - 12.5'	12.5' - 14.0'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	100%	100%	100%	99%
#20 =>	100%	100%	100%	99%
#40 =>	100%	100%	100%	98%
#60 =>	99%	99%	99%	89%
#140 =>	95%	98%	95%	58%
#200 =>	77.1%	97.2%	92.2%	44.6%
Wt Rcvd	40.4801	27.064	28.9111	35.541
Wt Oven Dried	29.1052	18.593	21.5388	25.5895
Moisture Content =>	39.1%	45.6%	34.2%	38.9%
Analysis of Data				
D10 size =>				
D30 size =>				
D50 size =>				0.086 mm
D60 size =>				0.112 mm
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	0%
AASHTO Gravel (+#10) =	0.2%	0.0%	0.0%	0.7%
Sand percentage =	22.9%	2.8%	7.8%	55.4%
Fines percentage =	77.1%	97.2%	92.2%	44.6%
Unified Soil MLass Symbol =	**ML**	**ML**	**ML**	**SM**



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June 2001

PARTICLE SIZE DATA
Liberty Development
Foggy Island Bay, Alaska

Plate
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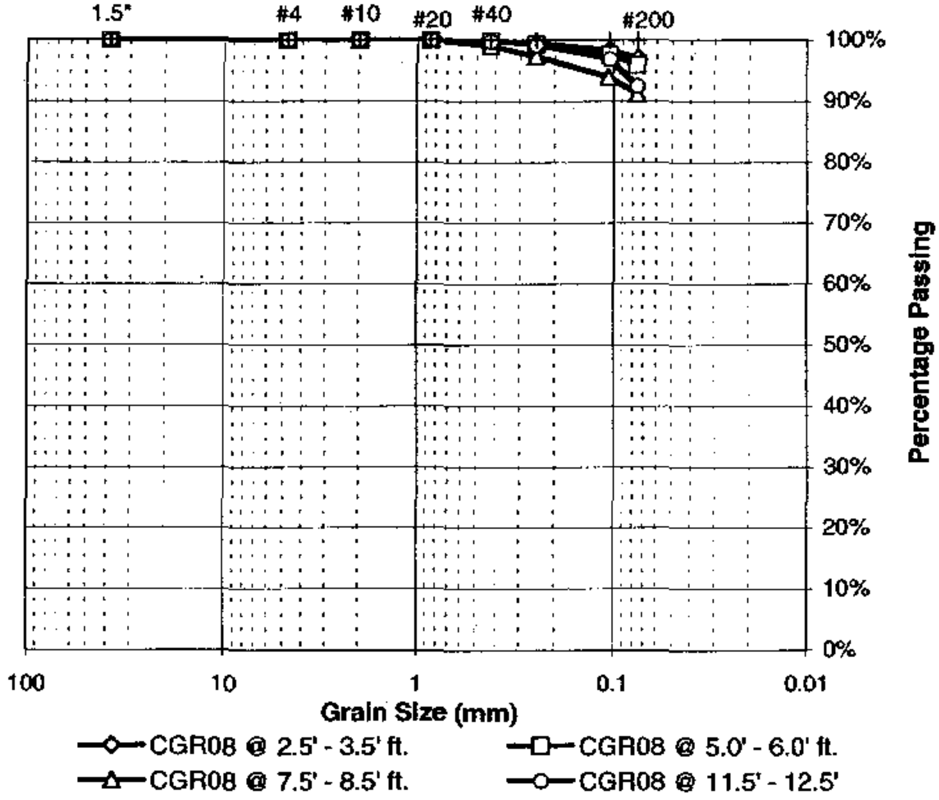
Boring =>	CGR08	CGR08	CGR08	CGR08
Sample Number =>	CGR08A	CGR08B	CGR08C	CGR08D
Depth =>	2.5' - 3.5'	5.0' - 6.0'	7.5' - 8.5'	11.5' - 12.5'
1 1/2" =>	100%	100%	100%	100%
#4 =>	100%	100%	100%	100%
#10 =>	100%	100%	100%	100%
#20 =>	100%	100%	100%	100%
#40 =>	100%	100%	99%	100%
#60 =>	100%	99%	97%	99%
#140 =>	98%	97%	94%	97%
#200 =>	97.0%	95.9%	91.2%	92.5%
Wt Rcvd	29.4231	25.9443	29.2121	31.0347
Wt Oven Dried	20.7727	16.2411	19.5429	22.345
Moisture Content =>	41.6%	59.7%	49.5%	38.9%
Analysis of Data				
D10 size =>				
D30 size =>				
D50 size =>				
D60 size =>				
Coeff. of Uniformity, Cu =				
Coeff. of Curvature, Cc =				
Gravel (+#4) percentage =	0%	0%	0%	0%
AASHTO Gravel (+#10) =	0.0%	0.0%	0.0%	0.0%
Sand percentage =	3.0%	4.1%	8.8%	7.5%
Fines percentage =	97.0%	95.9%	91.2%	92.5%
Unified Soil MLass Symbol =	**ML**	**ML**	**ML**	**ML**



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PARTICLE SIZE DATA

Liberty Development
Foggy Island Bay, Alaska

Plate
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Appendix E

Sediment Grain-size and Chemistry QA/QC Summary

Chemistry QA/QC Summary
Definitions of Results Notes and Validation Flags

Result Notes	Definition
*	The duplicate analysis is not within control limits. See case narrative.
B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
BN	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL. The Matrix Spike sample recovery is not within control limits. See case narrative.
J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
J,*	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL. The result is an outlier. See case narrative.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
ND,U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
ND,Ui	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. The MRL/MDL has been elevated due to a chromatographic interference.
	Validator Flags
VLL	The Laboratory Control Sample (LCS) recovery is below the established control limit. The results may be biased low based on the LCS recovery. See QA/QC summary.
VML	The Matrix Spike (MS) recovery is below the established control limit. The results may be biased low based on the MS recovery. See QA/QC summary.

2001 SEDIMENT GRAIN SIZE QA/QC SUMMARY

This Quality Assurance/Quality Control (QA/QC) brief presents the evaluation of analytical data for the grain size samples collected for the Liberty Development 2001 project on the North Slope of Alaska, for BP Exploration (Alaska), Inc. (BPXA). Samples were collected April 27, 2001 through May 6, 2001.

The results of the QA/QC data associated with the analysis of the following parameters are summarized in this report:

- Particle Size Determination, ASTM Method D422 (Modified).

Samples were shipped to Columbia Analytical Services, Inc. (CAS) on May 8, 2001, at their Kelso, Washington laboratory. CAS received the samples on May 9, 2001.

A QA/QC review was performed on the analytical data provided by CAS. Analytical data are generally in control and are usable for the purposes of this project, except as noted below. The review included an evaluation of sample handling, holding times, field lateral samples, and field split samples and laboratory duplicates.

Field Lateral Samples: Four lateral field samples were collected and submitted to the laboratory for grain size analysis. The lateral samples were collected from an independent core, from a soil boring located approximately five feet from the original boring. Table 1 presents original sample and lateral sample grain size results. The disparity between the sample results is attributable to the heterogeneous nature of the matrix and to sampling from a separate core.

Field Split Samples: Four split field samples were collected and submitted to the laboratory for grain size analysis. The split samples were separate samples, collected from the same core and submitted for analysis. Table 2 presents original sample and split sample grain size results. The majority of the results were within an agreement factor of two and all results were within an agreement factor of three.

Laboratory Duplicate Samples: Four duplicate samples were analyzed and reported by the laboratory for grain size. The duplicate samples were separate aliquots, taken in the laboratory from the submitted sample container, prepared and analyzed in the same analytical batch as the original sample. Table 3 presents original and duplicate sample results. All of the results were within an agreement factor of two, with the exception of the Fine Gravel results for sample U01-LIB01-AGR01A, the Medium Gravel results for sample U01-LIB01-AGR07A and the Very Fine Sand results for sample U01-LIB01-AGR08C. The disparity is attributable to the heterogeneous nature of the samples.

Table 1
Field Lateral Samples

Depth	Grain Size	Sieve/Particle Size	Sieve Number	Percent Retained	Replicate Percent Retained	RPD
Sample Name: U01-LIB01-AGR07A						
Lateral Sample Name:U01-LIB01-AGR07AB						
0.0' - 1.0'	Gravel, Medium	4.75 mm	4	20.6	0.00	NA
0.0' - 1.0'	Gravel, Fine	2.00 mm	10	0.00	0.00	NA
0.0' - 1.0'	Sand, Very Coarse	0.850 mm	20	0.57	0.00	NA
0.0' - 1.0'	Sand, Coarse	0.425 mm	40	0.12	0.42	111
0.0' - 1.0'	Sand, Medium	0.250 mm	60	1.5	1.26	17
0.0' - 1.0'	Sand, Fine	0.106 mm	140	30	12.6	82
0.0' - 1.0'	Sand, Very Fine	0.075 mm	200	8.38	7.96	5
0.0' - 1.0'	Clay	<0.0039 mm	NA	7.93	11.0	32
0.0' - 1.0'	Silt	0.0039 - 0.0625 mm	NA	39.4	59.3	40
Sample Name: U01-LIB01-AGR07B						
Lateral Sample Name:U01-LIB01-AGR07BB						
9.0' - 10.0'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
9.0' - 10.0'	Gravel, Fine	2.00 mm	10	0.00	0.00	NA
9.0' - 10.0'	Sand, Very Coarse	0.850 mm	20	5.62	0.00	NA
9.0' - 10.0'	Sand, Coarse	0.425 mm	40	5.84	0.25	184
9.0' - 10.0'	Sand, Medium	0.250 mm	60	7.84	2.17	113
9.0' - 10.0'	Sand, Fine	0.106 mm	140	20.3	6.99	98
9.0' - 10.0'	Sand, Very Fine	0.075 mm	200	9.7	7.27	29
9.0' - 10.0'	Clay	<0.0039 mm	NA	11.8	5.94	66
9.0' - 10.0'	Silt	0.0039 - 0.0625 mm	NA	32.4	77.5	82
Sample Name: U01-LIB01-AGR07C						
Lateral Sample Name:U01-LIB01-AGR07CB						
12.5' - 13.5'	Gravel, Medium	4.75 mm	4	0.00	0.60	NA
12.5' - 13.5'	Gravel, Fine	2.00 mm	10	0.00	2.50	NA
12.5' - 13.5'	Sand, Very Coarse	0.850 mm	20	0.11	1.89	178
12.5' - 13.5'	Sand, Coarse	0.425 mm	40	0.19	0.97	134
12.5' - 13.5'	Sand, Medium	0.250 mm	60	0.24	2.52	165
12.5' - 13.5'	Sand, Fine	0.106 mm	140	1.85	17.6	162
12.5' - 13.5'	Sand, Very Fine	0.075 mm	200	1.7	13.1	154
12.5' - 13.5'	Clay	<0.0039 mm	NA	14.4	12.1	17
12.5' - 13.5'	Silt	0.0039 - 0.0625 mm	NA	74.8	59.4	23
Sample Name: U01-LIB01-AGR07D						
Lateral Sample Name:U01-LIB01-AGR07DB						
14.3' - 15.0'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
14.3' - 15.0'	Gravel, Fine	2.00 mm	10	1.83	0.67	93
14.3' - 15.0'	Sand, Very Coarse	0.850 mm	20	2.84	0.35	156
14.3' - 15.0'	Sand, Coarse	0.425 mm	40	2.2	0.46	131
14.3' - 15.0'	Sand, Medium	0.250 mm	60	2.79	1.15	83
14.3' - 15.0'	Sand, Fine	0.106 mm	140	13.2	11.2	16
14.3' - 15.0'	Sand, Very Fine	0.075 mm	200	8.89	11.5	26
14.3' - 15.0'	Clay	<0.0039 mm	NA	11.9	25.6	73
14.3' - 15.0'	Silt	0.0039 - 0.0625 mm	NA	44.9	49.1	9

Table 2
Field Split Samples

[illegible]	Grain Size	[illegible] Size	[illegible] Submitted	Percent Retained	[illegible] Retained	RPD [illegible]
Sample Name: U01-LIB01-CGR06A						
Split Sample Name:U01-LIB01-CGR06AS						
1.0' - 2.0'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
1.0' - 2.0'	Gravel, Fine	2.00 mm	10	0.24	0.46	63
1.0' - 2.0'	Sand, Very Coarse	0.850 mm	20	0.1	0.12	18
1.0' - 2.0'	Sand, Coarse	0.425 mm	40	0.1	0.18	57
1.0' - 2.0'	Sand, Medium	0.250 mm	60	0.31	0.29	7
1.0' - 2.0'	Sand, Fine	0.106 mm	140	3.77	4.2	11
1.0' - 2.0'	Sand, Very Fine	0.075 mm	200	18.4	18.7	2
1.0' - 2.0'	Clay	<0.0039 mm	NA	14.8	14	6
1.0' - 2.0'	Silt	0.0039 - 0.0625 mm	NA	61.7	70.6	13
Sample Name: U01-LIB01-CGR06B						
Split Sample Name:U01-LIB01-CGR06BS						
3.5' - 4.5'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
3.5' - 4.5'	Gravel, Fine	2.00 mm	10	0.00	0.00	NA
3.5' - 4.5'	Sand, Very Coarse	0.850 mm	20	0.06	0.04	40
3.5' - 4.5'	Sand, Coarse	0.425 mm	40	0.16	0.24	40
3.5' - 4.5'	Sand, Medium	0.250 mm	60	0.34	0.48	34
3.5' - 4.5'	Sand, Fine	0.106 mm	140	0.97	1.41	37
3.5' - 4.5'	Sand, Very Fine	0.075 mm	200	1.23	1.16	6
3.5' - 4.5'	Clay	<0.0039 mm	NA	13.8	18.2	28
3.5' - 4.5'	Silt	0.0039 - 0.0625 mm	NA	76.9	71.2	8
Sample Name: U01-LIB01-CGR06C						
Split Sample Name:U01-LIB01-CGR06CS						
11.5' - 12.5'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
11.5' - 12.5'	Gravel, Fine	2.00 mm	10	0.00	0.00	NA
11.5' - 12.5'	Sand, Very Coarse	0.850 mm	20	0.03	0.03	0
11.5' - 12.5'	Sand, Coarse	0.425 mm	40	0.09	0.13	36
11.5' - 12.5'	Sand, Medium	0.250 mm	60	0.72	0.35	69
11.5' - 12.5'	Sand, Fine	0.106 mm	140	4.44	2.97	40
11.5' - 12.5'	Sand, Very Fine	0.075 mm	200	2.55	2.25	13
11.5' - 12.5'	Clay	<0.0039 mm	NA	10.8	11.2	4
11.5' - 12.5'	Silt	0.0039 - 0.0625 mm	NA	77.8	80.3	3
Sample Name: U01-LIB01-CGR06D						
Split Sample Name:U01-LIB01-CGR06DS						
12.5' - 14.0'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
12.5' - 14.0'	Gravel, Fine	2.00 mm	10	0.73	0.34	73
12.5' - 14.0'	Sand, Very Coarse	0.850 mm	20	0.35	0.62	56
12.5' - 14.0'	Sand, Coarse	0.425 mm	40	1.19	1.35	13
12.5' - 14.0'	Sand, Medium	0.250 mm	60	8.33	8.26	1
12.5' - 14.0'	Sand, Fine	0.106 mm	140	31.5	30.9	2
12.5' - 14.0'	Sand, Very Fine	0.075 mm	200	13.3	12.6	5
12.5' - 14.0'	Clay	<0.0039 mm	NA	9.67	10.9	12
12.5' - 14.0'	Silt	0.0039 - 0.0625 mm	NA	36.2	37.5	4

Table 3
Laboratory Duplicate Samples

Depth	Grain Size	Size Classification Size	Sieve Number	Percent Retained	Duplicate Percent Retained	RPD
Sample Name: U01-LIB01-AGR01A						
Duplicate Sample Name:U01-LIB01-AGR01A DUP						
0.0' - 0.5'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
0.0' - 0.5'	Gravel, Fine	2.00 mm	10	0.09	0.00	NA
0.0' - 0.5'	Sand, Very Coarse	0.850 mm	20	0.09	0.11	20
0.0' - 0.5'	Sand, Coarse	0.425 mm	40	0.7	1.02	37
0.0' - 0.5'	Sand, Medium	0.250 mm	60	6.36	7.32	14
0.0' - 0.5'	Sand, Fine	0.106 mm	140	63	64.8	3
0.0' - 0.5'	Sand, Very Fine	0.075 mm	200	7.25	7.13	2
0.0' - 0.5'	Clay	<0.0039 mm	NA	4.65	4.47	4
0.0' - 0.5'	Silt	0.0039 - 0.0625 mm	NA	20.6	18.7	10
Sample Name: U01-LIB01-AGR07A						
Duplicate Sample Name:U01-LIB01-AGR07A DUP						
0.0' - 1.0'	Gravel, Medium	4.75 mm	4	20.6	0.00	NA
0.0' - 1.0'	Gravel, Fine	2.00 mm	10	0.00	0.00	NA
0.0' - 1.0'	Sand, Very Coarse	0.850 mm	20	0.57	0.34	51
0.0' - 1.0'	Sand, Coarse	0.425 mm	40	0.12	0.23	63
0.0' - 1.0'	Sand, Medium	0.250 mm	60	1.5	1.12	29
0.0' - 1.0'	Sand, Fine	0.106 mm	140	30	23.8	23
0.0' - 1.0'	Sand, Very Fine	0.075 mm	200	8.38	7.84	7
0.0' - 1.0'	Clay	<0.0039 mm	NA	7.93	7.88	1
0.0' - 1.0'	Silt	0.0039 - 0.0625 mm	NA	39.4	49.1	22
Sample Name: U01-LIB01-AGR08C						
Duplicate Sample Name:U01-LIB01-AGR08C DUP						
7.5' - 8.5'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
7.5' - 8.5'	Gravel, Fine	2.00 mm	10	0.00	0.00	NA
7.5' - 8.5'	Sand, Very Coarse	0.850 mm	20	0.19	0.12	45
7.5' - 8.5'	Sand, Coarse	0.425 mm	40	0.20	0.16	22
7.5' - 8.5'	Sand, Medium	0.250 mm	60	0.28	0.25	11
7.5' - 8.5'	Sand, Fine	0.106 mm	140	0.47	0.75	46
7.5' - 8.5'	Sand, Very Fine	0.075 mm	200	0.35	0.79	77
7.5' - 8.5'	Clay	<0.0039 mm	NA	43.0	38.4	11
7.5' - 8.5'	Silt	0.0039 - 0.0625 mm	NA	55.4	57.8	4
Sample Name: U01-LIB01-CGR03A						
Duplicate Sample Name:U01-LIB01-CGR03A DUP						
4.0' - 5.0'	Gravel, Medium	4.75 mm	4	0.00	0.00	NA
4.0' - 5.0'	Gravel, Fine	2.00 mm	10	0.00	0.00	NA
4.0' - 5.0'	Sand, Very Coarse	0.850 mm	20	0.06	0.04	40
4.0' - 5.0'	Sand, Coarse	0.425 mm	40	0.1	0.1	0
4.0' - 5.0'	Sand, Medium	0.250 mm	60	0.32	0.3	6
4.0' - 5.0'	Sand, Fine	0.106 mm	140	1.11	0.97	13
4.0' - 5.0'	Sand, Very Fine	0.075 mm	200	3.14	3.33	6
4.0' - 5.0'	Clay	<0.0039 mm	NA	16.4	17.4	6
4.0' - 5.0'	Silt	0.0039 - 0.0625 mm	NA	78.5	76.7	2

2001 SEDIMENT CHEMISTRY QA/QC SUMMARY

1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Summary Report presents the evaluation of analytical data for sediment samples collected between April 25, 2001 and May 6, 2001 in association with the BP Exploration (Alaska), Inc. (BPXA) 2001 Liberty Development program. Subsurface sediment data were collected at eleven (11) locations and surface sediment data were collected at four (4) locations.

Non-conformance of data is identified, discussed, and qualified in this report.

The results of the QA/QC data associated with the analysis of the following parameters are summarized in this report:

- Total Solids, EPA Method E160.3 (Modified).
- Total Volatile Solids, EPA Method E160.4 (Modified).
- Total Organic Carbon (TOC), ASTM Method 4129-82 (Modified).
- Total Sulfides, U.S. Environmental Protection Agency (EPA) Method SW9030 (Modified).
- Ammonia, Method Plumb 1981
- Total Metals by inductively coupled plasma (ICP) optical emission spectroscopy, EPA Method SW6010B and ICP mass spectroscopy (ICPMS), EPA Method SW6020.
- Total Mercury by cold vapor atomic absorption (CVAA), EPA Methods SW7470A and SW7471A.
- Volatile Organic Compounds (VOCs); 1,2,Dichlorobenzene, 1,3-Dichlorobenzene, and 1,4-Dichlorobenzene, by gas chromatography/mass spectroscopy, U.S. Environmental Protection Agency (EPA) Methods SW5035 and SW8260B.
- Polynuclear aromatic hydrocarbons (PAHs) by gas chromatography/mass spectroscopy using single ion monitoring (SIM) mode, EPA Method SW8270C SIM.
- Semivolatile Organic Compounds (SVOCs) by gas chromatography/mass spectroscopy using full scan, large volume injection (LVI) mode, EPA Method SW8270C.
- Organochlorine Pesticides by gas chromatography, EPA Method SW8081A.
- Polychlorinated Biphenyls (PCBs) by gas chromatography, EPA Method SW8082.

Chemistry samples were collected April 28, 2001 through May 5, 2001. Columbia Analytical Services, Inc. (CAS) performed the analyses, at their Kelso, Washington laboratory.

A summary of samples submitted for analysis is provided in Table 1.

Table C-1
Summary of Samples

Analyses	Total Solids	Total Volatile Solids	Total Organic Carbon	Total Sulfides	Ammonia	Total Metals	Polynuclear Aromatic Hydrocarbons	Volatile Organic Compounds	Semivolatile Organic Compounds	Pesticides	PCBs
Sediment Samples	45	45	45	45	45	45	41	4	4	4	4
Field Dups (Splits)	5	5	5	5	5	5	5				
Field Laterals	5	5	5	5	5	5	5				
Field Blanks						5	5				
Equipment Blanks						5	5				
MS/MSDs			5	4	5	4	4	1	1	1	1

Samples were analyzed in accordance with EPA *Test Methods for Evaluating Solid Waste Physical/Chemical Methods*, SW-846, Third Edition (USEPA, 1999b); EPA *Methods for Chemical Analysis for Water and Wastes* (USEPA, 1983b); *Annual Book of American Society for Testing and Materials (ASTM) Standards, Water, Volume 11.01* (ASTM 1993) and. *Procedures for Handling and Chemical Analysis of Sediment and Water Samples* (1981) Plumb, R. H., Jr.

The laboratory was required to provide a hard copy deliverable including method and project specific QC and a digital deliverable in an Excel flat file format. Sample results were reported to the laboratory method detection limit (MDL), in order to meet project specific detection levels. Standard laboratory flagging was included in the deliverables. Data reviewer flags are preceded with a "V". The lists of standard laboratory qualifiers are included in this report as Attachment 1.

The data review focuses on criteria for the following QA/QC parameters and their overall effect on the data:

- Sample handling (chain-of-custody);
- Holding time compliance;
- Field QA/QC (equipment rinse blanks, field blanks, field duplicates);
- Calibration verification and laboratory control samples;
- Method reporting limits;
- Method blanks;
- Surrogates;
- Analytical methods;
- Precision and accuracy; and
- Completeness.

2.0 SAMPLE HANDLING (CHAIN-OF-CUSTODY)

URS Radian field personnel shipped all samples via Alaska Airlines Goldstreak to Portland, OR. The samples were delivered by courier to the CAS laboratory in Kelso, Washington.

Hard copy Chain of Custody (COC) forms were utilized for the entirety of the project. Cooler receipt forms, documenting sample condition and temperature, were completed at upon receipt at the laboratory.

Final sample login information, COC(s) and cooler receipt forms were faxed to the URS Radian, Anchorage, Alaska office by CAS.

Chain-of-custody (COC), cooler receipt forms and laboratory case narratives were provided in the final reports and were reviewed to determine if any sample handling procedures possibly affected the integrity of the samples and the quality of the resulting data.

All of sample containers were received at CAS intact and within the required 4° ± 2° C temperature range. Temperatures are documented on the individual cooler receipt forms.

All of the COCs were signed and dated as relinquished by the field personnel and as received by the laboratory. In two (2) sample shipments, requested analyses were omitted on the COC(s). The omitted analyses were confirmed by CAS with the URS Project Chemist prior to sample preparation and analysis. The cooler containing the first sets of equipment and field blanks submitted, was documented by the laboratory with no custody seals present. The field personnel confirmed that custody seals were placed on all coolers. The custody seals may have been taped over and not identified upon receipt by the laboratory, in this instance. The discrepancies/non-conformities documented do not affect the integrity of the samples, or the quality of the resulting data.

3.0 HOLDING TIME COMPLIANCE

All samples were extracted and/or analyzed within the recommended hold time for the analytical procedures utilized for this project.

4.0 FIELD QA/QC

Field QA/QC protocol is designed to monitor possible contamination during collection and transport and the accuracy and precision of the samples collected in the field.

For this project, field blanks, equipment blanks and field duplicates were submitted for analysis.

Collection and analysis of field duplicates allows for a measurement of precision that takes into account variables such as field sampling and laboratory analysis techniques.

4.1 Field Blanks

Field blanks, associated with the collection of the sediment samples, were taken and submitted to the laboratory for analysis. Purchased water was opened at the core sampling location, transferred to a laboratory-supplied container and submitted for analysis. Field blanks were submitted for total metals and PAH analysis. Refer to Table 1 for the number of field blanks and analyses requested.

A summary of field blank results, above the method reporting limit (MRL), is provided in Table 2. Barium, calcium, chromium and manganese were detected above the MRL in all five field blanks submitted. Iron was detected in two and lead in one of the field blanks. The results indicate possible low level contamination present in the purchased water and/or the water sample containers. The field blank results are significantly lower than the metal levels reported in the submitted sediment samples and should not affect data quality.

4.2 Equipment Rinse Blanks

Equipment blanks, associated with the collection of the sediment samples, were taken and submitted to the laboratory for analyses. Purchased water was used as a final rinse of sampling equipment, transferred to a laboratory-supplied container and submitted for analysis. Equipment blanks were submitted for total metals and PAH analysis. Refer to Table 1 for the number of equipment blanks and analyses requested.

A summary of equipment blank results, above the method reporting limit (MRL), is provided in Table 3. Barium, calcium, chromium and manganese were detected above the MRL in all five equipment blanks submitted, attributable in part to the low level contamination also present in the field blanks (Section 4.2).

Antimony, copper, iron, lead and nickel were also detected in some, but not all, of the submitted equipment blanks. Additionally, naphthalene and 2-methylnaphthalene were reported above the MRL in three of the five equipment blanks. All of the equipment blank results are significantly lower than the levels reported in the submitted sediment samples and should not affect data quality.

4.3 Field Duplicates (Splits)

Field duplicates were collected for the sediment samples and submitted to the laboratory blind for analyses. The field duplicates were separate samples, collected from the same core and submitted for analysis. Refer to Table 1 for the specific number of field duplicates and/or analyses requested.

Field duplicate data are summarized in the tables included as Attachment 2.

Field duplicates compared satisfactorily to their corresponding samples for this project. Guidelines recommended by the Army Corps of Engineers indicate a disagreement exists if there is a two times difference in the results reported, and a major disagreement exists if a three times difference exists.

The summary tables included as Attachment 2 include a Relative Percent Difference (RPD) precision calculation for the original sample and field duplicate results. A RPD greater than 66.7 equates to greater than two times disagreement and greater than 100 equates to greater than three times disagreement.

Table 2

Field Blank Summary

Sample ID	Sample Date	Method	Analyte	Sample Result	MRL	Units	Data Flag
U01-LIB01-FB1	04/30/2001	6020	Barium, Total	0.201	0.02	ug/L	
U01-LIB01-FB1	04/30/2001	6010B	Calcium, Total	123	50	ug/L	
U01-LIB01-FB1	04/30/2001	6020	Chromium, Total	0.52	0.2	ug/L	
U01-LIB01-FB1	04/30/2001	6010B	Iron, Total	49.4	20	ug/L	
U01-LIB01-FB1	04/30/2001	6020	Manganese, Total	0.14	0.05	ug/L	
U01-LIB01-FB2	05/01/2001	6020	Barium, Total	0.205	0.02	ug/L	
U01-LIB01-FB2	05/01/2001	6010B	Calcium, Total	140	50	ug/L	
U01-LIB01-FB2	05/01/2001	6020	Chromium, Total	0.5	0.2	ug/L	
U01-LIB01-FB2	05/01/2001	6010B	Iron, Total	39.3	20	ug/L	
U01-LIB01-FB2	05/01/2001	6020	Manganese, Total	0.14	0.05	ug/L	
U01-LIB01-FB3	05/02/2001	6020	Barium, Total	0.17	0.02	ug/L	
U01-LIB01-FB3	05/02/2001	6010B	Calcium, Total	105	50	ug/L	
U01-LIB01-FB3	05/02/2001	6020	Chromium, Total	0.5	0.2	ug/L	
U01-LIB01-FB3	05/02/2001	6020	Lead, Total	0.04	0.02	ug/L	
U01-LIB01-FB3	05/02/2001	6020	Manganese, Total	0.09	0.05	ug/L	
U01-LIB01-FB4	05/03/2001	6020	Barium, Total	0.18	0.02	ug/L	
U01-LIB01-FB4	05/03/2001	6010B	Calcium, Total	103	50	ug/L	
U01-LIB01-FB4	05/03/2001	6020	Chromium, Total	0.5	0.2	ug/L	
U01-LIB01-FB4	05/03/2001	6020	Manganese, Total	0.1	0.05	ug/L	
U01-LIB01-FB5	05/06/2001	6020	Barium, Total	0.303	0.02	ug/L	
U01-LIB01-FB5	05/06/2001	6010B	Calcium, Total	175	50	ug/L	
U01-LIB01-FB5	05/06/2001	6020	Chromium, Total	0.59	0.2	ug/L	
U01-LIB01-FB5	05/06/2001	6020	Manganese, Total	0.28	0.05	ug/L	

Table 3

Equipment Blank Summary

Sample ID	Sample Date	Method	Analyte	Sample Result	MRL	Units	Data Flag
U01-LIB01-EB1	04/29/01	6020	Barium, Total	0.36	0.02	ug/L	
U01-LIB01-EB1	04/29/01	6010B	Calcium, Total	266	50	ug/L	
U01-LIB01-EB1	04/29/01	6020	Chromium, Total	0.77	0.2	ug/L	
U01-LIB01-EB1	04/29/01	6020	Copper, Total	3.66	0.1	ug/L	
U01-LIB01-EB1	04/29/01	6010B	Iron, Total	176	20	ug/L	
U01-LIB01-EB1	04/29/01	6020	Manganese, Total	1.82	0.05	ug/L	
U01-LIB01-EB1	04/29/01	6020	Nickel, Total	0.31	0.2	ug/L	
U01-LIB01-EB1	04/29/01	8270C SIM	Naphthalene	0.024	0.02	ug/L	
U01-LIB01-EB1	04/29/01	8270C SIM	2-Methylnaphthalene	0.031	0.02	ug/L	
U01-LIB01-EB2	04/30/01	6020	Barium, Total	0.227	0.02	ug/L	
U01-LIB01-EB2	04/30/01	6010B	Calcium, Total	195	50	ug/L	
U01-LIB01-EB2	04/30/01	6020	Chromium, Total	0.56	0.2	ug/L	
U01-LIB01-EB2	04/30/01	6020	Copper, Total	0.38	0.1	ug/L	
U01-LIB01-EB2	04/30/01	6010B	Iron, Total	68.5	20	ug/L	
U01-LIB01-EB2	04/30/01	6020	Manganese, Total	0.71	0.05	ug/L	
U01-LIB01-EB2	04/30/01	6020	Nickel, Total	0.27	0.2	ug/L	
U01-LIB01-EB3	05/02/01	6020	Barium, Total	0.28	0.02	ug/L	
U01-LIB01-EB3	05/02/01	6010B	Calcium, Total	200	50	ug/L	
U01-LIB01-EB3	05/02/01	6020	Chromium, Total	0.6	0.2	ug/L	
U01-LIB01-EB3	05/02/01	6010B	Iron, Total	43.1	20	ug/L	
U01-LIB01-EB3	05/02/01	6020	Manganese, Total	0.9	0.05	ug/L	
U01-LIB01-EB3	05/02/01	8270C SIM	Naphthalene	0.027	0.02	ug/L	
U01-LIB01-EB3	05/02/01	8270C SIM	2-Methylnaphthalene	0.027	0.02	ug/L	
U01-LIB01-EB4	05/02/01	6020	Barium, Total	0.51	0.02	ug/L	
U01-LIB01-EB4	05/02/01	6010B	Calcium, Total	179	50	ug/L	
U01-LIB01-EB4	05/02/01	6020	Chromium, Total	0.5	0.2	ug/L	
U01-LIB01-EB4	05/02/01	6020	Copper, Total	0.4	0.2	ug/L	
U01-LIB01-EB4	05/02/01	6010B	Iron, Total	97.3	20	ug/L	
U01-LIB01-EB4	05/02/01	6020	Lead, Total	0.05	0.02	ug/L	
U01-LIB01-EB4	05/02/01	6020	Manganese, Total	1.07	0.05	ug/L	
U01-LIB01-EB4	05/02/01	6020	Nickel, Total	0.3	0.2	ug/L	
U01-LIB01-EB5	05/05/01	6020	Antimony, Total	0.025	0.02	ug/L	
U01-LIB01-EB5	05/05/01	6020	Barium, Total	0.215	0.02	ug/L	
U01-LIB01-EB5	05/05/01	6010B	Calcium, Total	123	50	ug/L	
U01-LIB01-EB5	05/05/01	6020	Chromium, Total	0.48	0.2	ug/L	
U01-LIB01-EB5	05/05/01	6020	Manganese, Total	0.14	0.05	ug/L	
U01-LIB01-EB5	05/05/01	6020	Nickel, Total	0.23	0.2	ug/L	
U01-LIB01-EB5	05/05/01	8270C SIM	Naphthalene	0.021	0.019	ug/L	

All of the field duplicate had results with less than a difference of two, except for the following:

- Samples U01-LIB01-AT02C/-AT02CS, the Total Organic Carbon (TOC) results differed by a factor of 2.3. The difference is likely attributable to sample non-homogeneity, and should not impact the data quality.

4.3 Field Laterals

Field laterals were collected for the sediment samples and submitted to the laboratory blind for analyses. The lateral samples were collected from an independent core, from a soil boring located approximately five feet from the original boring. Refer to Table 1 for the specific number of field laterals and/or analyses requested.

Field lateral data are summarized in the tables included as Attachment 3.

Several of the field lateral samples had analyte results with a difference greater than two. The disparity is attributable to changes in the lithology, to the heterogeneous nature of the matrix and to sampling from a separate core. The differences in the field lateral results do not impact data quality.

All of the field lateral had results with less than a difference of three, except for the following:

- Four of the five results for Sulfide by method SW9030M differed by more than a factor of three. The difference is likely attributable to sample non-homogeneity and/or the reactivity of sulfide, and should not impact the data quality.

5.0 LABORATORY QA/QC

5.1 Calibration Verification

Initial and continuing calibration verification standards are analyzed to monitor laboratory instrument performance prior to, during and concluding sample analysis. The laboratory SOPs must specify these ranges of standards in accordance with the associated EPA method used for the analysis. The laboratory is required to report any discrepancies and the effect on project samples. The laboratory reported no calibration verification discrepancies.

5.2 Laboratory Control Samples

Laboratory Control Samples and Laboratory Control Sample Duplicates (LCS/LCSD) are prepared in the laboratory by spiking a clean matrix (*e.g.* DI water, Ottawa sand) with a known concentration of target analyte. These samples are processed with a batch of 20 or less field samples. LCS/LCSD samples are calculated for accuracy, by percent recovery (%R), and precision, by relative percent difference (RPD). LCS/LCSD %R and RPD are evaluated against laboratory specified acceptance ranges to monitor if the analytical method was in control.

Cases where the LCS and/or LCSD were outside of the specified acceptance ranges are documented below:

- For CAS report K2103224, the LCS recovery of Bis(2-ethylhexyl)phthalate was above the specified acceptance range. The associated sample results were Non-Detect (ND) above the Method Reporting Limit (MRL), no validator flag was applied. The expected bias was high and the sample results were ND, therefore, the data quality should not be impacted. According to the CAS case narrative, the samples were re-extracted and analyzed. The re-analyses confirmed the original results, therefore, only the original results were reported.
- For CAS report K2103224, the LCS recovery of Benzoic acid was below the specified acceptance range. The benzoic acid results in the associated samples are qualified with a "VLL" flag. The flag is added by the reviewer to indicate the results may be biased low based on the LCS recovery. According to the CAS case narrative, the samples were re-extracted and analyzed. The re-analyses confirmed the original results, therefore, only the original results were reported.
- For CAS report K2103262, the percent recoveries and RPD's in the LCSD, for the majority of the PAH analytes by method 8270C SIM, were above the specified acceptance range. The associated samples were the final set of equipment and field blanks submitted. The sample results were Non-Detect (ND) above the Method Reporting Limit (MRL), no validator flag was applied. The expected bias was high and the sample results were ND, therefore, the data quality should not be impacted.

5.3 Matrix Spike/Matrix Spike Duplicate Samples

Matrix Spike and Matrix Spike Duplicate (MS/MSD) samples are prepared in the laboratory by spiking an aliquot of the submitted field sample with a known concentration of target analyte. These samples are processed with a batch of 20 or less field samples. MS/MSD samples are calculated for accuracy, by percent recovery (%R), and precision, by relative percent difference (RPD). MS/MSD %R and RPD are evaluated against laboratory specified acceptance ranges to monitor the accuracy and precision of the analytical method for the submitted matrix.

URS Radian personnel identified MS/MSD analyses on specified field samples, on the submitted COC. Refer to Table 1 for the specific number of MS/MSDs and/or analyses reported for the project.

MS/MSD data are summarized in the tables included as Attachment 4. Cases where the MS and/or MSD were outside of the specified acceptance ranges are documented below:

- For CAS report K2103054, the percent recovery (%R) of Iron in the MS of sample U01-LIB01-AT01C was below the specified acceptance range. The spike concentration for the analyte was less than four times (<4x) that present in the sample. No validator flag was applied. High levels of target analyte contamination in the parent sample interfere with accurate %R calculation; therefore, the data quality should not be impacted.
- For CAS report K2103140, the percent recovery (%R) of Iron (Fe) in the MS of sample U01-LIB01-AT03DB was below the specified acceptance range. The spike concentration for the analyte was less than four times (<4x) that present in the sample. No validator flag was

applied. High levels of target analyte contamination in the parent sample interfere with accurate %R calculation; therefore, the data quality should not be impacted.

- The MS %R of Antimony (Sb) U01-LIB01-AT03DB was below the specified acceptance range. The low recovery of Sb is attributable to sorption of the metal to particulates in the sediment. The method SW3050B digestion procedure is not rigorous enough to bring all of the Sb back into solution. The associated sample analytes are qualified with a "VML" flag. The flag is added by the reviewer to indicate the results may be biased low based on the MS recoveries.
- For CAS report K2103207, the percent recovery (%R) of Iron (Fe) and Manganese (Mn) in the MS of sample U01-LIB01-BT04B was below the specified acceptance range. The spike concentration for the analyte was less than four times (<4x) that present in the sample. No validator flag was applied. High levels of target analyte contamination in the parent sample interfere with accurate %R calculation; therefore, the data quality should not be impacted.
- The MS %R of Antimony (Sb) U01-LIB01-BT04B was below the specified acceptance range. The low recovery of Sb is attributable to sorption of the metal to particulates in the sediment. The method SW3050B digestion procedure is not rigorous enough to bring all of the Sb back into solution. The associated sample analytes are qualified with a "VML" flag. The flag is added by the reviewer to indicate the results may be biased low based on the MS recoveries.
- For CAS report K2103226, the percent recovery (%R) of Iron (Fe) in the MS of sample U01-LIB01-CT01A was below the specified acceptance range. The spike concentration for the analyte was less than four times (<4x) that present in the sample. No validator flag was applied. High levels of target analyte contamination in the parent sample interfere with accurate %R calculation; therefore, the data quality should not be impacted.
- The MS %R of Antimony (Sb) U01-LIB01-CT01A was below the specified acceptance range. The %R of Sb in the LCS was also low (36%), however, within laboratory specified limits. The low recovery of Sb is attributable to sorption of the metal to particulates in the sediment. The method SW3050B digestion procedure is not rigorous enough to bring all of the Sb back into solution. The associated sample analytes are qualified with a "VML" flag. The flag is added by the reviewer to indicate the results may be biased low based on the MS recoveries.

9.1 Laboratory Duplicate Samples

Laboratory duplicates are repeated, independent determinations of the same sample, by the same analyst, at essentially the same time, and under the same conditions. The sample is split in the laboratory and each fraction is carried through all stages of sample preparation and analysis. Duplicate analyses measure the precision of each analytical method. Laboratory duplicate analyses are performed for 10 percent of samples analyzed, or at least one per day, for analytical methods not requiring MS/MSD. Laboratory duplicates were reported for the following analyses; ammonia, sulfide, total metals (SW6010B/SW6020), total organic carbon (TOC), total solids and total volatile solids. All laboratory duplicate results were within an agreement factor of two.

Laboratory duplicate data are summarized in the tables included as Attachment 4. Cases where the duplicates were outside of the laboratory specified acceptance ranges are documented below:

- For CAS report K2103054, the relative percent difference (RPD) for Barium (Ba) in the duplicate of sample U01-LIB01-AT01C was above the specified acceptance limit. The difference is attributable to the heterogeneous nature of the sample matrix. No validator flag was applied. The data quality should not be impacted.
- The RPD for total volatile solids in the duplicate of sample U01-LIB01-AT01CS was above the specified acceptance limit. The difference is attributable to the heterogeneous nature of the sample matrix. No validator flag was applied. The data quality should not be impacted.
- For CAS report K2103207, the relative percent difference (RPD) for sulfide in the duplicate of sample U01-LIB01-BT04B was above the specified acceptance limit. The difference is attributable to the heterogeneous nature of the sample matrix. No validator flag was applied. The data quality should not be impacted.
- For CAS report K2103226, the relative percent difference (RPD) for ammonia in the duplicate of sample U01-LIB01-CT01A was above the specified acceptance limit. The difference is attributable to the heterogeneous nature of the sample matrix. No validator flag was applied. The data quality should not be impacted.
- The RPD for total mercury in the duplicate of sample U01-LIB01-CT01A was above the specified acceptance limit. The results for bot the original and duplicate sample were near the MRL (0.02 mg/Kg), attributing to the increased variability. No validator flag was applied. The data quality should not be impacted.

6.0 METHOD REPORTING LIMITS

Method Reporting Limits (MRLs) were determined by multiplying the method detection limit by a factor of generally three to five. For this project, methods were selected that could provide project specific detection limits. Results are reported down to the laboratory MDL. MRLs were adjusted by the laboratory for sample weight/volume, percent solids, dilutions, matrix interference, etc. Reported results, which are greater than the MDL but less than the MRL were flagged by the laboratory as applicable and should be considered estimates.

7.0 METHOD BLANKS

Method blanks are clean matrices, extracted and analyzed concurrent with a batch of 20 or less samples for each of the analytical procedures performed for this project. These samples are prepared in the laboratory in conjunction with project samples to monitor for contamination during the analytical procedure performed in the laboratory. A measured result above the MRL in a method blank would indicate a laboratory method control problem that could affect data quality. For this project, method blanks were tested at the required frequency. Method blanks reported for the project did not contain target analyte results above the laboratory MRL.

8.0 SURROGATES

Surrogates are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to those tested that are added to each sample tested before the extraction step of the procedure. Subsequent measurements of surrogate compounds indicate overall method performance for each sample. Organic methods SW8081A, SW8082, SW8260B, SW8270C and SW8270C SIM utilize this technique. Samples diluted (usually by a factor of five or more prior to analysis); due to high analyte concentration or matrix interference, result in reduced surrogate concentration. The accuracy of surrogates measured at these levels is impacted and should not necessarily be compared to limit ranges developed for the method

Cases where the surrogate recoveries were outside of the specified acceptance ranges are documented below:

- For CAS report K2103224, one of the method 8270C surrogates, Terphenyl-d14, in the LCS, MS and in samples U01-LIB01-AS01, -AS02, -AS03, -AS04, had reported recoveries above the laboratory specified acceptance range. According to the CAS case narrative, the anomaly was traced to a concentrated surrogate spike solution. The samples were re-extracted and analyzed for confirmation. The surrogate recoveries in the re-analyses were within limits and the results confirmed the initial results. The initial results only were reported. The associated sample results were Non-Detect (ND) or estimated values between the MDL and MRL (J). No validator flags were applied. The expected bias was high and the sample results were ND above the MRL, therefore, the data quality should not be impacted.

9.0 ANALYTICAL METHODS

The following subsections summarize the analytical methods utilized for the project.

9.1 Subsurface Sediments

Subsurface sediment samples were analyzed by the laboratory utilizing the following methods:

- Total Solids by EPA Method E160.3 (Modified).
- Total Volatile Solids by EPA Method E160.4 (Modified).
- Total Organic Carbon (TOC), by ASTM Method 4129-82 (Modified).
- Total Sulfides by EPA Method SW9030 (Modified).
- Ammonia by Method Plumb 1981
- Total Metals by EPA Method SW6010B and EPA Method SW6020.
- Total Mercury by EPA Methods SW7470A and SW7471A.
- Polynuclear aromatic hydrocarbons (PAHs) by EPA Method SW8270C SIM.

QA/QC criteria were met for the listed methods, except as noted in the previous sections.

9.2 Surface Sediments

Surface sediment samples were analyzed by the laboratory utilizing all of the methods listed for subsurface sediments (except PAH by 8270C SIM) and the following methods:

- Volatile Organic Compounds (VOCs) by EP) Methods SW5035 and SW8260B.
- Semivolatile Organic Compounds (SVOCs) by EPA Method SW8270C.
- Organochlorine Pesticides EPA Method SW8081A.
- Polychlorinated Biphenyls (PCBs) by EPA Method SW8082.

QA/QC criteria were met for the listed methods, except as noted in the previous sections.

10.0 ACCURACY AND PRECISION

Accuracy criteria monitor agreement of measured results with "true values" as determined by the analytical spike recovery project samples. Accuracy was measured for this project by the analysis of LCS/LCSD (see Section 5.2), and MS/MSD (see Section 5.3) analyses. Accuracy measurements that were outside of the laboratory specified ranges are qualified appropriately.

Precision criteria monitor analytical reproducibility. Precision was measured by the analysis of sample duplicates (field and laboratory), MS duplicates (MSD), and/or LCS duplicates (LCSD). Precision measurements that were above the laboratory specified limit are qualified appropriately.

11.0 COMPLETENESS

The percentage of valid results is reported as completeness. Completeness is calculated after the QC data have been evaluated and the results applied to the measurement data. In addition to results identified as being outside of the QC limits established for a method, broken or spilled samples, or samples that could not be analyzed for any other reason, are included in the assessment of completeness. Only sample results totally rejected are considered invalid for the calculation of completeness. There were no rejected sample results for the project. The completeness goals for the project were met.

12.0 REFERENCES

USEPA, 1986. *Test Methods for Evaluating Solid Waste*, SW-846, Third Edition.

Attachment 1

Standard Laboratory Data Qualifiers

Qualifier Type	Symbol	Definition
Inorganic	*	The result is an outlier. See case narrative.
Inorganic	#	The control limit criteria is not applicable. See case narrative.
Inorganic	B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
Inorganic	E	The result is an estimate amount because the value exceeded the instrument calibration range.
Inorganic	J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
Inorganic	U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
Inorganic	i	The MRL/MDL has been elevated due to a matrix interference.
Inorganic	X	See case narrative.
Metals	#	The control limit criteria is not applicable. See case narrative.
Metals	B	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
Metals	E	The reported value is estimated because of the presence of matrix interference.
Metals	M	The duplicate injection precision was not met.
Metals	N	The Matrix Spike sample recovery is not within control limits. See case narrative.
Metals	S	The reported value was determined by the Method of Standard Additions (MSA).
Metals	U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL.
Metals	W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
Metals	i	The MRL/MDL has been elevated due to a matrix interference.
Metals	X	See case narrative.
Metals	*	The duplicate analysis is not within control limits. See case narrative.
Metals	+	The correlation coefficient for the MSA is less than 0.995.

Standard Laboratory Data Qualifiers (continued)

Organic	*	The result is an outlier. See case narrative.
Organic	#	The control limit criteria is not applicable. See case narrative.
Organic	A	A tentatively identified compound, a suspected aldol-condensation product.
Organic	B	The analyte was found in the associated method blank at a level that is significant relative to the sample result.
Organic	C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
Organic	D	The reported result is from a dilution.
Organic	E	The result is an estimate amount because the value exceeded the instrument calibration range.
Organic	J	The result is an estimated concentration that is less than the MRL but greater than or equal to the MDL.
Organic	N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
Organic	P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results (25% for CLP Pesticides).
Organic	U	The compound was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL[*].
Organic	i	The MRL/MDL has been elevated due to a chromatographic interference.
Organic	X	See case narrative.
PHC Specific	F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
PHC Specific	L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
PHC Specific	H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
PHC Specific	O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
PHC Specific	Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
PHC Specific	Z	The chromatographic fingerprint does not resemble a petroleum product.

Attachment 2

Field Duplicate Data

Field Duplicate Results

Sample Name	Sample Dup Name	Sample Date	Sample Description	Method	Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	160.3M	Solids, Total	71.9	71.6	PERCENT	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	160.4M	Solids, Total Volatile	4.32	4.33	PERCENT	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	PLUMB NH3S1	Ammonia as Nitrogen	3	3.7	mg/Kg	21
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	3.3	2.62	PERCENT	23
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	9030M	Sulfide	44.1	50.9	mg/Kg	14
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Naphthalene	7	7.1	ug/Kg	1
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	2-Methylnaphthalene	14	15	ug/Kg	7
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Dibenzofuran	3	3	ug/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Fluorene	3	3	ug/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Phenanthrene	16	16	ug/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Fluoranthene	4	7	ug/Kg	55
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Pyrene	4	4	ug/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Benz(a)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Chrysene	7.4	7.6	ug/Kg	3
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Benzo(b)fluoranthene	4	4	ug/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	1	1	ug/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	3	3	ug/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Antimony, Total	0.21	0.17	mg/Kg	21
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Arsenic, Total	9.9	6.5	mg/Kg	41
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Barium, Total	47.9	40.4	mg/Kg	17
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Cadmium, Total	0.21	0.23	mg/Kg	9
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6010B	Calcium, Total	67100	63900	mg/Kg	5
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Chromium, Total	14.2	13.6	mg/Kg	4
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Copper, Total	12.7	11.8	mg/Kg	7
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6010B	Iron, Total	18600	19100	mg/Kg	3
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Lead, Total	7.33	7.11	mg/Kg	3
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6010B	Manganese, Total	196	229	mg/Kg	16
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	7471A	Mercury, Total	0.04	0.04	mg/Kg	0
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Nickel, Total	18.2	18.5	mg/Kg	2
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Silver, Total	0.105	0.109	mg/Kg	4
U01-LIB01-AT02A	U01-LIB01-AT02AS	04/28/01	Sediment	6020	Zinc, Total	50.7	51.2	mg/Kg	1

Field Duplicate Results

Sample Name	[illegible]	[illegible]	[illegible]	[illegible]	Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	160.3M	Solids, Total	45	43.7	PERCENT	3
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	160.4M	Solids, Total Volatile	23.6	26.4	PERCENT	11
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	PLUMB NH3S1	Ammonia as Nitrogen	95	96.5	mg/Kg	2
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	14.7	13.4	PERCENT	9
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	9030M	Sulfide	210	183	mg/Kg	14
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Naphthalene	13	13	ug/Kg	0
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	2-Methylnaphthalene	19	17	ug/Kg	11
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Dibenzofuran	4	5	ug/Kg	22
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Fluorene	4	5	ug/Kg	22
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Phenanthrene	26	24	ug/Kg	8
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Anthracene	ND	6	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Fluoranthene	9	10	ug/Kg	11
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Pyrene	10	10	ug/Kg	0
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Benz(a)anthracene	ND	6	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Chrysene	13	16	ug/Kg	21
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Benzo(b)fluoranthene	5	9	ug/Kg	57
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	ND	5	ug/Kg	NA
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Antimony, Total	0.31	0.34	mg/Kg	9
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Arsenic, Total	12.8	12.7	mg/Kg	1
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Barium, Total	73.1	85.2	mg/Kg	15
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Cadmium, Total	1.12	1.12	mg/Kg	0
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6010B	Calcium, Total	30200	31900	mg/Kg	5
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Chromium, Total	21.4	23.3	mg/Kg	9
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Copper, Total	41.2	40.4	mg/Kg	2
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6010B	Iron, Total	26900	29600	mg/Kg	10
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Lead, Total	13.3	14.6	mg/Kg	9
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6010B	Manganese, Total	324	353	mg/Kg	9
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	7471A	Mercury, Total	0.08	0.09	mg/Kg	12
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Nickel, Total	35.3	34.9	mg/Kg	1
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Silver, Total	0.267	0.297	mg/Kg	11
U01-LIB01-AT02B	U01-LIB01-AT02BS	04/28/01	Sediment	6020	Zinc, Total	99.8	99.6	mg/Kg	0

Field Duplicate Results

[illegible] Sample Name	[illegible] Sample Dup Name	Sample Date	Sample [illegible]	[illegible] Method	Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	160.3M	Solids, Total	79.6	80	PERCENT	1
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	160.4M	Solids, Total Volatile	2.47	2.18	PERCENT	12
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	PLUMB NH3S1	Ammonia as Nitrogen	22.8	19.5	mg/Kg	16
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	2.39	1.04	PERCENT	79
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	9030M	Sulfide	69.6	100	mg/Kg	36
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Naphthalene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	2-Methylnaphthalene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Dibenzofuran	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Fluorene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Phenanthrene	4	5	ug/Kg	22
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Fluoranthene	2	4	ug/Kg	67
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Pyrene	ND	5	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Benz(a)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Chrysene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Benzo(b)fluoranthene	ND	2	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	ND	0.9	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	ND	ND	ug/Kg	NA
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Antimony, Total	0.14	0.12	mg/Kg	15
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Arsenic, Total	3.5	3.7	mg/Kg	6
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Barium, Total	64.9	61.5	mg/Kg	5
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Cadmium, Total	0.19	0.24	mg/Kg	23
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6010B	Calcium, Total	59900	63900	mg/Kg	6
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Chromium, Total	10	10.3	mg/Kg	3
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Copper, Total	6.82	9.36	mg/Kg	31
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6010B	Iron, Total	12600	13400	mg/Kg	6
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Lead, Total	4.65	4.61	mg/Kg	1
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6010B	Manganese, Total	255	329	mg/Kg	25
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	7471A	Mercury, Total	0.01	0.01	mg/Kg	0
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Nickel, Total	12.9	13.9	mg/Kg	7
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Silver, Total	0.043	0.046	mg/Kg	7
U01-LIB01-AT02C	U01-LIB01-AT02CS	04/28/01	Sediment	6020	Zinc, Total	30.6	35.9	mg/Kg	16

Field Duplicate Results

Sample Name	Sample Dup Name	Sample [illegible]	Sample [illegible]	Method	[illegible] Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	160.3M	Solids, Total	69.2	75.8	PERCENT	9
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	160.4M	Solids, Total Volatile	6.2	3.43	PERCENT	58
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	PLUMB NH3S1	Ammonia as Nitrogen	33.5	28.2	mg/Kg	17
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	2.35	2.58	PERCENT	9
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	9030M	Sulfide	894	753	mg/Kg	17
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Naphthalene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	2-Methylnaphthalene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Dibenzofuran	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Fluorene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Phenanthrene	4	3	ug/Kg	29
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Benz(a)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Chrysene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Benzo(b)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	ND	ND	ug/Kg	NA
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Antimony, Total	0.16	0.19	mg/Kg	17
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Arsenic, Total	5.9	5.6	mg/Kg	5
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Barium, Total	70.1	57.4	mg/Kg	20
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Cadmium, Total	0.2	0.21	mg/Kg	5
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6010B	Calcium, Total	49600	41600	mg/Kg	18
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Chromium, Total	11.2	9.59	mg/Kg	15
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Copper, Total	9.21	7.87	mg/Kg	16
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6010B	Iron, Total	13600	11900	mg/Kg	13
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Lead, Total	5.03	4.47	mg/Kg	12
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6010B	Manganese, Total	275	225	mg/Kg	20
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	7471A	Mercury, Total	0.02	0.02	mg/Kg	0
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Nickel, Total	14	13.6	mg/Kg	3
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Silver, Total	0.057	0.056	mg/Kg	2
U01-LIB01-AT02D	U01-LIB01-AT02DS	04/28/01	Sediment	6020	Zinc, Total	32	30.4	mg/Kg	5

Field Duplicate Results

[illegible] Sample Name	[illegible] Sample Dup Name	Sample [illegible]	Sample [illegible]	[illegible] Method	[illegible] Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	160.3M	Solids, Total	78	79.6	PERCENT	2
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	160.4M	Solids, Total Volatile	6.45	5.78	PERCENT	11
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	9030M	Sulfide	2330	1760	mg/Kg	28
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	5.45	4.5	PERCENT	19
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	Plumb NH3S1	Ammonia as Nitrogen	12.1	13.1	mg/Kg	8
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Antimony, Total	0.11	0.08	mg/Kg	32
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Arsenic, Total	6.6	4.7	mg/Kg	34
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Barium, Total	68	48.3	mg/Kg	34
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Cadmium, Total	0.36	0.32	mg/Kg	12
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6010B	Calcium, Total	22100	18800	mg/Kg	16
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Chromium, Total	12.6	13	mg/Kg	3
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Copper, Total	13	15	mg/Kg	14
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6010B	Iron, Total	23300	20100	mg/Kg	15
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Lead, Total	8.52	8.6	mg/Kg	1
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6010B	Manganese, Total	320	238	mg/Kg	29
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	7470A	Mercury, Total	0.04	0.03	mg/Kg	29
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Nickel, Total	19.5	18.2	mg/Kg	7
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Silver, Total	0.11	0.09	mg/Kg	20
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	6020	Zinc, Total	57.3	55	mg/Kg	4
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Naphthalene	5	4	ug/Kg	22
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	2-Methylnaphthalene	12	11	ug/Kg	9
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Dibenzofuran	4	3	ug/Kg	29
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Fluorene	4	3	ug/Kg	29
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Phenanthrene	20	18	ug/Kg	11
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Fluoranthene	6	6	ug/Kg	0
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Pyrene	8.6	6.7	ug/Kg	25
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Benz(a)anthracene	2	3	ug/Kg	40
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Chrysene	15	13	ug/Kg	14
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Benzo(b)fluoranthene	11	6	ug/Kg	59
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	2	2	ug/Kg	0
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-CT01D	U01-LIB01-CT01DS	05/03/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	6	6	ug/Kg	0

Attachment 3

Field Lateral Data

Field Lateral Results

Sample Name	Sample Dup Name	Sample Date	Sample Description	Method	Analytes	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	160.3M	Solids, Total	54.6	70.4	PERCENT	25
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Naphthalene	28	13	ug/Kg	73
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	2-Methylnaphthalene	52	26	ug/Kg	67
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Dibenzofuran	13	6	ug/Kg	74
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Fluorene	5	3	ug/Kg	50
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Phenanthrene	52	31	ug/Kg	51
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Fluoranthene	14	7.2	ug/Kg	64
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Pyrene	14	8.6	ug/Kg	48
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Benz(a)anthracene	5	3	ug/Kg	50
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Chrysene	22	13	ug/Kg	51
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Benzo(b)fluoranthene	12	7.4	ug/Kg	47
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Benzo(a)pyrene	5	ND	ug/Kg	NA
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	2	1	ug/Kg	67
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	8	4	ug/Kg	67
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	160.4M	Solids, Total Volatile	12.9	5.45	PERCENT	81
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	Plumb NH3S1	Ammonia as Nitrogen	83.6	83.6	mg/Kg	0
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	9030M	Sulfide	628	1900	mg/Kg	101
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	8.58	4.22	PERCENT	68
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Antimony, Total	0.19	0.15	mg/Kg	24
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Arsenic, Total	15.2	10.1	mg/Kg	40
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6010B	Barium, Total	48.9	44.2	mg/Kg	10
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Cadmium, Total	0.65	0.34	mg/Kg	63
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6010B	Calcium, Total	28100	28300	mg/Kg	1
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Chromium, Total	15	13.2	mg/Kg	13
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Copper, Total	28.6	17.1	mg/Kg	50
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6010B	Iron, Total	26000	15600	mg/Kg	50
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Lead, Total	11	7.5	mg/Kg	38
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6010B	Manganese, Total	385	273	mg/Kg	34
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	7471A	Mercury, Total	0.09	0.05	mg/Kg	57
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Nickel, Total	25.2	19.2	mg/Kg	27
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Silver, Total	0.266	0.139	mg/Kg	63
U01-LIB01-AT03A	U01-LIB01-AT03AB	04/29/01	Sediment	6020	Zinc, Total	60.8	46.4	mg/Kg	27

Field Lateral Results

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	160.3M	Solids, Total	57	70	PERCENT	20
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Naphthalene	ND	4	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	2-Methylnaphthalene	ND	5	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Dibenzofuran	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Fluorene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Phenanthrene	6	8.7	ug/Kg	37
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Fluoranthene	ND	3	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Pyrene	ND	3	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Benz(a)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Chrysene	ND	4	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Benzo(b)fluoranthene	ND	2	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	ND	ND	ug/Kg	NA
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	160.4M	Solids, Total Volatile	12.7	7.35	PERCENT	53
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	Plumb NH3S1	Ammonia as Nitrogen	105	259	mg/Kg	85
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	9030M	Sulfide	152	1410	mg/Kg	161
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	3.38	2.8	PERCENT	19
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Antimony, Total	0.15	0.14	mg/Kg	7
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Arsenic, Total	7.2	5.3	mg/Kg	30
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6010B	Barium, Total	68.9	43.9	mg/Kg	44
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Cadmium, Total	0.49	0.29	mg/Kg	51
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6010B	Calcium, Total	22300	23600	mg/Kg	6
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Chromium, Total	17.2	14.9	mg/Kg	14
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Copper, Total	19.9	13.6	mg/Kg	38
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6010B	Iron, Total	20400	15400	mg/Kg	28
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Lead, Total	10.8	8.01	mg/Kg	30
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6010B	Manganese, Total	206	139	mg/Kg	39
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	7471A	Mercury, Total	0.05	0.05	mg/Kg	0
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Nickel, Total	21.8	18.1	mg/Kg	19
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Silver, Total	0.131	0.102	mg/Kg	25
U01-LIB01-AT03B	U01-LIB01-AT03BB	04/29/01	Sediment	6020	Zinc, Total	67	55.6	mg/Kg	19

Field Lateral Results

Sample Name	Sample Dup Name	Sample Date	Sample Description	Method	Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	160.3M	Solids, Total	74	61.6	PERCENT	18
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Naphthalene	6	5	ug/Kg	18
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	2-Methylnaphthalene	12	7	ug/Kg	53
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Dibenzofuran	3	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Fluorene	4	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Phenanthrene	20	11	ug/Kg	58
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Fluoranthene	4	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Pyrene	5	3	ug/Kg	50
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Benz(a)anthracene	ND	6	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Chrysene	10	6	ug/Kg	50
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Benzo(b)fluoranthene	6	3	ug/Kg	67
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	1	1	ug/Kg	0
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	4	ND	ug/Kg	NA
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	160.4M	Solids, Total Volatile	6.59	12.6	PERCENT	63
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	Plumb NH3S1	Ammonia as Nitrogen	282	152	mg/Kg	60
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	9030M	Sulfide	836	56.7	mg/Kg	175
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	3.17	5.34	PERCENT	51
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Antimony, Total	0.26	0.14	mg/Kg	60
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Arsenic, Total	7.5	5.6	mg/Kg	29
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6010B	Barium, Total	108	60.3	mg/Kg	57
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Cadmium, Total	0.39	0.24	mg/Kg	48
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6010B	Calcium, Total	31500	17900	mg/Kg	55
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Chromium, Total	20.1	12.3	mg/Kg	48
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Copper, Total	21.3	10.6	mg/Kg	67
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6010B	Iron, Total	24100	27200	mg/Kg	12
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Lead, Total	12.7	7.07	mg/Kg	57
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6010B	Manganese, Total	268	245	mg/Kg	9
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	7471A	Mercury, Total	0.06	0.04	mg/Kg	40
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Nickel, Total	25.9	16.6	mg/Kg	44
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Silver, Total	0.161	0.129	mg/Kg	22
U01-LIB01-AT03C	U01-LIB01-AT03CB	04/29/01	Sediment	6020	Zinc, Total	72.4	47.7	mg/Kg	41

Field Lateral Results

Sample Name	Sample Duplicate Name	Sample Date	Sample Matrix	Method	Analyte	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	160.3M	Solids, Total	59	81	PERCENT	31
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Naphthalene	8.5	3	ug/Kg	96
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	2-Methylnaphthalene	8.8	7	ug/Kg	23
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Acenaphthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Dibenzofuran	4	2	ug/Kg	67
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Fluorene	3	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Phenanthrene	15	13	ug/Kg	14
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Fluoranthene	6	4	ug/Kg	40
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Pyrene	7	4	ug/Kg	55
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Benz(a)anthracene	5	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Chrysene	9.3	7	ug/Kg	28
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Benzo(b)fluoranthene	6	5	ug/Kg	18
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	2	2	ug/Kg	0
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	ND	3	ug/Kg	NA
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	160.4M	Solids, Total Volatile	12.8	7.99	PERCENT	46
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	Plumb NH3S1	Ammonia as Nitrogen	125	156	mg/Kg	22
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	9030M	Sulfide	1820	50.1	mg/Kg	189
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	7.4	2.72	PERCENT	92
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Antimony, Total	0.17	0.16	mg/Kg	6
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Arsenic, Total	14.3	5.8	mg/Kg	85
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6010B	Barium, Total	101	86.6	mg/Kg	15
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Cadmium, Total	0.34	0.29	mg/Kg	16
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6010B	Calcium, Total	34500	65100	mg/Kg	61
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Chromium, Total	12.7	16	mg/Kg	23
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Copper, Total	15.3	17.3	mg/Kg	12
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6010B	Iron, Total	20700	20900	mg/Kg	1
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Lead, Total	9.13	11.5	mg/Kg	23
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6010B	Manganese, Total	210	257	mg/Kg	20
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	7471A	Mercury, Total	0.06	0.06	mg/Kg	0
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Nickel, Total	19.7	20	mg/Kg	2
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Silver, Total	0.125	0.143	mg/Kg	13
U01-LIB01-AT03D	U01-LIB01-AT03DB	04/29/01	Sediment	6020	Zinc, Total	50.4	66.9	mg/Kg	28

Field Lateral Results

[illegible] Sample Name	Sample [illegible] Name	[illegible]	[illegible]	[illegible]	[illegible]	Sample Result	Duplicate Result	Units	RPD
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	160.3M	Solids, Total	76.4	74.5	PERCENT	3
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	160.4M	Solids, Total Volatile	3.28	3.33	PERCENT	2
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	9030M	Sulfide	723	496	mg/Kg	37
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	ASTM D4129-82M	Carbon, Total Organic (TOC)	2.88	2.71	PERCENT	6
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	Plumb NH3S1	Ammonia as Nitrogen	36.8	45.3	mg/Kg	21
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Antimony, Total	0.07	0.08	mg/Kg	13
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Arsenic, Total	6.4	4.3	mg/Kg	39
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Barium, Total	62.6	60.6	mg/Kg	3
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Cadmium, Total	0.32	0.29	mg/Kg	10
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6010B	Calcium, Total	36100	30800	mg/Kg	16
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Chromium, Total	18	17.9	mg/Kg	1
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Copper, Total	17.4	13.8	mg/Kg	23
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6010B	Iron, Total	13100	14600	mg/Kg	11
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Lead, Total	9.24	7.59	mg/Kg	20
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6010B	Manganese, Total	117	145	mg/Kg	21
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	7470A	Mercury, Total	0.04	0.04	mg/Kg	0
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Nickel, Total	25.7	25.3	mg/Kg	2
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Silver, Total	0.06	0.08	mg/Kg	29
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	6020	Zinc, Total	72.3	66.7	mg/Kg	8
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Naphthalene	3	4	ug/Kg	29
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	2-Methylnaphthalene	6	7.6	ug/Kg	24
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Acenaphthylene	ND	ND	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Acenaphthene	ND	2	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Dibenzofuran	ND	4	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Fluorene	ND	4	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Phenanthrene	8.1	11	ug/Kg	30
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Anthracene	ND	ND	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Fluoranthene	2	3	ug/Kg	40
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Pyrene	4	4	ug/Kg	0
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Benz(a)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Chrysene	5	6	ug/Kg	18
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Benzo(b)fluoranthene	3	3	ug/Kg	0
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Benzo(k)fluoranthene	ND	ND	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Benzo(a)pyrene	ND	ND	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Indeno(1,2,3-cd)pyrene	0.9	ND	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Dibenz(a,h)anthracene	ND	ND	ug/Kg	NA
U01-LIB01-CT03D	U01-LIB01-CT03DB	05/04/01	Sediment	8270C SIM	Benzo(g,h,i)perylene	ND	2	ug/Kg	NA

Attachment 4

Matrix Spike Data

Ammonia By Plumb 1981
Matrix Spike (MS)

Sample ID	Matrix	Analyte	Method	Units	MS %R	Accuracy Limit	Data Flag
U01-LIB01-BT01A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	99	75-125	
U01-LIB01-CT01A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	99	75-125	
U01-LIB01-BT03A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	100	75-125	
U01-LIB01-AT03A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	98	75-125	
U01-LIB01-AT01A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	108	75-125	

Sulfide by SW9030M
Matrix Spike (MS)

Sample ID	Matrix	Analyte	Method	Units	MS %R	Accuracy Limit	Data Flag
U01-LIB01-CT01A	Sediment	Sulfide	9030M	mg/Kg	111	60-130	
U01-LIB01-BT04B	Sediment	Sulfide	9030M	mg/Kg	66	60-130	
U01-LIB01-AT01A	Sediment	Sulfide	9030M	mg/Kg	93	60-130	
U01-LIB01-AS02	Sediment	Sulfide	9030M	mg/Kg	90	60-130	

Total Organic Carbon (TOC) by ASTM D4129-82M
Matrix Spike (MS)

Sample ID	Matrix	Analyte	Method	Units	MS %R	Accuracy Limit	Data Flag
U01-LIB01-CT01A	Sediment	TOC	D4129-82M	mg/Kg	90	75-125	
U01-LIB01-BT04B	Sediment	TOC	D4129-82M	mg/Kg	99	75-125	
U01-LIB01-AT03A	Sediment	TOC	D4129-82M	mg/Kg	100	75-125	
U01-LIB01-AT01A	Sediment	TOC	D4129-82M	mg/Kg	83	75-125	
U01-LIB01-AS04	Sediment	TOC	D4129-82M	mg/Kg	95	75-125	

Ammonia by Plumb NH3S1
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	5.2	4.8	8	20	
U01-LIB01-BT03A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	40	44	10	20	
U01-LIB01-AT03A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	83.6	87.6	5	20	
U01-LIB01-CT01A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	5.4	7.9	38	20	*
U01-LIB01-BT01A	Sediment	Ammonia	Plumb NH3S1	mg/Kg	ND	0.3	NA	20	

Sulfide by SW9030M
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01A	Sediment	Sulfide	9030M	mg/Kg	2250	2240	< 1	20	
U01-LIB01-BT04B	Sediment	Sulfide	9030M	mg/Kg	451	590	27	20	*
U01-LIB01-AS02	Sediment	Sulfide	9030M	mg/Kg	51.6	52	<1	20	
U01-LIB01-CT01A	Sediment	Sulfide	9030M	mg/Kg	449	531	17	20	

Total Organic Carbon by ASTM D4129-82M
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01A	Sediment	TOC	D4129-82M	mg/Kg	3.9	3.9	5	20	
U01-LIB01-BT04B	Sediment	TOC	D4129-82M	mg/Kg	3.33	3.31	< 1	20	
U01-LIB01-AT03A	Sediment	TOC	D4129-82M	mg/Kg	8.58	8.52	<1	20	
U01-LIB01-AS04	Sediment	TOC	D4129-82M	mg/Kg	3.67	3.67	<1	20	
U01-LIB01-CT01A	Sediment	TOC	D4129-82M	mg/Kg	2.65	2.85	7	20	

Total Solids by 160.3M
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01A	Sediment	Solids	160.3M	Percent	74.4	73.2	2	20	
U01-LIB01-AT02CS	Sediment	Solids	160.3M	Percent	80	78.6	2	20	
U01-LIB01-AT03A	Sediment	Solids	160.3M	Percent	54.6	51.3	6	20	
U01-LIB01-AT04B	Sediment	Solids	160.3M	Percent	70.9	70.7	<1	20	
U01-LIB01-BT04B	Sediment	Solids	160.3M	Percent	70.3	71.2	1	20	
U01-LIB01-CT01A	Sediment	Solids	160.3M	Percent	79.2	81.4	3	20	
U01-LIB01-CT02A	Sediment	Solids	160.3M	Percent	75.1	75	<1	20	
U01-LIB01-AS04	Sediment	Solids	160.3M	Percent	71.3	71.6	<1	20	

Total Volatile Solids by 160.4M
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01A	Sediment	Solids	160.4M	Percent	5.47	5.25	4	20	
U01-LIB01-AT02CS	Sediment	Solids	160.4M	Percent	2.18	2.73	22	20	*
U01-LIB01-AT03A	Sediment	Solids	160.4M	Percent	12.9	15.2	16	20	
U01-LIB01-AT04B	Sediment	Solids	160.4M	Percent	4.53	4.48	1	20	
U01-LIB01-BT04B	Sediment	Solids	160.4M	Percent	11.1	10.4	6	20	
U01-LIB01-CT01A	Sediment	Solids	160.4M	Percent	2.94	2.78	6	20	
U01-LIB01-CT02A	Sediment	Solids	160.4M	Percent	3.82	4.39	14	20	
U01-LIB01-AS04	Sediment	Solids	160.4M	Percent	3.56	4.16	16	20	

PAH SIM
Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample ID	Matrix	Analyte	Method	Units	MS %R	MSD %R	RPD	Accuracy Limit	Precision Limit	Data Flag
U01-LIB01-AT02DS	Sediment	Naphthalene	8270C SIM	ug/Kg	85	85	0	45-135	40	
U01-LIB01-AT02DS	Sediment	2-Methylnaphthalene	8270C SIM	ug/Kg	88	85	4	45-135	40	
U01-LIB01-AT02DS	Sediment	Acenaphthylene	8270C SIM	ug/Kg	104	97	6	45-135	40	
U01-LIB01-AT02DS	Sediment	Acenaphthene	8270C SIM	ug/Kg	88	88	0	57-120	40	
U01-LIB01-AT02DS	Sediment	Dibenzofuran	8270C SIM	ug/Kg	88	88	0	45-135	40	
U01-LIB01-AT02DS	Sediment	Fluorene	8270C SIM	ug/Kg	98	97	0	45-135	40	
U01-LIB01-AT02DS	Sediment	Phenanthrene	8270C SIM	ug/Kg	88	90	3	45-135	40	
U01-LIB01-AT02DS	Sediment	Anthracene	8270C SIM	ug/Kg	101	103	3	45-135	40	
U01-LIB01-AT02DS	Sediment	Fluoranthene	8270C SIM	ug/Kg	95	94	0	45-135	40	
U01-LIB01-AT02DS	Sediment	Pyrene	8270C SIM	ug/Kg	98	100	3	36-144	40	
U01-LIB01-AT02DS	Sediment	Benz(a)anthracene	8270C SIM	ug/Kg	110	112	3	45-135	40	
U01-LIB01-AT02DS	Sediment	Chrysene	8270C SIM	ug/Kg	91	91	0	45-135	40	
U01-LIB01-AT02DS	Sediment	Benzo(b)fluoranthene	8270C SIM	ug/Kg	98	103	6	45-135	40	
U01-LIB01-AT02DS	Sediment	Benzo(k)fluoranthene	8270C SIM	ug/Kg	95	100	6	45-135	40	
U01-LIB01-AT02DS	Sediment	Benzo(a)pyrene	8270C SIM	ug/Kg	110	116	5	45-140	40	
U01-LIB01-AT02DS	Sediment	Indeno(1,2,3-cd)pyrene	8270C SIM	ug/Kg	128	128	0	45-135	40	
U01-LIB01-AT02DS	Sediment	Dibenz(a,h)anthracene	8270C SIM	ug/Kg	104	103	0	45-135	40	
U01-LIB01-AT02DS	Sediment	Benzo(g,h,i)perylene	8270C SIM	ug/Kg	85	85	0	45-135	40	
U01-LIB01-AT04D	Sediment	Naphthalene	8270C SIM	ug/Kg	77	83	7	45-135	40	
U01-LIB01-AT04D	Sediment	2-Methylnaphthalene	8270C SIM	ug/Kg	87	81	7	45-135	40	
U01-LIB01-AT04D	Sediment	Acenaphthylene	8270C SIM	ug/Kg	90	93	3	45-135	40	
U01-LIB01-AT04D	Sediment	Acenaphthene	8270C SIM	ug/Kg	85	84	0	57-120	40	
U01-LIB01-AT04D	Sediment	Dibenzofuran	8270C SIM	ug/Kg	81	84	4	45-135	40	
U01-LIB01-AT04D	Sediment	Fluorene	8270C SIM	ug/Kg	87	92	6	45-135	40	
U01-LIB01-AT04D	Sediment	Phenanthrene	8270C SIM	ug/Kg	89	91	3	45-135	40	
U01-LIB01-AT04D	Sediment	Anthracene	8270C SIM	ug/Kg	99	102	3	45-135	40	
U01-LIB01-AT04D	Sediment	Fluoranthene	8270C SIM	ug/Kg	87	89	3	45-135	40	
U01-LIB01-AT04D	Sediment	Pyrene	8270C SIM	ug/Kg	101	101	0	36-144	40	
U01-LIB01-AT04D	Sediment	Benz(a)anthracene	8270C SIM	ug/Kg	111	113	3	45-135	40	
U01-LIB01-AT04D	Sediment	Chrysene	8270C SIM	ug/Kg	88	90	3	45-135	40	
U01-LIB01-AT04D	Sediment	Benzo(b)fluoranthene	8270C SIM	ug/Kg	98	97	0	45-135	40	
U01-LIB01-AT04D	Sediment	Benzo(k)fluoranthene	8270C SIM	ug/Kg	93	96	3	45-135	40	
U01-LIB01-AT04D	Sediment	Benzo(a)pyrene	8270C SIM	ug/Kg	108	110	3	45-140	40	
U01-LIB01-AT04D	Sediment	Indeno(1,2,3-cd)pyrene	8270C SIM	ug/Kg	104	107	3	45-135	40	
U01-LIB01-AT04D	Sediment	Dibenz(a,h)anthracene	8270C SIM	ug/Kg	105	105	0	45-135	40	
U01-LIB01-AT04D	Sediment	Benzo(g,h,i)perylene	8270C SIM	ug/Kg	83	83	0	45-135	40	

PAH SIM
Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample ID	Matrix	Analyte	Method	Units	MS %R	MSD %R	RPD	Accuracy Limit	Precision Limit	Data Flag
U01-LIB01-BT04B	Sediment	Naphthalene	8270C SIM	ug/Kg	83	78	7	45-135	40	
U01-LIB01-BT04B	Sediment	2-Methylnaphthalene	8270C SIM	ug/Kg	90	87	3	45-135	40	
U01-LIB01-BT04B	Sediment	Acenaphthylene	8270C SIM	ug/Kg	93	90	3	45-135	40	
U01-LIB01-BT04B	Sediment	Acenaphthene	8270C SIM	ug/Kg	88	85	3	57-120	40	
U01-LIB01-BT04B	Sediment	Dibenzofuran	8270C SIM	ug/Kg	95	90	6	45-135	40	
U01-LIB01-BT04B	Sediment	Fluorene	8270C SIM	ug/Kg	98	95	3	45-135	40	
U01-LIB01-BT04B	Sediment	Phenanthrene	8270C SIM	ug/Kg	93	96	3	45-135	40	
U01-LIB01-BT04B	Sediment	Anthracene	8270C SIM	ug/Kg	107	107	0	45-135	40	
U01-LIB01-BT04B	Sediment	Fluoranthene	8270C SIM	ug/Kg	98	95	3	45-135	40	
U01-LIB01-BT04B	Sediment	Pyrene	8270C SIM	ug/Kg	102	105	3	36-144	40	
U01-LIB01-BT04B	Sediment	Benz(a)anthracene	8270C SIM	ug/Kg	113	113	0	45-135	40	
U01-LIB01-BT04B	Sediment	Chrysene	8270C SIM	ug/Kg	93	93	0	45-135	40	
U01-LIB01-BT04B	Sediment	Benzo(b)fluoranthene	8270C SIM	ug/Kg	114	109	5	45-135	40	
U01-LIB01-BT04B	Sediment	Benzo(k)fluoranthene	8270C SIM	ug/Kg	102	99	3	45-135	40	
U01-LIB01-BT04B	Sediment	Benzo(a)pyrene	8270C SIM	ug/Kg	113	110	3	45-140	40	
U01-LIB01-BT04B	Sediment	Indeno(1,2,3-cd)pyrene	8270C SIM	ug/Kg	110	113	3	45-135	40	
U01-LIB01-BT04B	Sediment	Dibenz(a,h)anthracene	8270C SIM	ug/Kg	93	107	14	45-135	40	
U01-LIB01-BT04B	Sediment	Benzo(g,h,i)perylene	8270C SIM	ug/Kg	78	86	10	45-135	40	
U01-LIB01-CT01A	Sediment	Naphthalene	8270C SIM	ug/Kg	81	84	4	45-135	40	
U01-LIB01-CT01A	Sediment	2-Methylnaphthalene	8270C SIM	ug/Kg	95	91	3	45-135	40	
U01-LIB01-CT01A	Sediment	Acenaphthylene	8270C SIM	ug/Kg	105	105	0	45-135	40	
U01-LIB01-CT01A	Sediment	Acenaphthene	8270C SIM	ug/Kg	92	92	0	57-120	40	
U01-LIB01-CT01A	Sediment	Dibenzofuran	8270C SIM	ug/Kg	91	91	0	45-135	40	
U01-LIB01-CT01A	Sediment	Fluorene	8270C SIM	ug/Kg	101	101	0	45-135	40	
U01-LIB01-CT01A	Sediment	Phenanthrene	8270C SIM	ug/Kg	95	97	3	45-135	40	
U01-LIB01-CT01A	Sediment	Anthracene	8270C SIM	ug/Kg	108	111	3	45-135	40	
U01-LIB01-CT01A	Sediment	Fluoranthene	8270C SIM	ug/Kg	102	102	0	45-135	40	
U01-LIB01-CT01A	Sediment	Pyrene	8270C SIM	ug/Kg	98	97	0	36-144	40	
U01-LIB01-CT01A	Sediment	Benz(a)anthracene	8270C SIM	ug/Kg	121	121	0	45-135	40	
U01-LIB01-CT01A	Sediment	Chrysene	8270C SIM	ug/Kg	100	99	0	45-135	40	
U01-LIB01-CT01A	Sediment	Benzo(b)fluoranthene	8270C SIM	ug/Kg	104	104	0	45-135	40	
U01-LIB01-CT01A	Sediment	Benzo(k)fluoranthene	8270C SIM	ug/Kg	108	105	3	45-135	40	
U01-LIB01-CT01A	Sediment	Benzo(a)pyrene	8270C SIM	ug/Kg	118	114	3	45-140	40	
U01-LIB01-CT01A	Sediment	Indeno(1,2,3-cd)pyrene	8270C SIM	ug/Kg	108	98	9	45-135	40	
U01-LIB01-CT01A	Sediment	Dibenz(a,h)anthracene	8270C SIM	ug/Kg	108	108	0	45-135	40	
U01-LIB01-CT01A	Sediment	Benzo(g,h,i)perylene	8270C SIM	ug/Kg	85	85	0	45-135	40	

Metals By SW6010B
Matrix Spike (MS)

Sample ID	Matrix	Analyte	Method	Units	MS %R	Accuracy Limit	Data Flag
U01-LIB01-CT01A	Sediment	Iron, Total	6010B	mg/Kg	-286	70-130	
U01-LIB01-CT01A	Sediment	Manganese, Total	6010B	mg/Kg	93	70-130	
U01-LIB01-BT04B	Sediment	Barium, Total	6010B	mg/Kg	102	70-130	
U01-LIB01-BT04B	Sediment	Iron, Total	6010B	mg/Kg	1013	70-130	
U01-LIB01-BT04B	Sediment	Manganese, Total	6010B	mg/Kg	137	70-130	
U01-LIB01-AT03DB	Sediment	Barium, Total	6010B	mg/Kg	95	70-130	
U01-LIB01-AT03DB	Sediment	Iron, Total	6010B	mg/Kg	567	70-130	
U01-LIB01-AT03DB	Sediment	Manganese, Total	6010B	mg/Kg	100	70-130	
U01-LIB01-AT01C	Sediment	Iron, Total	6010B	mg/Kg	202	70-130	
U01-LIB01-AT01C	Sediment	Manganese, Total	6010B	mg/Kg	107	70-130	

Mercury by SW7471A
Matrix Spike (MS)

Sample ID	Matrix	Analyte	Method	Units	MS %R	Accuracy Limit	Data Flag
U01-LIB01-CT01A	Sediment	Mercury, Total	7470A	mg/Kg	97	60-130	
U01-LIB01-BT04B	Sediment	Mercury, Total	7470A	mg/Kg	87	60-130	
U01-LIB01-AT03C	Sediment	Mercury, Total	7471A	mg/Kg	89	60-130	
U01-LIB01-AT03CB	Sediment	Mercury, Total	7471A	mg/Kg	90	60-130	
U01-LIB01-AT01C	Sediment	Mercury, Total	7471A	mg/Kg	107	60-130	

Metals By SW6010B
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01C	Sediment	Calcium, Total	6010B	mg/Kg	13800	13500	2	30	
U01-LIB01-AT01C	Sediment	Iron, Total	6010B	mg/Kg	8640	9570	10	30	
U01-LIB01-AT01C	Sediment	Manganese, Total	6010B	mg/Kg	105	113	7	30	
U01-LIB01-AT03DB	Sediment	Barium, Total	6010B	mg/Kg	86.6	95.9	10	30	
U01-LIB01-AT03DB	Sediment	Calcium, Total	6010B	mg/Kg	65100	64500	1	30	
U01-LIB01-AT03DB	Sediment	Iron, Total	6010B	mg/Kg	20900	21400	2	30	
U01-LIB01-AT03DB	Sediment	Manganese, Total	6010B	mg/Kg	257	264	3	30	
U01-LIB01-BT04B	Sediment	Barium, Total	6010B	mg/Kg	171	160	7	30	
U01-LIB01-BT04B	Sediment	Calcium, Total	6010B	mg/Kg	28800	29200	1	30	
U01-LIB01-BT04B	Sediment	Iron, Total	6010B	mg/Kg	36000	34500	5	30	
U01-LIB01-BT04B	Sediment	Manganese, Total	6010B	mg/Kg	520	497	5	30	
U01-LIB01-CT01A	Sediment	Calcium, Total	6010B	mg/Kg	76400	73900	3	30	
U01-LIB01-CT01A	Sediment	Iron, Total	6010B	mg/Kg	16800	15200	10	30	
U01-LIB01-CT01A	Sediment	Manganese, Total	6010B	mg/Kg	183	179	2	30	

Mercury by SW7471A
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01C	Sediment	Mercury, Total	7471A	mg/Kg	ND	0.01	NA	30	
U01-LIB01-BT04B	Sediment	Mercury, Total	7470A	mg/Kg	0.06	0.07	3	30	
U01-LIB01-AT03C	Sediment	Mercury, Total	7471A	mg/Kg	0.06	0.05	8	30	
U01-LIB01-AT03CB	Sediment	Mercury, Total	7471A	mg/Kg	0.04	0.04	2	30	
U01-LIB01-CT01A	Sediment	Mercury, Total	7470A	mg/Kg	0.04	0.07	65	30	

Metals By SW6020
Matrix Spike (MS)

Sample ID	Matrix	Analyte	Method	Units	MS %R	Accuracy Limit	Data Flag
U01-LIB01-AT01C	Sediment	Antimony, Total	SW6020	mg/Kg	74	70-130	
U01-LIB01-AT01C	Sediment	Arsenic, Total	SW6020	mg/Kg	86	70-130	
U01-LIB01-AT01C	Sediment	Barium, Total	SW6020	mg/Kg	112	70-130	
U01-LIB01-AT01C	Sediment	Cadmium, Total	SW6020	mg/Kg	88	70-130	
U01-LIB01-AT01C	Sediment	Chromium, Total	SW6020	mg/Kg	89	70-130	
U01-LIB01-AT01C	Sediment	Copper, Total	SW6020	mg/Kg	91	70-130	
U01-LIB01-AT01C	Sediment	Lead, Total	SW6020	mg/Kg	91	70-130	
U01-LIB01-AT01C	Sediment	Nickel, Total	SW6020	mg/Kg	90	70-130	
U01-LIB01-AT01C	Sediment	Silver, Total	SW6020	mg/Kg	98	70-130	
U01-LIB01-AT01C	Sediment	Zinc, Total	SW6020	mg/Kg	81	70-130	
U01-LIB01-AT03DB	Sediment	Antimony, Total	SW6020	mg/Kg	27	70-130	VML
U01-LIB01-AT03DB	Sediment	Arsenic, Total	SW6020	mg/Kg	91	70-130	
U01-LIB01-AT03DB	Sediment	Cadmium, Total	SW6020	mg/Kg	97	70-130	
U01-LIB01-AT03DB	Sediment	Chromium, Total	SW6020	mg/Kg	90	70-130	
U01-LIB01-AT03DB	Sediment	Copper, Total	SW6020	mg/Kg	92	70-130	
U01-LIB01-AT03DB	Sediment	Lead, Total	SW6020	mg/Kg	123	70-130	
U01-LIB01-AT03DB	Sediment	Nickel, Total	SW6020	mg/Kg	93	70-130	
U01-LIB01-AT03DB	Sediment	Silver, Total	SW6020	mg/Kg	83	70-130	
U01-LIB01-AT03DB	Sediment	Zinc, Total	SW6020	mg/Kg	81	70-130	
U01-LIB01-BT04B	Sediment	Antimony, Total	SW6020	mg/Kg	39	70-130	VML
U01-LIB01-BT04B	Sediment	Arsenic, Total	SW6020	mg/Kg	92	70-130	
U01-LIB01-BT04B	Sediment	Cadmium, Total	SW6020	mg/Kg	92	70-130	
U01-LIB01-BT04B	Sediment	Chromium, Total	SW6020	mg/Kg	115	70-130	
U01-LIB01-BT04B	Sediment	Copper, Total	SW6020	mg/Kg	98	70-130	
U01-LIB01-BT04B	Sediment	Lead, Total	SW6020	mg/Kg	95	70-130	
U01-LIB01-BT04B	Sediment	Nickel, Total	SW6020	mg/Kg	104	70-130	
U01-LIB01-BT04B	Sediment	Silver, Total	SW6020	mg/Kg	103	70-130	
U01-LIB01-BT04B	Sediment	Zinc, Total	SW6020	mg/Kg	94	70-130	
U01-LIB01-CT01A	Sediment	Antimony, Total	SW6020	mg/Kg	37	70-130	VML
U01-LIB01-CT01A	Sediment	Arsenic, Total	SW6020	mg/Kg	87	70-130	
U01-LIB01-CT01A	Sediment	Barium, Total	SW6020	mg/Kg	87	70-130	
U01-LIB01-CT01A	Sediment	Cadmium, Total	SW6020	mg/Kg	87	70-130	
U01-LIB01-CT01A	Sediment	Chromium, Total	SW6020	mg/Kg	82	70-130	
U01-LIB01-CT01A	Sediment	Copper, Total	SW6020	mg/Kg	85	70-130	
U01-LIB01-CT01A	Sediment	Lead, Total	SW6020	mg/Kg	92	70-130	
U01-LIB01-CT01A	Sediment	Nickel, Total	SW6020	mg/Kg	79	70-130	
U01-LIB01-CT01A	Sediment	Silver, Total	SW6020	mg/Kg	89	70-130	
U01-LIB01-CT01A	Sediment	Zinc, Total	SW6020	mg/Kg	85	70-130	

Metals By SW6020
Duplicate Analysis

Sample ID	Matrix	Analyte	Method	Units	Sample Result	Dup Result	RPD	Precision Limit	Data Flag
U01-LIB01-AT01C	Sediment	Antimony, Total	6020	mg/Kg	0.16	0.14	17	30	
U01-LIB01-AT01C	Sediment	Arsenic, Total	6020	mg/Kg	3.5	3.2	10	30	
U01-LIB01-AT01C	Sediment	Barium, Total	6020	mg/Kg	31.4	21.2	39	30	*
U01-LIB01-AT01C	Sediment	Cadmium, Total	6020	mg/Kg	0.11	0.1	16	30	
U01-LIB01-AT01C	Sediment	Chromium, Total	6020	mg/Kg	7.9	6.54	19	30	
U01-LIB01-AT01C	Sediment	Copper, Total	6020	mg/Kg	5.04	4.13	20	30	
U01-LIB01-AT01C	Sediment	Lead, Total	6020	mg/Kg	2.33	2.3	1	30	
U01-LIB01-AT01C	Sediment	Nickel, Total	6020	mg/Kg	9.41	8.48	10	30	
U01-LIB01-AT01C	Sediment	Silver, Total	6020	mg/Kg	0.035	0.034	5	30	
U01-LIB01-AT01C	Sediment	Zinc, Total	6020	mg/Kg	27.6	25	10	30	
U01-LIB01-AT03DB	Sediment	Antimony, Total	6020	mg/Kg	0.16	0.16	1	30	
U01-LIB01-AT03DB	Sediment	Arsenic, Total	6020	mg/Kg	5.8	6.6	12	30	
U01-LIB01-AT03DB	Sediment	Cadmium, Total	6020	mg/Kg	0.29	0.29	2	30	
U01-LIB01-AT03DB	Sediment	Chromium, Total	6020	mg/Kg	16	19.2	18	30	
U01-LIB01-AT03DB	Sediment	Copper, Total	6020	mg/Kg	17.3	17.5	1	30	
U01-LIB01-AT03DB	Sediment	Lead, Total	6020	mg/Kg	11.5	13.7	17	30	
U01-LIB01-AT03DB	Sediment	Nickel, Total	6020	mg/Kg	20	22.4	11	30	
U01-LIB01-AT03DB	Sediment	Silver, Total	6020	mg/Kg	0.143	0.123	16	30	
U01-LIB01-AT03DB	Sediment	Zinc, Total	6020	mg/Kg	66.9	68.6	3	30	
U01-LIB01-BT04B	Sediment	Antimony, Total	6020	mg/Kg	0.23	0.29	24	30	
U01-LIB01-BT04B	Sediment	Arsenic, Total	6020	mg/Kg	9.4	9.3	1	30	
U01-LIB01-BT04B	Sediment	Cadmium, Total	6020	mg/Kg	0.46	0.52	11	30	
U01-LIB01-BT04B	Sediment	Chromium, Total	6020	mg/Kg	28.1	33.6	18	30	
U01-LIB01-BT04B	Sediment	Copper, Total	6020	mg/Kg	30.9	31.8	3	30	
U01-LIB01-BT04B	Sediment	Lead, Total	6020	mg/Kg	17.6	17.5	1	30	
U01-LIB01-BT04B	Sediment	Nickel, Total	6020	mg/Kg	39.9	44	10	30	
U01-LIB01-BT04B	Sediment	Silver, Total	6020	mg/Kg	0.2	0.19	3	30	
U01-LIB01-BT04B	Sediment	Zinc, Total	6020	mg/Kg	108	109	1	30	
U01-LIB01-CT01A	Sediment	Antimony, Total	6020	mg/Kg	0.11	0.12	9	30	
U01-LIB01-CT01A	Sediment	Arsenic, Total	6020	mg/Kg	7.1	7	1	30	
U01-LIB01-CT01A	Sediment	Barium, Total	6020	mg/Kg	71.9	58.7	20	30	
U01-LIB01-CT01A	Sediment	Cadmium, Total	6020	mg/Kg	0.31	0.28	7	30	
U01-LIB01-CT01A	Sediment	Chromium, Total	6020	mg/Kg	17.2	14.5	17	30	
U01-LIB01-CT01A	Sediment	Copper, Total	6020	mg/Kg	16.4	15.9	3	30	
U01-LIB01-CT01A	Sediment	Lead, Total	6020	mg/Kg	9.53	9.36	2	30	
U01-LIB01-CT01A	Sediment	Nickel, Total	6020	mg/Kg	22.7	21.8	4	30	
U01-LIB01-CT01A	Sediment	Silver, Total	6020	mg/Kg	0.09	0.07	15	30	
U01-LIB01-CT01A	Sediment	Zinc, Total	6020	mg/Kg	68.2	66.1	3	30	

VOCs by 8260B
Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample ID	Matrix	Analyte	Method	Units	MS %R	MSD %R	RPD	Accuracy Limit	Precision Limit	Data Flag
U01-LIB01-AS01	Sediment	1,3-Dichlorobenzene	SW8260B	ug/Kg	89	76	17	50-150	40	
U01-LIB01-AS01	Sediment	1,4-Dichlorobenzene	SW8260B	ug/Kg	82	67	21	50-150	40	
U01-LIB01-AS01	Sediment	1,2-Dichlorobenzene	SW8260B	ug/Kg	89	76	17	34-131	40	

SVOCs by SW8270C
Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample ID	Matrix	Analyte	Method	Units	MS %R	MSD %R	RPD	Accuracy Limit	Precision Limit	Data Flag
U01-LIB01-AS01	Sediment	Phenol	SW8270C	ug/Kg	82	77	5	20-99	40	
U01-LIB01-AS01	Sediment	2-Chlorophenol	SW8270C	ug/Kg	83	79	5	17-98	40	
U01-LIB01-AS01	Sediment	1,4-Dichlorobenzene	SW8270C	ug/Kg	80	75	6	10-109	40	
U01-LIB01-AS01	Sediment	N-Nitrosodi-n-propylamine	SW8270C	ug/Kg	92	87	6	12-135	40	
U01-LIB01-AS01	Sediment	1,2,4-Trichlorobenzene	SW8270C	ug/Kg	80	75	6	21-100	40	
U01-LIB01-AS01	Sediment	4-Chloro-3-methylphenol	SW8270C	ug/Kg	93	87	8	15-113	40	
U01-LIB01-AS01	Sediment	Acenaphthene	SW8270C	ug/Kg	89	80	11	26-104	40	
U01-LIB01-AS01	Sediment	4-Nitrophenol	SW8270C	ug/Kg	120	110	8	10-186	40	
U01-LIB01-AS01	Sediment	2,4-Dinitrotoluene	SW8270C	ug/Kg	113	102	10	26-149	40	
U01-LIB01-AS01	Sediment	Pentachlorophenol (PCP)	SW8270C	ug/Kg	92	72	24	10-145	40	
U01-LIB01-AS01	Sediment	Pyrene	SW8270C	ug/Kg	120	113	6	18-144	40	

Pesticides by SW8081A
Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample ID	Matrix	Analyte	Method	Units	MS %R	MSD %R	RPD	Accuracy Limit	Precision Limit	Data Flag
U01-LIB01-AS02	Sediment	alpha-BHC	8081A	ug/Kg	105	98	7	53-130	50	
U01-LIB01-AS02	Sediment	beta-BHC	8081A	ug/Kg	108	108	0	58-130	50	
U01-LIB01-AS02	Sediment	gamma-BHC (Lindane)	8081A	ug/Kg	108	100	7	56-137	50	
U01-LIB01-AS02	Sediment	delta-BHC	8081A	ug/Kg	108	100	7	43-134	50	
U01-LIB01-AS02	Sediment	Heptachlor	8081A	ug/Kg	100	92	8	51-132	50	
U01-LIB01-AS02	Sediment	Aldrin	8081A	ug/Kg	108	100	7	50-146	50	
U01-LIB01-AS02	Sediment	Heptachlor Epoxide	8081A	ug/Kg	100	100	0	43-157	50	
U01-LIB01-AS02	Sediment	gamma-Chlordane	8081A	ug/Kg	100	100	0	48-143	50	
U01-LIB01-AS02	Sediment	Endosulfan I	8081A	ug/Kg	108	100	7	45-141	50	
U01-LIB01-AS02	Sediment	alpha-Chlordane	8081A	ug/Kg	100	100	0	51-142	50	
U01-LIB01-AS02	Sediment	Dieldrin	8081A	ug/Kg	108	108	0	64-137	50	
U01-LIB01-AS02	Sediment	4,4'-DDE	8081A	ug/Kg	115	108	7	57-152	50	
U01-LIB01-AS02	Sediment	Endrin	8081A	ug/Kg	115	108	7	47-153	50	
U01-LIB01-AS02	Sediment	Endosulfan II	8081A	ug/Kg	108	100	7	60-140	50	
U01-LIB01-AS02	Sediment	4,4'-DDD	8081A	ug/Kg	113	113	0	58-154	50	
U01-LIB01-AS02	Sediment	Endrin Aldehyde	8081A	ug/Kg	92	92	0	23-130	50	
U01-LIB01-AS02	Sediment	Endosulfan Sulfate	8081A	ug/Kg	100	100	0	49-119	50	
U01-LIB01-AS02	Sediment	4,4'-DDT	8081A	ug/Kg	108	108	0	52-138	50	
U01-LIB01-AS02	Sediment	Endrin Ketone	8081A	ug/Kg	115	108	7	66-144	50	
U01-LIB01-AS02	Sediment	Methoxychlor	8081A	ug/Kg	115	115	0	46-144	50	

PCBs by SW8082
Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Sample ID	Matrix	Analyte	Method	Units	MS %R	MSD %R	RPD	Accuracy Limit	Precision Limit	Data Flag
U01-LIB01-AS01	Sediment	Aroclor 1016	8082	ug/Kg	93	100	7	51-145	50	
U01-LIB01-AS01	Sediment	Aroclor 1260	8082	ug/Kg	100	107	6	58-147	50	

Appendix F
Laboratory Results

Grain Size Result Summary

[illegible]	Sample Identification	Depth	Latitude	Longitude	Grain Size	Sieve/Particle Size	Sieve Number	Percent Retained
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Gravel, Fine	2.00 mm	10	0.09
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Sand, Very Coarse	0.850 mm	20	0.09
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Sand, Coarse	0.425 mm	40	0.7
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Sand, Medium	0.250 mm	60	6.36
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Sand, Fine	0.106 mm	140	63
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Sand, Very Fine	0.075 mm	200	7.25
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Clay	<0.0039 mm	NA	4.65
LIB01-AGR01	U01-LIB01-AGR01A	0.0' - 0.5'	70.226917	-147.652717	Silt	0.0039 - 0.0625 mm	NA	20.6
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Sand, Very Coarse	0.850 mm	20	0.11
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Sand, Coarse	0.425 mm	40	1.02
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Sand, Medium	0.250 mm	60	7.32
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Sand, Fine	0.106 mm	140	64.8
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Sand, Very Fine	0.075 mm	200	7.13
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Clay	<0.0039 mm	NA	4.47
LIB01-AGR01	U01-LIB01-AGR01A DUP	0.0' - 0.5'	70.226917	-147.652717	Silt	0.0039 - 0.0625 mm	NA	18.7
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Sand, Very Coarse	0.850 mm	20	0.02
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Sand, Coarse	0.425 mm	40	0.23
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Sand, Medium	0.250 mm	60	0.71
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Sand, Fine	0.106 mm	140	3.4
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Sand, Very Fine	0.075 mm	200	9.28
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Clay	<0.0039 mm	NA	5.91
LIB01-AGR01	U01-LIB01-AGR01B	4.0' - 5.0'	70.226917	-147.652717	Silt	0.0039 - 0.0625 mm	NA	89.3
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Sand, Very Coarse	0.850 mm	20	0.27
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Sand, Coarse	0.425 mm	40	0.44
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Sand, Medium	0.250 mm	60	1.16
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Sand, Fine	0.106 mm	140	4.36
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Sand, Very Fine	0.075 mm	200	4.78
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Clay	<0.0039 mm	NA	8.97
LIB01-AGR01	U01-LIB01-AGR01C	9.0' - 10.0'	70.226917	-147.652717	Silt	0.0039 - 0.0625 mm	NA	79.9

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Gravel, Medium	4.75 mm	4	4.51
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Gravel, Fine	2.00 mm	10	2.8
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Sand, Very Coarse	0.850 mm	20	0.79
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Sand, Coarse	0.425 mm	40	2.72
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Sand, Medium	0.250 mm	60	11.1
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Sand, Fine	0.106 mm	140	23.9
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Sand, Very Fine	0.075 mm	200	8.35
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Clay	<0.0039 mm	NA	8.96
LIB01-AGR01	U01-LIB01-AGR01D	12.0' - 13.0'	70.226917	-147.652717	Silt	0.0039 - 0.0625 mm	NA	32.2
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Sand, Very Coarse	0.850 mm	20	0.14
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Sand, Coarse	0.425 mm	40	0.22
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Sand, Medium	0.250 mm	60	0.79
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Sand, Fine	0.106 mm	140	5.82
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Sand, Very Fine	0.075 mm	200	4.04
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Clay	<0.0039 mm	NA	5.59
LIB01-AGR02	U01-LIB01-AGR02A	1.5' - 2.5'	70.233150	-147.642150	Silt	0.0039 - 0.0625 mm	NA	80.1
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Gravel, Fine	2.00 mm	10	0.10
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Sand, Very Coarse	0.850 mm	20	0.17
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Sand, Coarse	0.425 mm	40	0.50
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Sand, Medium	0.250 mm	60	3.12
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Sand, Fine	0.106 mm	140	40.2
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Sand, Very Fine	0.075 mm	200	9.95
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Clay	<0.0039 mm	NA	6.46
LIB01-AGR02	U01-LIB01-AGR02B	3.0' - 3.5'	70.233150	-147.642150	Silt	0.0039 - 0.0625 mm	NA	35.7
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Gravel, Fine	2.00 mm	10	0.01
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Sand, Very Coarse	0.850 mm	20	0.06
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Sand, Coarse	0.425 mm	40	0.59
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Sand, Medium	0.250 mm	60	10.7
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Sand, Fine	0.106 mm	140	51.1
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Sand, Very Fine	0.075 mm	200	8.01
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Clay	<0.0039 mm	NA	3.18
LIB01-AGR02	U01-LIB01-AGR02C	6.0' - 7.0'	70.233150	-147.642150	Silt	0.0039 - 0.0625 mm	NA	23.5

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Sand, Very Coarse	0.850 mm	20	1.18
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Sand, Coarse	0.425 mm	40	0.67
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Sand, Medium	0.250 mm	60	1.03
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Sand, Fine	0.106 mm	140	4.08
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Sand, Very Fine	0.075 mm	200	3.41
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Clay	<0.0039 mm	NA	12.9
LIB01-AGR02	U01-LIB01-AGR02D	11.0' - 12.0'	70.233150	-147.642150	Silt	0.0039 - 0.0625 mm	NA	76.9
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Gravel, Medium	4.75 mm	4	0.9
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Gravel, Fine	2.00 mm	10	5.44
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Sand, Very Coarse	0.850 mm	20	4.51
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Sand, Coarse	0.425 mm	40	2.57
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Sand, Medium	0.250 mm	60	2.51
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Sand, Fine	0.106 mm	140	14.3
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Sand, Very Fine	0.075 mm	200	8.81
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Clay	<0.0039 mm	NA	8.9
LIB01-AGR03	U01-LIB01-AGR03A	0.0' - 0.7'	70.239600	-147.630433	Silt	0.0039 - 0.0625 mm	NA	49.8
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Gravel, Medium	4.75 mm	4	1.37
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Sand, Very Coarse	0.850 mm	20	0.17
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Sand, Coarse	0.425 mm	40	0.28
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Sand, Medium	0.250 mm	60	1.03
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Sand, Fine	0.106 mm	140	9.49
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Sand, Very Fine	0.075 mm	200	6.61
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Clay	<0.0039 mm	NA	8.72
LIB01-AGR03	U01-LIB01-AGR03B	2.5' - 4.0'	70.239600	-147.630433	Silt	0.0039 - 0.0625 mm	NA	67.5
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Gravel, Medium	4.75 mm	4	0.05
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Sand, Very Coarse	0.850 mm	20	1.1
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Sand, Coarse	0.425 mm	40	0.61
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Sand, Medium	0.250 mm	60	1.39
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Sand, Fine	0.106 mm	140	8.56
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Sand, Very Fine	0.075 mm	200	7.49
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Clay	<0.0039 mm	NA	7.17
LIB01-AGR03	U01-LIB01-AGR03C	9.0' - 10.0'	70.239600	-147.630433	Silt	0.0039 - 0.0625 mm	NA	73.5

Grain Size Result Summary

[illegible]	Sample Identification	Depth	Latitude	Longitude	Grain Size	[illegible] Size	Sieve Number	Percent Retained
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Gravel, Medium	4.75 mm	4	0.87
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Gravel, Fine	2.00 mm	10	3.54
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Sand, Very Coarse	0.850 mm	20	1.92
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Sand, Coarse	0.425 mm	40	7.1
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Sand, Medium	0.250 mm	60	27.9
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Sand, Fine	0.106 mm	140	33.1
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Sand, Very Fine	0.075 mm	200	2.29
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Clay	<0.0039 mm	NA	5.04
LIB01-AGR03	U01-LIB01-AGR03D	13.5' - 14.5'	70.239600	-147.630433	Silt	0.0039 - 0.0625 mm	NA	19.1
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Sand, Very Coarse	0.850 mm	20	0.11
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Sand, Coarse	0.425 mm	40	0.34
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Sand, Medium	0.250 mm	60	2.00
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Sand, Fine	0.106 mm	140	6.38
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Sand, Very Fine	0.075 mm	200	1.08
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Clay	<0.0039 mm	NA	9.01
LIB01-AGR04	U01-LIB01-AGR04A	0.5' - 1.5'	70.245700	-147.619100	Silt	0.0039 - 0.0625 mm	NA	82.6
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Gravel, Medium	4.75 mm	4	10.7
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Gravel, Fine	2.00 mm	10	2.98
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Sand, Very Coarse	0.850 mm	20	1.62
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Sand, Coarse	0.425 mm	40	2.11
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Sand, Medium	0.250 mm	60	7.03
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Sand, Fine	0.106 mm	140	23.4
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Sand, Very Fine	0.075 mm	200	12.5
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Clay	<0.0039 mm	NA	4.76
LIB01-AGR04	U01-LIB01-AGR04B	5.0' - 6.5'	70.245700	-147.619100	Silt	0.0039 - 0.0625 mm	NA	35.5
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Gravel, Medium	4.75 mm	4	13.4
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Gravel, Fine	2.00 mm	10	13.3
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Sand, Very Coarse	0.850 mm	20	12.4
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Sand, Coarse	0.425 mm	40	13.4
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Sand, Medium	0.250 mm	60	8.51
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Sand, Fine	0.106 mm	140	10.4
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Sand, Very Fine	0.075 mm	200	3.35
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Clay	<0.0039 mm	NA	3.12
LIB01-AGR04	U01-LIB01-AGR04C	8.0' - 9.0'	70.245700	-147.619100	Silt	0.0039 - 0.0625 mm	NA	19.9

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Gravel, Fine	2.00 mm	10	0.35
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Sand, Very Coarse	0.850 mm	20	0.56
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Sand, Coarse	0.425 mm	40	0.51
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Sand, Medium	0.250 mm	60	0.86
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Sand, Fine	0.106 mm	140	3.73
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Sand, Very Fine	0.075 mm	200	6.15
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Clay	<0.0039 mm	NA	10.2
LIB01-AGR04	U01-LIB01-AGR04D	11.0' - 12.5'	70.245700	-147.619100	Silt	0.0039 - 0.0625 mm	NA	74.3
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Sand, Very Coarse	0.850 mm	20	0.07
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Sand, Coarse	0.425 mm	40	0.19
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Sand, Medium	0.250 mm	60	0.38
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Sand, Fine	0.106 mm	140	1.65
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Sand, Very Fine	0.075 mm	200	2.70
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Clay	<0.0039 mm	NA	10.5
LIB01-AGR05	U01-LIB01-AGR05A	0.0' - 1.0'	70.252117	-147.607817	Silt	0.0039 - 0.0625 mm	NA	78.5
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Sand, Very Coarse	0.850 mm	20	0.24
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Sand, Coarse	0.425 mm	40	0.76
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Sand, Medium	0.250 mm	60	0.95
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Sand, Fine	0.106 mm	140	3.90
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Sand, Very Fine	0.075 mm	200	2.57
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Clay	<0.0039 mm	NA	16.9
LIB01-AGR05	U01-LIB01-AGR05B	5.0' - 6.0'	70.252117	-147.607817	Silt	0.0039 - 0.0625 mm	NA	73.1
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Sand, Very Coarse	0.850 mm	20	0.03
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Sand, Coarse	0.425 mm	40	0.29
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Sand, Medium	0.250 mm	60	0.44
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Sand, Fine	0.106 mm	140	7.99
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Sand, Very Fine	0.075 mm	200	10.0
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Clay	<0.0039 mm	NA	11.5
LIB01-AGR05	U01-LIB01-AGR05C	10.0' - 11.0'	70.252117	-147.607817	Silt	0.0039 - 0.0625 mm	NA	64.6

Grain Size Result Summary

[illegible] Bore Log	Sample Identification	Depth	Latitude	Longitude	Grain Size	Sieve/Particle Size	Sieve Number	Percent Retained
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Sand, Very Coarse	0.850 mm	20	0.08
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Sand, Coarse	0.425 mm	40	3.84
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Sand, Medium	0.250 mm	60	37.3
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Sand, Fine	0.106 mm	140	37.3
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Sand, Very Fine	0.075 mm	200	5.73
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Clay	<0.0039 mm	NA	2.02
LIB01-AGR05	U01-LIB01-AGR05D	12.5' - 13.5'	70.252117	-147.607817	Silt	0.0039 - 0.0625 mm	NA	12.8
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Sand, Very Coarse	0.850 mm	20	0.17
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Sand, Coarse	0.425 mm	40	0.22
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Sand, Medium	0.250 mm	60	0.49
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Sand, Fine	0.106 mm	140	7.97
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Sand, Very Fine	0.075 mm	200	21.6
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Clay	<0.0039 mm	NA	6.28
LIB01-AGR06	U01-LIB01-AGR06A	0.0' - 0.5'	70.258394	-147.596279	Silt	0.0039 - 0.0625 mm	NA	59.4
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Sand, Very Coarse	0.850 mm	20	0.39
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Sand, Coarse	0.425 mm	40	0.48
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Sand, Medium	0.250 mm	60	1.08
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Sand, Fine	0.106 mm	140	13.1
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Sand, Very Fine	0.075 mm	200	14.6
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Clay	<0.0039 mm	NA	6.37
LIB01-AGR06	U01-LIB01-AGR06B	3.5' - 4.5'	70.258394	-147.596279	Silt	0.0039 - 0.0625 mm	NA	57.3
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Sand, Very Coarse	0.850 mm	20	0.01
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Sand, Coarse	0.425 mm	40	0.10
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Sand, Medium	0.250 mm	60	2.19
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Sand, Fine	0.106 mm	140	53.7
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Sand, Very Fine	0.075 mm	200	9.54
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Clay	<0.0039 mm	NA	6.44
LIB01-AGR06	U01-LIB01-AGR06C	8.5' - 10.0'	70.258394	-147.596279	Silt	0.0039 - 0.0625 mm	NA	26.1

Grain Size Result Summary

Borehole ID	Sample Identification	Depth	Latitude	Longitude	Description	Sieve/Particle Size	Sieve Number	Percent Retained
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Sand, Very Coarse	0.850 mm	20	0.14
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Sand, Coarse	0.425 mm	40	0.31
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Sand, Medium	0.250 mm	60	0.86
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Sand, Fine	0.106 mm	140	4.53
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Sand, Very Fine	0.075 mm	200	4.45
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Clay	<0.0039 mm	NA	16.8
LIB01-AGR06	U01-LIB01-AGR06D	14.0' - 15.0'	70.258394	-147.596279	Silt	0.0039 - 0.0625 mm	NA	68.4
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	20.6
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	0.57
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	0.12
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	1.5
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	30
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	8.38
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	7.93
LIB01-AGR07	U01-LIB01-AGR07A	0.0' - 1.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	39.4
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	0.34
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	0.23
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	1.12
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	23.8
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	7.84
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	7.88
LIB01-AGR07	U01-LIB01-AGR07A DUP	0.0' - 1.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	49.1
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	0.00
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	0.42
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	1.26
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	12.6
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	7.96
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	11.0
LIB01-AGR07	U01-LIB01-AGR07AB	0.0' - 1.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	59.3

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	5.62
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	5.84
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	7.84
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	20.3
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	9.7
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	11.8
LIB01-AGR07	U01-LIB01-AGR07B	9.0' - 10.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	32.4
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	0.00
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	0.25
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	2.17
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	6.99
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	7.27
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	5.94
LIB01-AGR07	U01-LIB01-AGR07BB	9.0' - 10.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	77.5
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	0.11
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	0.19
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	0.24
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	1.85
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	1.7
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Clay	<0.0039 mm	NA	14.4
LIB01-AGR07	U01-LIB01-AGR07C	12.5' - 13.5'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	74.8
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.60
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	2.50
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	1.89
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	0.97
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	2.52
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	17.6
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	13.1
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	12.1
LIB01-AGR07	U01-LIB01-AGR07CB	11.0' - 12.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	59.4

Grain Size Result Summary

Bore Log	Sample Identification	Depth	Latitude	Longitude	[illegible]	Sieve/Particle Size	Sieve Number	Percent Retained
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	1.83
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	2.84
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	2.2
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	2.79
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	13.2
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	8.89
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	11.9
LIB01-AGR07	U01-LIB01-AGR07D	14.3' - 15.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	44.9
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Gravel, Fine	2.00 mm	10	0.67
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Sand, Very Coarse	0.850 mm	20	0.35
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Sand, Coarse	0.425 mm	40	0.46
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Sand, Medium	0.250 mm	60	1.15
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Sand, Fine	0.106 mm	140	11.2
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Sand, Very Fine	0.075 mm	200	11.5
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Clay	<0.0039 mm	NA	25.6
LIB01-AGR07	U01-LIB01-AGR07DB	14.0' - 15.0'	70.264833	-147.584633	Silt	0.0039 - 0.0625 mm	NA	49.1
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Sand, Very Coarse	0.850 mm	20	1.42
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Sand, Coarse	0.425 mm	40	1.01
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Sand, Medium	0.250 mm	60	3.58
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Sand, Fine	0.106 mm	140	27.3
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Sand, Very Fine	0.075 mm	200	14.0
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Clay	<0.0039 mm	NA	3.97
LIB01-AGR08	U01-LIB01-AGR08A	0.5' - 1.5'	70.271550	-147.572067	Silt	0.0039 - 0.0625 mm	NA	41.6
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Sand, Very Coarse	0.850 mm	20	0.07
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Sand, Coarse	0.425 mm	40	0.16
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Sand, Medium	0.250 mm	60	0.35
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Sand, Fine	0.106 mm	140	11.5
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Sand, Very Fine	0.075 mm	200	14.1
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Clay	<0.0039 mm	NA	5.92
LIB01-AGR08	U01-LIB01-AGR08B	4.0' - 5.0'	70.271550	-147.572067	Silt	0.0039 - 0.0625 mm	NA	64.5

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Sand, Very Coarse	0.850 mm	20	0.19
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Sand, Coarse	0.425 mm	40	0.20
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Sand, Medium	0.250 mm	60	0.28
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Sand, Fine	0.106 mm	140	0.47
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Sand, Very Fine	0.075 mm	200	0.35
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Clay	<0.0039 mm	NA	43.0
LIB01-AGR08	U01-LIB01-AGR08C	7.5' - 8.5'	70.271550	-147.572067	Silt	0.0039 - 0.0625 mm	NA	55.4
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Sand, Very Coarse	0.850 mm	20	0.12
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Sand, Coarse	0.425 mm	40	0.16
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Sand, Medium	0.250 mm	60	0.25
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Sand, Fine	0.106 mm	140	0.75
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Sand, Very Fine	0.075 mm	200	0.79
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Clay	<0.0039 mm	NA	38.4
LIB01-AGR08	U01-LIB01-AGR08C DUP	7.5' - 8.5'	70.271550	-147.572067	Silt	0.0039 - 0.0625 mm	NA	57.8
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Gravel, Medium	4.75 mm	4	8.99
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Gravel, Fine	2.00 mm	10	5.74
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Sand, Very Coarse	0.850 mm	20	5.77
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Sand, Coarse	0.425 mm	40	5.64
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Sand, Medium	0.250 mm	60	7.96
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Sand, Fine	0.106 mm	140	16.2
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Sand, Very Fine	0.075 mm	200	10.8
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Clay	<0.0039 mm	NA	15.8
LIB01-AGR08	U01-LIB01-AGR08D	11.5' - 12.5'	70.271550	-147.572067	Silt	0.0039 - 0.0625 mm	NA	31.3
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Gravel, Medium	4.75 mm	4	0.50
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Gravel, Fine	2.00 mm	10	0.27
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Sand, Very Coarse	0.850 mm	20	0.07
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Sand, Coarse	0.425 mm	40	0.21
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Sand, Medium	0.250 mm	60	0.31
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Sand, Fine	0.106 mm	140	1.07
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Sand, Very Fine	0.075 mm	200	2.41
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Clay	<0.0039 mm	NA	7.02
LIB01-AGR09	U01-LIB01-AGR09A	1.0' - 2.0'	70.278450	-147.559333	Silt	0.0039 - 0.0625 mm	NA	81.9

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Gravel, Fine	2.00 mm	10	0.06
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Sand, Very Coarse	0.850 mm	20	0.50
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Sand, Coarse	0.425 mm	40	0.49
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Sand, Medium	0.250 mm	60	0.92
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Sand, Fine	0.106 mm	140	3.53
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Sand, Very Fine	0.075 mm	200	4.29
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Clay	<0.0039 mm	NA	23.1
LIB01-AGR09	U01-LIB01-AGR09B	3.5' - 4.5'	70.278450	-147.559333	Silt	0.0039 - 0.0625 mm	NA	69.6
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Gravel, Fine	2.00 mm	10	0.08
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Sand, Very Coarse	0.850 mm	20	0.13
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Sand, Coarse	0.425 mm	40	1.40
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Sand, Medium	0.250 mm	60	14.8
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Sand, Fine	0.106 mm	140	52.5
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Sand, Very Fine	0.075 mm	200	7.60
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Clay	<0.0039 mm	NA	12.1
LIB01-AGR09	U01-LIB01-AGR09C	4.5' - 5.5'	70.278450	-147.559333	Silt	0.0039 - 0.0625 mm	NA	19.5
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Gravel, Medium	4.75 mm	4	0.00
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Gravel, Fine	2.00 mm	10	0.00
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Sand, Very Coarse	0.850 mm	20	0.16
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Sand, Coarse	0.425 mm	40	0.34
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Sand, Medium	0.250 mm	60	0.55
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Sand, Fine	0.106 mm	140	1.53
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Sand, Very Fine	0.075 mm	200	0.63
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Clay	<0.0039 mm	NA	33.9
LIB01-AGR09	U01-LIB01-AGR09D	9.0' - 10.0'	70.278450	-147.559333	Silt	0.0039 - 0.0625 mm	NA	59.3
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Gravel, Medium	4.75 mm	4	0.6
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Gravel, Fine	2.00 mm	10	0.6
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Sand, Very Coarse	0.850 mm	20	0.48
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Sand, Coarse	0.425 mm	40	0.76
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Sand, Medium	0.250 mm	60	4.92
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Sand, Fine	0.106 mm	140	27.3
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Sand, Very Fine	0.075 mm	200	13.8
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Clay	<0.0039 mm	NA	6.57
Surface Sediment	U01-LIB01-AS01	0.0' - 0.5'	70.261402	-147.736171	Silt	0.0039 - 0.0625 mm	NA	45.0

Grain Size Result Summary

Bore ID	Sample Identification	Depth	Latitude	Longitude	Grain Size	Sieve/Particle Size	Sieve Number	Percent Retained
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Gravel, Medium	4.75 mm	4	0.00
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Gravel, Fine	2.00 mm	10	0.00
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Sand, Very Coarse	0.850 mm	20	0.07
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Sand, Coarse	0.425 mm	40	0.72
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Sand, Medium	0.250 mm	60	6.08
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Sand, Fine	0.106 mm	140	69.4
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Sand, Very Fine	0.075 mm	200	8.28
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Clay	<0.0039 mm	NA	2.79
Surface Sediment	U01-LIB01-AS02	0.0' - 0.5'	70.222127	-147.661879	Silt	0.0039 - 0.0625 mm	NA	10.1
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Gravel, Medium	4.75 mm	4	0.00
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Gravel, Fine	2.00 mm	10	0.16
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Sand, Very Coarse	0.850 mm	20	0.10
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Sand, Coarse	0.425 mm	40	0.42
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Sand, Medium	0.250 mm	60	2.12
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Sand, Fine	0.106 mm	140	6.96
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Sand, Very Fine	0.075 mm	200	2.00
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Clay	<0.0039 mm	NA	14.0
Surface Sediment	U01-LIB01-AS03	0.0' - 0.5'	70.25208	-147.607942	Silt	0.0039 - 0.0625 mm	NA	69.6
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Gravel, Medium	4.75 mm	4	0.00
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Gravel, Fine	2.00 mm	10	0.03
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Sand, Very Coarse	0.850 mm	20	0.07
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Sand, Coarse	0.425 mm	40	0.16
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Sand, Medium	0.250 mm	60	0.24
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Sand, Fine	0.106 mm	140	0.97
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Sand, Very Fine	0.075 mm	200	5.41
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Clay	<0.0039 mm	NA	16.2
Surface Sediment	U01-LIB01-AS04	0.0' - 0.5'	70.27779	-147.561256	Silt	0.0039 - 0.0625 mm	NA	69.6
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Gravel, Medium	4.75 mm	4	9.72
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Gravel, Fine	2.00 mm	10	2.34
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Sand, Very Coarse	0.850 mm	20	1.17
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Sand, Coarse	0.425 mm	40	5.22
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Sand, Medium	0.250 mm	60	46.2
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Sand, Fine	0.106 mm	140	33.7
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Sand, Very Fine	0.075 mm	200	0.44
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Clay	<0.0039 mm	NA	1.01
LIB01-BGR01	U01-LIB01-BGR01A	2.0' - 3.0'	70.209700	-147.508400	Silt	0.0039 - 0.0625 mm	NA	1.21

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Gravel, Medium	4.75 mm	4	20.3
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Gravel, Fine	2.00 mm	10	5.1
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Sand, Very Coarse	0.850 mm	20	2.13
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Sand, Coarse	0.425 mm	40	7.94
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Sand, Medium	0.250 mm	60	41.6
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Sand, Fine	0.106 mm	140	19.9
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Sand, Very Fine	0.075 mm	200	0.73
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Clay	<0.0039 mm	NA	1.78
LIB01-BGR01	U01-LIB01-BGR01B	9.0' - 11.0'	70.209700	-147.508400	Silt	0.0039 - 0.0625 mm	NA	1.76
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Gravel, Medium	4.75 mm	4	45.6
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Gravel, Fine	2.00 mm	10	12.9
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Sand, Very Coarse	0.850 mm	20	4.61
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Sand, Coarse	0.425 mm	40	7.16
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Sand, Medium	0.250 mm	60	13.5
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Sand, Fine	0.106 mm	140	6.28
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Sand, Very Fine	0.075 mm	200	1.33
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Clay	<0.0039 mm	NA	3.23
LIB01-BGR01	U01-LIB01-BGR01C	11.5' - 13.0'	70.209700	-147.508400	Silt	0.0039 - 0.0625 mm	NA	5.64
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Gravel, Medium	4.75 mm	4	37.4
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Gravel, Fine	2.00 mm	10	13.6
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Sand, Very Coarse	0.850 mm	20	4.87
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Sand, Coarse	0.425 mm	40	5.93
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Sand, Medium	0.250 mm	60	15.7
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Sand, Fine	0.106 mm	140	10.7
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Sand, Very Fine	0.075 mm	200	1.27
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Clay	<0.0039 mm	NA	2.84
LIB01-BGR01	U01-LIB01-BGR01D	14.0' - 14.5'	70.209700	-147.508400	Silt	0.0039 - 0.0625 mm	NA	6.26
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Gravel, Medium	4.75 mm	4	6.04
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Gravel, Fine	2.00 mm	10	1.98
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Sand, Very Coarse	0.850 mm	20	1.35
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Sand, Coarse	0.425 mm	40	6.06
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Sand, Medium	0.250 mm	60	19.2
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Sand, Fine	0.106 mm	140	29.3
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Sand, Very Fine	0.075 mm	200	5.77
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Clay	<0.0039 mm	NA	9.25
LIB01-BGR03	U01-LIB01-BGR03A	0.4' - 0.8'	70.224217	-147.521167	Silt	0.0039 - 0.0625 mm	NA	20.5

Grain Size Result Summary

[illegible] Bore Log	[illegible] Sample Identification	[illegible] Depth	[illegible] Latitude	[illegible] Longitude	[illegible] Grain Size	[illegible] Sieve/Particle Size	Sieve Number	Percent Retained
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Gravel, Medium	4.75 mm	4	2.32
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Gravel, Fine	2.00 mm	10	1.38
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Sand, Very Coarse	0.850 mm	20	1.12
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Sand, Coarse	0.425 mm	40	4.01
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Sand, Medium	0.250 mm	60	13.8
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Sand, Fine	0.106 mm	140	26.6
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Sand, Very Fine	0.075 mm	200	6.27
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Clay	<0.0039 mm	NA	9.59
LIB01-BGR03	U01-LIB01-BGR03B	12.5' - 13.0'	70.224217	-147.521167	Silt	0.0039 - 0.0625 mm	NA	32.1
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Gravel, Medium	4.75 mm	4	49.3
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Gravel, Fine	2.00 mm	10	7.82
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Sand, Very Coarse	0.850 mm	20	2.25
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Sand, Coarse	0.425 mm	40	4.78
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Sand, Medium	0.250 mm	60	14.5
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Sand, Fine	0.106 mm	140	20.9
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Sand, Very Fine	0.075 mm	200	1.86
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Clay	<0.0039 mm	NA	1.15
LIB01-BGR03	U01-LIB01-BGR03C	13.0' - 13.5'	70.224217	-147.521167	Silt	0.0039 - 0.0625 mm	NA	2.06
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Gravel, Medium	4.75 mm	4	0.00
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Gravel, Fine	2.00 mm	10	1.14
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Sand, Very Coarse	0.850 mm	20	0.53
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Sand, Coarse	0.425 mm	40	0.29
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Sand, Medium	0.250 mm	60	0.43
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Sand, Fine	0.106 mm	140	3.82
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Sand, Very Fine	0.075 mm	200	7.54
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Clay	<0.0039 mm	NA	14.9
LIB01-BGR05	U01-LIB01-BGR05A	0.5' - 1.0'	70.238533	-147.531167	Silt	0.0039 - 0.0625 mm	NA	70
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Gravel, Medium	4.75 mm	4	0.91
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Gravel, Fine	2.00 mm	10	2
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Sand, Very Coarse	0.850 mm	20	2.74
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Sand, Coarse	0.425 mm	40	3.33
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Sand, Medium	0.250 mm	60	8.33
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Sand, Fine	0.106 mm	140	13.7
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Sand, Very Fine	0.075 mm	200	3.67
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Clay	<0.0039 mm	NA	9.77
LIB01-BGR05	U01-LIB01-BGR05B	5.5' - 6.0'	70.238533	-147.531167	Silt	0.0039 - 0.0625 mm	NA	53.8

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Gravel, Medium	4.75 mm	4	0.00
LIB01-BGR05	U01-LIB01-BGR05C	11.0'- 13.0'	70.238533	-147.531167	Gravel, Fine	2.00 mm	10	0.35
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Sand, Very Coarse	0.850 mm	20	0.79
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Sand, Coarse	0.425 mm	40	1.34
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Sand, Medium	0.250 mm	60	12.6
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Sand, Fine	0.106 mm	140	71.3
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Sand, Very Fine	0.075 mm	200	6.21
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Clay	<0.0039 mm	NA	1.97
LIB01-BGR05	U01-LIB01-BGR05C	11.0' - 13.0'	70.238533	-147.531167	Silt	0.0039 - 0.0625 mm	NA	4.67
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Gravel, Medium	4.75 mm	4	43.8
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Gravel, Fine	2.00 mm	10	13.2
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Sand, Very Coarse	0.850 mm	20	5
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Sand, Coarse	0.425 mm	40	6.5
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Sand, Medium	0.250 mm	60	17.9
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Sand, Fine	0.106 mm	140	9.48
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Sand, Very Fine	0.075 mm	200	0.8
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Clay	<0.0039 mm	NA	0.85
LIB01-BGR05	U01-LIB01-BGR05D	13.0' - 14.0'	70.238533	-147.531167	Silt	0.0039 - 0.0625 mm	NA	2.44
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Gravel, Medium	4.75 mm	4	0.00
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Gravel, Fine	2.00 mm	10	0.02
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Sand, Very Coarse	0.850 mm	20	0.46
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Sand, Coarse	0.425 mm	40	0.42
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Sand, Medium	0.250 mm	60	0.41
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Sand, Fine	0.106 mm	140	0.79
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Sand, Very Fine	0.075 mm	200	0.63
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Clay	<0.0039 mm	NA	44.0
LIB01-BGR08	U01-LIB01-BGR08A	5.0' - 5.5'	70.260033	-147.546017	Silt	0.0039 - 0.0625 mm	NA	52.6
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Gravel, Medium	4.75 mm	4	0.00
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Gravel, Fine	2.00 mm	10	0.94
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Sand, Very Coarse	0.850 mm	20	1.35
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Sand, Coarse	0.425 mm	40	0.84
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Sand, Medium	0.250 mm	60	0.60
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Sand, Fine	0.106 mm	140	0.91
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Sand, Very Fine	0.075 mm	200	0.57
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Clay	<0.0039 mm	NA	41.0
LIB01-BGR08	U01-LIB01-BGR08B	8.0' - 9.0'	70.260033	-147.546017	Silt	0.0039 - 0.0625 mm	NA	53.3

Grain Size Result Summary

[illegible] Bore Log #	[illegible] Sample Identification	[illegible] Depth	[illegible] Latitude	[illegible] Longitude	[illegible] Grain Size	[illegible] Sieve/Particle Size	Sieve Number	Percent Retained
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Gravel, Medium	4.75 mm	4	0.00
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Gravel, Fine	2.00 mm	10	0.73
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Sand, Very Coarse	0.850 mm	20	1.09
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Sand, Coarse	0.425 mm	40	1.35
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Sand, Medium	0.250 mm	60	1.92
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Sand, Fine	0.106 mm	140	7.42
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Sand, Very Fine	0.075 mm	200	5.98
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Clay	<0.0039 mm	NA	21.0
LIB01-BGR08	U01-LIB01-BGR08C	13.0' - 14.0'	70.260033	-147.546017	Silt	0.0039 - 0.0625 mm	NA	57.1
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Gravel, Medium	4.75 mm	4	0.00
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Gravel, Fine	2.00 mm	10	0.00
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Sand, Very Coarse	0.850 mm	20	0.62
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Sand, Coarse	0.425 mm	40	0.78
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Sand, Medium	0.250 mm	60	1.23
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Sand, Fine	0.106 mm	140	2.86
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Sand, Very Fine	0.075 mm	200	1.17
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Clay	<0.0039 mm	NA	44.3
LIB01-BGR08	U01-LIB01-BGR08D	14.0' - 15.0'	70.260033	-147.546017	Silt	0.0039 - 0.0625 mm	NA	52.0
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Sand, Very Coarse	0.850 mm	20	0.06
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Sand, Coarse	0.425 mm	40	0.1
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Sand, Medium	0.250 mm	60	0.32
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Sand, Fine	0.106 mm	140	1.11
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Sand, Very Fine	0.075 mm	200	3.14
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Clay	<0.0039 mm	NA	16.4
LIB01-CGR03	U01-LIB01-CGR03A	4.0' - 5.0'	70.232250	-147.502533	Silt	0.0039 - 0.0625 mm	NA	78.5
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Sand, Very Coarse	0.850 mm	20	0.04
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Sand, Coarse	0.425 mm	40	0.1
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Sand, Medium	0.250 mm	60	0.3
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Sand, Fine	0.106 mm	140	0.97
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Sand, Very Fine	0.075 mm	200	3.33
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Clay	<0.0039 mm	NA	17.4
LIB01-CGR03	U01-LIB01-CGR03A DUP	4.0' - 5.0'	70.232250	-147.502533	Silt	0.0039 - 0.0625 mm	NA	76.7

Grain Size Result Summary

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Sand, Very Coarse	0.850 mm	20	0.02
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Sand, Coarse	0.425 mm	40	0.17
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Sand, Medium	0.250 mm	60	0.21
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Sand, Fine	0.106 mm	140	2.8
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Sand, Very Fine	0.075 mm	200	5.84
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Clay	<0.0039 mm	NA	10.7
LIB01-CGR03	U01-LIB01-CGR03B	7.5' - 8.5'	70.232250	-147.502533	Silt	0.0039 - 0.0625 mm	NA	20.8
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Sand, Very Coarse	0.850 mm	20	0.15
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Sand, Coarse	0.425 mm	40	0.89
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Sand, Medium	0.250 mm	60	20.2
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Sand, Fine	0.106 mm	140	46.6
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Sand, Very Fine	0.075 mm	200	3.2
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Clay	<0.0039 mm	NA	9.33
LIB01-CGR03	U01-LIB01-CGR03C	10.0' - 11.0'	70.232250	-147.502533	Silt	0.0039 - 0.0625 mm	NA	12.8
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Gravel, Fine	2.00 mm	10	0.14
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Sand, Very Coarse	0.850 mm	20	0.29
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Sand, Coarse	0.425 mm	40	2.34
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Sand, Medium	0.250 mm	60	20.4
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Sand, Fine	0.106 mm	140	37.3
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Sand, Very Fine	0.075 mm	200	3.56
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Clay	<0.0039 mm	NA	11.6
LIB01-CGR03	U01-LIB01-CGR03D	12.5' - 13.5'	70.232250	-147.502533	Silt	0.0039 - 0.0625 mm	NA	17.3
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.24
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.1
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	0.1
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	0.31
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	3.77
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	18.4
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Clay	<0.0039 mm	NA	14.8
LIB01-CGR06	U01-LIB01-CGR06A	1.0' - 2.0'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	61.7

Grain Size Result Summary

Boring ID	Sample Identification	Depth	Latitude	Longitude	Grain Size	[illegible]	[illegible]	[illegible]
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.46
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.12
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	0.18
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	0.29
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	4.2
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	18.7
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Clay	<0.0039 mm	NA	14
LIB01-CGR06	U01-LIB01-CGR06AS	1.0' - 2.0'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	70.6
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.06
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	0.16
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	0.34
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	0.97
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	1.23
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Clay	<0.0039 mm	NA	13.8
LIB01-CGR06	U01-LIB01-CGR06B	3.5' - 4.5'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	76.9
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.04
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	0.24
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	0.48
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	1.41
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	1.16
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Clay	<0.0039 mm	NA	18.2
LIB01-CGR06	U01-LIB01-CGR06BS	3.5' - 4.5'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	71.2
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.03
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	0.09
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	0.72
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	4.44
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	2.55
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Clay	<0.0039 mm	NA	10.8
LIB01-CGR06	U01-LIB01-CGR06C	11.5' - 12.5'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	77.8

Grain Size Result Summary

Bore Log	Sample Identification	Depth	Latitude	Longitude	Grain Size	Sieve/Particle Size	Sieve Number	Percent Retained
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.03
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	0.13
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	0.35
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	2.97
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	2.25
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Clay	<0.0039 mm	NA	11.2
LIB01-CGR06	U01-LIB01-CGR06CS	11.5' - 12.5'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	80.3
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.73
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.35
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	1.19
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	8.33
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	31.5
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	13.3
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Clay	<0.0039 mm	NA	9.67
LIB01-CGR06	U01-LIB01-CGR06D	12.5' - 14.0'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	36.2
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Gravel, Fine	2.00 mm	10	0.34
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Sand, Very Coarse	0.850 mm	20	0.62
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Sand, Coarse	0.425 mm	40	1.35
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Sand, Medium	0.250 mm	60	8.26
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Sand, Fine	0.106 mm	140	30.9
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Sand, Very Fine	0.075 mm	200	12.6
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Clay	<0.0039 mm	NA	10.9
LIB01-CGR06	U01-LIB01-CGR06DS	12.5' - 14.0'	70.254533	-147.500250	Silt	0.0039 - 0.0625 mm	NA	37.5
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Sand, Very Coarse	0.850 mm	20	0.04
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Sand, Coarse	0.425 mm	40	0.16
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Sand, Medium	0.250 mm	60	0.3
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Sand, Fine	0.106 mm	140	1.16
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Sand, Very Fine	0.075 mm	200	1.38
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Clay	<0.0039 mm	NA	26.7
LIB01-CGR08	U01-LIB01-CGR08A	2.5' - 3.5'	70.269817	-147.498267	Silt	0.0039 - 0.0625 mm	NA	69.8

Grain Size Result Summary

[illegible]	[illegible]	Depth	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Sand, Very Coarse	0.850 mm	20	0.00
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Sand, Coarse	0.425 mm	40	0.12
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Sand, Medium	0.250 mm	60	0.55
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Sand, Fine	0.106 mm	140	1.87
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Sand, Very Fine	0.075 mm	200	1.52
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Clay	<0.0039 mm	NA	20
LIB01-CGR08	U01-LIB01-CGR08B	5.0' - 6.0'	70.269817	-147.498267	Silt	0.0039 - 0.0625 mm	NA	75.8
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Sand, Very Coarse	0.850 mm	20	0.00
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Sand, Coarse	0.425 mm	40	0.99
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Sand, Medium	0.250 mm	60	1.69
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Sand, Fine	0.106 mm	140	3.43
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Sand, Very Fine	0.075 mm	200	2.66
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Clay	<0.0039 mm	NA	10.8
LIB01-CGR08	U01-LIB01-CGR08C	7.5' - 8.5'	70.269817	-147.498267	Silt	0.0039 - 0.0625 mm	NA	76.5
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Gravel, Medium	4.75 mm	4	0.00
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Gravel, Fine	2.00 mm	10	0.00
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Sand, Very Coarse	0.850 mm	20	0.03
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Sand, Coarse	0.425 mm	40	0.15
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Sand, Medium	0.250 mm	60	0.58
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Sand, Fine	0.106 mm	140	2.33
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Sand, Very Fine	0.075 mm	200	4.42
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Clay	<0.0039 mm	NA	14
LIB01-CGR08	U01-LIB01-CGR08D	11.5' - 12.5'	70.269817	-147.498267	Silt	0.0039 - 0.0625 mm	NA	74.6

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	74.4	PERCENT	NA	NA		
	U01-LIB01-AT01B	73.7	PERCENT	NA	NA		
	U01-LIB01-AT01C	82.8	PERCENT	NA	NA		
	U01-LIB01-AT01D	63.7	PERCENT	NA	NA		
LIB01-AGR05	U01-LIB01-AT02A	71.9	PERCENT	NA	NA		
	U01-LIB01-AT02AS	71.6	PERCENT	NA	NA		
	U01-LIB01-AT02B	45	PERCENT	NA	NA		
	U01-LIB01-AT02BS	43.7	PERCENT	NA	NA		
	U01-LIB01-AT02C	79.6	PERCENT	NA	NA		
	U01-LIB01-AT02CS	80	PERCENT	NA	NA		
	U01-LIB01-AT02D	69.2	PERCENT	NA	NA		
	U01-LIB01-AT02DS	75.8	PERCENT	NA	NA		
LIB01-AGR07	U01-LIB01-AT03A	54.6	PERCENT	NA	NA		
	U01-LIB01-AT03AB	70.4	PERCENT	NA	NA		
	U01-LIB01-AT03B	57	PERCENT	NA	NA		
	U01-LIB01-AT03BB	70	PERCENT	NA	NA		
	U01-LIB01-AT03C	74	PERCENT	NA	NA		
	U01-LIB01-AT03CB	61.6	PERCENT	NA	NA		
	U01-LIB01-AT03D	59	PERCENT	NA	NA		
	U01-LIB01-AT03DB	81	PERCENT	NA	NA		
LIB01-AGR09	U01-LIB01-AT04A	67.3	PERCENT	NA	NA		
	U01-LIB01-AT04B	70.9	PERCENT	NA	NA		
	U01-LIB01-AT04C	77.9	PERCENT	NA	NA		
	U01-LIB01-AT04D	72.5	PERCENT	NA	NA		
LIB01-BGR01	U01-LIB01-BT01A	84.6	PERCENT	NA	NA		
	U01-LIB01-BT01B	83.3	PERCENT	NA	NA		
	U01-LIB01-BT01C	82.3	PERCENT	NA	NA		
	U01-LIB01-BT01D	82.3	PERCENT	NA	NA		
LIB01-BGR03	U01-LIB01-BT02A	62	PERCENT	NA	NA		
	U01-LIB01-BT02B	93.1	PERCENT	NA	NA		
LIB01-BGR05	U01-LIB01-BT03A	75.6	PERCENT	NA	NA		
	U01-LIB01-BT03B	58.6	PERCENT	NA	NA		
	U01-LIB01-BT03C	70.4	PERCENT	NA	NA		
LIB01-BGR08	U01-LIB01-BT04A	64.3	PERCENT	NA	NA		
	U01-LIB01-BT04B	70.3	PERCENT	NA	NA		
	U01-LIB01-BT04C	79.5	PERCENT	NA	NA		
	U01-LIB01-BT04D	82.2	PERCENT	NA	NA		
LIB01-CGR03	U01-LIB01-CT01A	79.2	PERCENT	NA	NA		
	U01-LIB01-CT01B	84.6	PERCENT	NA	NA		
	U01-LIB01-CT01C	78.7	PERCENT	NA	NA		
	U01-LIB01-CT01D	78	PERCENT	NA	NA		
	U01-LIB01-CT01DS	79.6	PERCENT	NA	NA		
LIB01-CGR06	U01-LIB01-CT02A	75.1	PERCENT	NA	NA		
	U01-LIB01-CT02B	64	PERCENT	NA	NA		
	U01-LIB01-CT02C	73.8	PERCENT	NA	NA		
	U01-LIB01-CT02D	49.5	PERCENT	NA	NA		
LIB01-CGR08	U01-LIB01-CT03A	75.2	PERCENT	NA	NA		
	U01-LIB01-CT03B	71.4	PERCENT	NA	NA		
	U01-LIB01-CT03C	61.5	PERCENT	NA	NA		
	U01-LIB01-CT03D	76.4	PERCENT	NA	NA		
	U01-LIB01-CT03DB	74.5	PERCENT	NA	NA		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	5.47	PERCENT	NA	NA		
	U01-LIB01-AT01B	5.9	PERCENT	NA	NA		
	U01-LIB01-AT01C	1.44	PERCENT	NA	NA		
	U01-LIB01-AT01D	9.74	PERCENT	NA	NA		
LIB01-AGR05	U01-LIB01-AT02A	4.32	PERCENT	NA	NA		
	U01-LIB01-AT02AS	4.33	PERCENT	NA	NA		
	U01-LIB01-AT02B	23.6	PERCENT	NA	NA		
	U01-LIB01-AT02BS	26.4	PERCENT	NA	NA		
	U01-LIB01-AT02C	2.47	PERCENT	NA	NA		
	U01-LIB01-AT02CS	2.18	PERCENT	NA	NA		
	U01-LIB01-AT02D	6.2	PERCENT	NA	NA		
	U01-LIB01-AT02DS	3.43	PERCENT	NA	NA		
LIB01-AGR07	U01-LIB01-AT03A	12.9	PERCENT	NA	NA		
	U01-LIB01-AT03AB	5.45	PERCENT	NA	NA		
	U01-LIB01-AT03B	12.7	PERCENT	NA	NA		
	U01-LIB01-AT03BB	7.35	PERCENT	NA	NA		
	U01-LIB01-AT03C	6.59	PERCENT	NA	NA		
	U01-LIB01-AT03CB	12.6	PERCENT	NA	NA		
	U01-LIB01-AT03D	12.8	PERCENT	NA	NA		
	U01-LIB01-AT03DB	7.99	PERCENT	NA	NA		
LIB01-AGR09	U01-LIB01-AT04A	4.62	PERCENT	NA	NA		
	U01-LIB01-AT04B	4.53	PERCENT	NA	NA		
	U01-LIB01-AT04C	8.15	PERCENT	NA	NA		
	U01-LIB01-AT04D	8.18	PERCENT	NA	NA		
LIB01-BGR01	U01-LIB01-BT01A	0.76	PERCENT	NA	NA		
	U01-LIB01-BT01B	1.54	PERCENT	NA	NA		
	U01-LIB01-BT01C	1.74	PERCENT	NA	NA		
	U01-LIB01-BT01D	0.71	PERCENT	NA	NA		
LIB01-BGR03	U01-LIB01-BT02A	7.9	PERCENT	NA	NA		
	U01-LIB01-BT02B	1.34	PERCENT	NA	NA		
LIB01-BGR05	U01-LIB01-BT03A	5.48	PERCENT	NA	NA		
	U01-LIB01-BT03B	13.1	PERCENT	NA	NA		
	U01-LIB01-BT03C	4.89	PERCENT	NA	NA		
LIB01-BGR08	U01-LIB01-BT04A	7.94	PERCENT	NA	NA		
	U01-LIB01-BT04B	11.1	PERCENT	NA	NA		
	U01-LIB01-BT04C	6.71	PERCENT	NA	NA		
	U01-LIB01-BT04D	3.8	PERCENT	NA	NA		
LIB01-CGR03	U01-LIB01-CT01A	2.94	PERCENT	NA	NA		
	U01-LIB01-CT01B	3.89	PERCENT	NA	NA		
	U01-LIB01-CT01C	5.48	PERCENT	NA	NA		
	U01-LIB01-CT01D	6.45	PERCENT	NA	NA		
	U01-LIB01-CT01DS	5.78	PERCENT	NA	NA		
LIB01-CGR06	U01-LIB01-CT02A	3.82	PERCENT	NA	NA		
	U01-LIB01-CT02B	7.4	PERCENT	NA	NA		
	U01-LIB01-CT02C	5.66	PERCENT	NA	NA		
	U01-LIB01-CT02D	17.3	PERCENT	NA	NA		
LIB01-CGR08	U01-LIB01-CT03A	2.83	PERCENT	NA	NA		
	U01-LIB01-CT03B	3.9	PERCENT	NA	NA		
	U01-LIB01-CT03C	7.32	PERCENT	NA	NA		
	U01-LIB01-CT03D	3.28	PERCENT	NA	NA		
	U01-LIB01-CT03DB	3.33	PERCENT	NA	NA		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	5.2	mg/Kg	0.2	0.2		
	U01-LIB01-AT01B	7.2	mg/Kg	0.2	0.2		
	U01-LIB01-AT01C	5.5	mg/Kg	0.2	0.2		
	U01-LIB01-AT01D	17.3	mg/Kg	0.2	0.2		
LIB01-AGR05	U01-LIB01-AT02A	3	mg/Kg	0.2	0.2		
	U01-LIB01-AT02AS	3.7	mg/Kg	0.2	0.2		
	U01-LIB01-AT02B	95	mg/Kg	0.2	0.2		
	U01-LIB01-AT02BS	96.5	mg/Kg	0.2	0.2		
	U01-LIB01-AT02C	22.8	mg/Kg	0.2	0.2		
	U01-LIB01-AT02CS	19.5	mg/Kg	0.2	0.2		
	U01-LIB01-AT02D	33.5	mg/Kg	0.2	0.2		
	U01-LIB01-AT02DS	28.2	mg/Kg	0.2	0.2		
LIB01-AGR07	U01-LIB01-AT03A	83.6	mg/Kg	6.0	6.0		
	U01-LIB01-AT03AB	83.6	mg/Kg	6.0	6.0		
	U01-LIB01-AT03B	105	mg/Kg	6.0	6.0		
	U01-LIB01-AT03BB	259	mg/Kg	6.0	6.0		
	U01-LIB01-AT03C	282	mg/Kg	6.0	6.0		
	U01-LIB01-AT03CB	152	mg/Kg	6.0	6.0		
	U01-LIB01-AT03D	125	mg/Kg	6.0	6.0		
	U01-LIB01-AT03DB	156	mg/Kg	6.0	6.0		
LIB01-AGR09	U01-LIB01-AT04A	134	mg/Kg	6.0	6.0		
	U01-LIB01-AT04B	287	mg/Kg	6.0	6.0		
	U01-LIB01-AT04C	609	mg/Kg	6.0	6.0		
	U01-LIB01-AT04D	710	mg/Kg	6.0	6.0		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	mg/Kg	0.3	0.3		
	U01-LIB01-BT01B	1.1	mg/Kg	0.3	0.3		
	U01-LIB01-BT01C	1.8	mg/Kg	0.3	0.3		
	U01-LIB01-BT01D	0.7	mg/Kg	0.3	0.3		
LIB01-BGR03	U01-LIB01-BT02A	22	mg/Kg	10	20		
	U01-LIB01-BT02B	102	mg/Kg	10	20		
LIB01-BGR05	U01-LIB01-BT03A	40	mg/Kg	10	20		
	U01-LIB01-BT03B	110	mg/Kg	10	20		
	U01-LIB01-BT03C	212	mg/Kg	10	20		
LIB01-BGR08	U01-LIB01-BT04A	307	mg/Kg	10	20		
	U01-LIB01-BT04B	402	mg/Kg	10	20		
	U01-LIB01-BT04C	500	mg/Kg	10	20		
	U01-LIB01-BT04D	493	mg/Kg	10	20		
LIB01-CGR03	U01-LIB01-CT01A	5.4	mg/Kg	0.3	0.3		
	U01-LIB01-CT01B	9.1	mg/Kg	0.3	0.3		
	U01-LIB01-CT01C	11.9	mg/Kg	0.3	0.3		
	U01-LIB01-CT01D	12.1	mg/Kg	0.3	0.3		
	U01-LIB01-CT01DS	13.1	mg/Kg	0.3	0.3		
LIB01-CGR06	U01-LIB01-CT02A	9.6	mg/Kg	0.3	0.3		
	U01-LIB01-CT02B	33.3	mg/Kg	0.3	0.3		
	U01-LIB01-CT02C	24.8	mg/Kg	0.3	0.3		
	U01-LIB01-CT02D	43.9	mg/Kg	0.3	0.3		
LIB01-CGR08	U01-LIB01-CT03A	3.8	mg/Kg	0.3	0.3		
	U01-LIB01-CT03B	25.9	mg/Kg	0.3	0.3		
	U01-LIB01-CT03C	49.7	mg/Kg	0.3	0.3		
	U01-LIB01-CT03D	36.8	mg/Kg	0.3	0.3		
	U01-LIB01-CT03DB	45.3	mg/Kg	0.3	0.3		

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Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	4.09	PERCENT	0.02	0.05		
	U01-LIB01-AT01B	4.58	PERCENT	0.02	0.05		
	U01-LIB01-AT01C	0.61	PERCENT	0.02	0.05		
	U01-LIB01-AT01D	5	PERCENT	0.02	0.05		
LIB01-AGR05	U01-LIB01-AT02A	3.3	PERCENT	0.02	0.05		
	U01-LIB01-AT02AS	2.62	PERCENT	0.02	0.05		
	U01-LIB01-AT02B	14.7	PERCENT	0.02	0.05		
	U01-LIB01-AT02BS	13.4	PERCENT	0.02	0.05		
	U01-LIB01-AT02C	2.39	PERCENT	0.02	0.05		
	U01-LIB01-AT02CS	1.04	PERCENT	0.02	0.05		
	U01-LIB01-AT02D	2.35	PERCENT	0.02	0.05		
	U01-LIB01-AT02DS	2.58	PERCENT	0.02	0.05		
LIB01-AGR07	U01-LIB01-AT03A	8.58	PERCENT	0.02	0.05		
	U01-LIB01-AT03AB	4.22	PERCENT	0.02	0.05		
	U01-LIB01-AT03B	3.38	PERCENT	0.02	0.05		
	U01-LIB01-AT03BB	2.8	PERCENT	0.02	0.05		
	U01-LIB01-AT03C	3.17	PERCENT	0.02	0.05		
	U01-LIB01-AT03CB	5.34	PERCENT	0.02	0.05		
	U01-LIB01-AT03D	7.4	PERCENT	0.02	0.05		
	U01-LIB01-AT03DB	2.72	PERCENT	0.02	0.05		
LIB01-AGR09	U01-LIB01-AT04A	2.07	PERCENT	0.02	0.05		
	U01-LIB01-AT04B	2.3	PERCENT	0.02	0.05		
	U01-LIB01-AT04C	2.48	PERCENT	0.02	0.05		
	U01-LIB01-AT04D	2.81	PERCENT	0.02	0.05		
LIB01-BGR01	U01-LIB01-BT01A	0.23	PERCENT	0.02	0.05		
	U01-LIB01-BT01B	0.22	PERCENT	0.02	0.05		
	U01-LIB01-BT01C	0.43	PERCENT	0.02	0.05		
	U01-LIB01-BT01D	0.46	PERCENT	0.02	0.05		
LIB01-BGR03	U01-LIB01-BT02A	2.82	PERCENT	0.03	0.05		
	U01-LIB01-BT02B	0.63	PERCENT	0.03	0.05		
LIB01-BGR05	U01-LIB01-BT03A	2.37	PERCENT	0.03	0.05		
	U01-LIB01-BT03B	7.83	PERCENT	0.03	0.05		
	U01-LIB01-BT03C	2.2	PERCENT	0.03	0.05		
LIB01-BGR08	U01-LIB01-BT04A	2.69	PERCENT	0.03	0.05		
	U01-LIB01-BT04B	3.33	PERCENT	0.03	0.05		
	U01-LIB01-BT04C	2.63	PERCENT	0.03	0.05		
	U01-LIB01-BT04D	1.85	PERCENT	0.03	0.05		
LIB01-CGR03	U01-LIB01-CT01A	2.65	PERCENT	0.02	0.05		
	U01-LIB01-CT01B	3.23	PERCENT	0.02	0.05		
	U01-LIB01-CT01C	2.15	PERCENT	0.02	0.05		
	U01-LIB01-CT01D	5.45	PERCENT	0.02	0.05		
	U01-LIB01-CT01DS	4.5	PERCENT	0.02	0.05		
LIB01-CGR06	U01-LIB01-CT02A	2.78	PERCENT	0.02	0.05		
	U01-LIB01-CT02B	3.04	PERCENT	0.02	0.05		
	U01-LIB01-CT02C	3.13	PERCENT	0.02	0.05		
	U01-LIB01-CT02D	8.39	PERCENT	0.02	0.05		
LIB01-CGR08	U01-LIB01-CT03A	2.26	PERCENT	0.02	0.05		
	U01-LIB01-CT03B	3.15	PERCENT	0.02	0.05		
	U01-LIB01-CT03C	4.32	PERCENT	0.02	0.05		
	U01-LIB01-CT03D	2.88	PERCENT	0.02	0.05		
	U01-LIB01-CT03DB	2.71	PERCENT	0.02	0.05		

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Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	2240	mg/Kg	200	200		
	U01-LIB01-AT01B	1960	mg/Kg	200	200		
	U01-LIB01-AT01C	40.8	mg/Kg	5.0	5.0		
	U01-LIB01-AT01D	3290	mg/Kg	200	200		
LIB01-AGR05	U01-LIB01-AT02A	44.1	mg/Kg	2.5	2.5		
	U01-LIB01-AT02AS	50.9	mg/Kg	2.5	2.5		
	U01-LIB01-AT02B	210	mg/Kg	10	10		
	U01-LIB01-AT02BS	183	mg/Kg	5.0	5.0		
	U01-LIB01-AT02C	69.6	mg/Kg	5.0	5.0		
	U01-LIB01-AT02CS	100	mg/Kg	5.0	5.0		
	U01-LIB01-AT02D	894	mg/Kg	100	100		
	U01-LIB01-AT02DS	753	mg/Kg	100	100		
LIB01-AGR07	U01-LIB01-AT03A	628	mg/Kg	50	50		
	U01-LIB01-AT03AB	1900	mg/Kg	100	100		
	U01-LIB01-AT03B	152	mg/Kg	10	10		
	U01-LIB01-AT03BB	1410	mg/Kg	100	100		
	U01-LIB01-AT03C	836	mg/Kg	50	50		
	U01-LIB01-AT03CB	56.7	mg/Kg	5.0	5.0		
	U01-LIB01-AT03D	1820	mg/Kg	100	100		
	U01-LIB01-AT03DB	50.1	mg/Kg	5.0	5.0		
LIB01-AGR09	U01-LIB01-AT04A	1350	mg/Kg	100	100		
	U01-LIB01-AT04B	1050	mg/Kg	100	100		
	U01-LIB01-AT04C	1000	mg/Kg	100	100		
	U01-LIB01-AT04D	1640	mg/Kg	100	100		
LIB01-BGR01	U01-LIB01-BT01A	18.8	mg/Kg	2.5	2.5		
	U01-LIB01-BT01B	54.6	mg/Kg	5.0	5.0		
	U01-LIB01-BT01C	74.9	mg/Kg	10.0	10.0		
	U01-LIB01-BT01D	26.1	mg/Kg	2.5	2.5		
LIB01-BGR03	U01-LIB01-BT02A	1610	mg/Kg	60	100		
	U01-LIB01-BT02B	27.4	mg/Kg	3.0	5.0		
LIB01-BGR05	U01-LIB01-BT03A	321	mg/Kg	6.0	10		
	U01-LIB01-BT03B	271	mg/Kg	12	20		
	U01-LIB01-BT03C	422	mg/Kg	12	20		
LIB01-BGR08	U01-LIB01-BT04A	102	mg/Kg	3.0	5.0		
	U01-LIB01-BT04B	451	mg/Kg	24	40		
	U01-LIB01-BT04C	1790	mg/Kg	6.0	100		
	U01-LIB01-BT04D	230	mg/Kg	24	40		
LIB01-CGR03	U01-LIB01-CT01A	449	mg/Kg	40	40		
	U01-LIB01-CT01B	1420	mg/Kg	100	100		
	U01-LIB01-CT01C	1120	mg/Kg	100	100		
	U01-LIB01-CT01D	2330	mg/Kg	200	200		
	U01-LIB01-CT01DS	1760	mg/Kg	100	100		
LIB01-CGR06	U01-LIB01-CT02A	93.5	mg/Kg	5.0	5.0		
	U01-LIB01-CT02B	2020	mg/Kg	100	100		
	U01-LIB01-CT02C	66	mg/Kg	5.0	5.0		
	U01-LIB01-CT02D	54.5	mg/Kg	2.0	2.0		
LIB01-CGR08	U01-LIB01-CT03A	362	mg/Kg	20	20		
	U01-LIB01-CT03B	1930	mg/Kg	100	100		
	U01-LIB01-CT03C	250	mg/Kg	10.0	10.0		
	U01-LIB01-CT03D	723	mg/Kg	40	40		
	U01-LIB01-CT03DB	496	mg/Kg	40	40		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	0.17	mg/Kg	0.03	0.06		
	U01-LIB01-AT01B	0.18	mg/Kg	0.03	0.06		
	U01-LIB01-AT01C	0.16	mg/Kg	0.03	0.06		
	U01-LIB01-AT01D	0.16	mg/Kg	0.03	0.06		
LIB01-AGR05	U01-LIB01-AT02A	0.21	mg/Kg	0.03	0.06		
	U01-LIB01-AT02AS	0.17	mg/Kg	0.03	0.06		
	U01-LIB01-AT02B	0.31	mg/Kg	0.03	0.05		
	U01-LIB01-AT02BS	0.34	mg/Kg	0.03	0.05		
	U01-LIB01-AT02C	0.14	mg/Kg	0.03	0.05		
	U01-LIB01-AT02CS	0.12	mg/Kg	0.03	0.06		
	U01-LIB01-AT02D	0.16	mg/Kg	0.03	0.05		
	U01-LIB01-AT02DS	0.19	mg/Kg	0.03	0.06		
LIB01-AGR07	U01-LIB01-AT03A	0.19	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-AT03AB	0.15	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-AT03B	0.15	mg/Kg	0.02	0.05	N	VML
	U01-LIB01-AT03BB	0.14	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-AT03C	0.26	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-AT03CB	0.14	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-AT03D	0.17	mg/Kg	0.02	0.05	N	VML
	U01-LIB01-AT03DB	0.16	mg/Kg	0.03	0.06	N	VML
LIB01-AGR09	U01-LIB01-AT04A	0.11	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-AT04B	0.12	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-AT04C	0.34	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-AT04D	0.35	mg/Kg	0.03	0.06	N	VML
LIB01-BGR01	U01-LIB01-BT01A	0.05	mg/Kg	0.04	0.06	BN	VML
	U01-LIB01-BT01B	0.04	mg/Kg	0.04	0.06	BN	VML
	U01-LIB01-BT01C	0.06	mg/Kg	0.04	0.06	BN	VML
	U01-LIB01-BT01D	0.04	mg/Kg	0.04	0.06	BN	VML
LIB01-BGR03	U01-LIB01-BT02A	0.12	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-BT02B	0.1	mg/Kg	0.03	0.05	N	VML
LIB01-BGR05	U01-LIB01-BT03A	0.2	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-BT03B	0.09	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-BT03C	0.1	mg/Kg	0.04	0.06	N	VML
LIB01-BGR08	U01-LIB01-BT04A	0.17	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-BT04B	0.23	mg/Kg	0.04	0.06	N	VML
	U01-LIB01-BT04C	0.22	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-BT04D	0.13	mg/Kg	0.04	0.06	N	VML
LIB01-CGR03	U01-LIB01-CT01A	0.11	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-CT01B	0.11	mg/Kg	0.04	0.06	N	VML
	U01-LIB01-CT01C	0.12	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-CT01D	0.11	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-CT01DS	0.08	mg/Kg	0.03	0.05	N	VML
LIB01-CGR06	U01-LIB01-CT02A	0.09	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-CT02B	0.12	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-CT02C	0.06	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-CT02D	0.15	mg/Kg	0.03	0.05	N	VML
LIB01-CGR08	U01-LIB01-CT03A	0.12	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-CT03B	0.1	mg/Kg	0.04	0.06	N	VML
	U01-LIB01-CT03C	0.09	mg/Kg	0.03	0.06	N	VML
	U01-LIB01-CT03D	0.07	mg/Kg	0.03	0.05	N	VML
	U01-LIB01-CT03DB	0.08	mg/Kg	0.03	0.06	N	VML

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	6.2	mg/Kg	0.1	0.6		
	U01-LIB01-AT01B	6.7	mg/Kg	0.1	0.6		
	U01-LIB01-AT01C	3.5	mg/Kg	0.1	0.6		
	U01-LIB01-AT01D	7.6	mg/Kg	0.1	0.6		
LIB01-AGR05	U01-LIB01-AT02A	9.9	mg/Kg	0.1	0.6		
	U01-LIB01-AT02AS	6.5	mg/Kg	0.1	0.6		
	U01-LIB01-AT02B	12.8	mg/Kg	0.3	2.5		
	U01-LIB01-AT02BS	12.7	mg/Kg	0.3	2.6		
	U01-LIB01-AT02C	3.5	mg/Kg	0.1	0.5		
	U01-LIB01-AT02CS	3.7	mg/Kg	0.1	0.6		
	U01-LIB01-AT02D	5.9	mg/Kg	0.1	0.5		
	U01-LIB01-AT02DS	5.6	mg/Kg	0.1	0.6		
LIB01-AGR07	U01-LIB01-AT03A	15.2	mg/Kg	0.1	0.5		
	U01-LIB01-AT03AB	10.1	mg/Kg	0.1	0.6		
	U01-LIB01-AT03B	7.2	mg/Kg		0.5		
	U01-LIB01-AT03BB	5.3	mg/Kg	0.1	0.6		
	U01-LIB01-AT03C	7.5	mg/Kg	0.1	0.6		
	U01-LIB01-AT03CB	5.6	mg/Kg	0.1	0.6		
	U01-LIB01-AT03D	14.3	mg/Kg		0.5		
	U01-LIB01-AT03DB	5.8	mg/Kg	0.1	0.6		
LIB01-AGR09	U01-LIB01-AT04A	3.4	mg/Kg	0.1	0.5		
	U01-LIB01-AT04B	4.3	mg/Kg	0.1	0.6		
	U01-LIB01-AT04C	9.6	mg/Kg	0.1	0.5		
	U01-LIB01-AT04D	10.4	mg/Kg	0.1	0.6		
LIB01-BGR01	U01-LIB01-BT01A	3	mg/Kg	0.1	0.6		
	U01-LIB01-BT01B	2.4	mg/Kg	0.1	0.6		
	U01-LIB01-BT01C	2.9	mg/Kg	0.1	0.6		
	U01-LIB01-BT01D	2.7	mg/Kg	0.1	0.6		
LIB01-BGR03	U01-LIB01-BT02A	12.1	mg/Kg	0.2	0.6		
	U01-LIB01-BT02B	7.3	mg/Kg	0.2	0.5		
LIB01-BGR05	U01-LIB01-BT03A	7.6	mg/Kg	0.2	0.6		
	U01-LIB01-BT03B	3.3	mg/Kg	0.2	0.5		
	U01-LIB01-BT03C	4.3	mg/Kg	0.2	0.6		
LIB01-BGR08	U01-LIB01-BT04A	7.6	mg/Kg	0.2	0.6		
	U01-LIB01-BT04B	9.4	mg/Kg	0.2	0.6		
	U01-LIB01-BT04C	10.6	mg/Kg	0.2	0.5		
	U01-LIB01-BT04D	6.6	mg/Kg	0.2	0.6		
LIB01-CGR03	U01-LIB01-CT01A	7.1	mg/Kg	0.3	2.6		
	U01-LIB01-CT01B	5.6	mg/Kg	0.1	0.6		
	U01-LIB01-CT01C	6	mg/Kg	0.1	0.5		
	U01-LIB01-CT01D	6.6	mg/Kg	0.1	0.5		
	U01-LIB01-CT01DS	4.7	mg/Kg	0.1	0.5		
LIB01-CGR06	U01-LIB01-CT02A	5.3	mg/Kg	0.1	0.6		
	U01-LIB01-CT02B	6.4	mg/Kg	0.3	2.8		
	U01-LIB01-CT02C	5.5	mg/Kg	0.3	2.8		
	U01-LIB01-CT02D	9.6	mg/Kg	0.2	2.3		
LIB01-CGR08	U01-LIB01-CT03A	6.6	mg/Kg	0.3	2.8		
	U01-LIB01-CT03B	11.3	mg/Kg	0.3	2.9		
	U01-LIB01-CT03C	6.8	mg/Kg	0.3	2.9		
	U01-LIB01-CT03D	6.4	mg/Kg	0.3	2.7		
	U01-LIB01-CT03DB	4.3	mg/Kg	0.3	2.8		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	37.9	mg/Kg	0.02	0.03	*	
	U01-LIB01-AT01B	58.1	mg/Kg	0.02	0.03	*	
	U01-LIB01-AT01C	31.4	mg/Kg	0.02	0.03	*	
	U01-LIB01-AT01D	46.6	mg/Kg	0.02	0.03	*	
LIB01-AGR05	U01-LIB01-AT02A	47.9	mg/Kg	0.02	0.03	*	
	U01-LIB01-AT02AS	40.4	mg/Kg	0.02	0.03	*	
	U01-LIB01-AT02B	73.1	mg/Kg	0.1	0.13	*	
	U01-LIB01-AT02BS	85.2	mg/Kg	0.1	0.13	*	
	U01-LIB01-AT02C	64.9	mg/Kg	0.02	0.03	*	
	U01-LIB01-AT02CS	61.5	mg/Kg	0.03	0.03	*	
	U01-LIB01-AT02D	70.1	mg/Kg	0.02	0.03	*	
	U01-LIB01-AT02DS	57.4	mg/Kg	0.02	0.03	*	
LIB01-AGR07	U01-LIB01-AT03A	48.9	mg/Kg	0.1	1		
	U01-LIB01-AT03AB	44.2	mg/Kg	0.1	1.2		
	U01-LIB01-AT03B	68.9	mg/Kg	0.1	1		
	U01-LIB01-AT03BB	43.9	mg/Kg	0.1	1.2		
	U01-LIB01-AT03C	108	mg/Kg	0.1	1.1		
	U01-LIB01-AT03CB	60.3	mg/Kg	0.1	1.2		
	U01-LIB01-AT03D	101	mg/Kg	0.1	0.9		
	U01-LIB01-AT03DB	86.6	mg/Kg	0.1	1.2		
LIB01-AGR09	U01-LIB01-AT04A	38.1	mg/Kg	0.1	1.1		
	U01-LIB01-AT04B	44.3	mg/Kg	0.1	1.2		
	U01-LIB01-AT04C	94.1	mg/Kg	0.1	1.1		
	U01-LIB01-AT04D	89.1	mg/Kg	0.1	1.2		
LIB01-BGR01	U01-LIB01-BT01A	40.8	mg/Kg	0.02	0.02		
	U01-LIB01-BT01B	36.9	mg/Kg	0.02	0.02		
	U01-LIB01-BT01C	28.6	mg/Kg	0.02	0.02		
	U01-LIB01-BT01D	33.4	mg/Kg	0.02	0.02		
LIB01-BGR03	U01-LIB01-BT02A	44	mg/Kg	0.1	1.2		
	U01-LIB01-BT02B	45	mg/Kg	0.1	1.1		
LIB01-BGR05	U01-LIB01-BT03A	68.1	mg/Kg	0.1	1.1		
	U01-LIB01-BT03B	100	mg/Kg	0.1	0.9		
	U01-LIB01-BT03C	66.5	mg/Kg	0.1	1.2		
LIB01-BGR08	U01-LIB01-BT04A	82.5	mg/Kg	0.1	1.1		
	U01-LIB01-BT04B	171	mg/Kg	0.1	1.2		
	U01-LIB01-BT04C	143	mg/Kg	0.1	1.1		
	U01-LIB01-BT04D	86.1	mg/Kg	0.1	1.2		
LIB01-CGR03	U01-LIB01-CT01A	71.9	mg/Kg	0.11	0.11		
	U01-LIB01-CT01B	81.1	mg/Kg	0.02	0.02		
	U01-LIB01-CT01C	73.6	mg/Kg	0.02	0.02		
	U01-LIB01-CT01D	68	mg/Kg	0.02	0.02		
	U01-LIB01-CT01DS	48.3	mg/Kg	0.02	0.02		
LIB01-CGR06	U01-LIB01-CT02A	73.9	mg/Kg	0.02	0.02		
	U01-LIB01-CT02B	68.7	mg/Kg	0.11	0.11		
	U01-LIB01-CT02C	36.7	mg/Kg	0.11	0.11		
	U01-LIB01-CT02D	79.1	mg/Kg	0.09	0.09		
LIB01-CGR08	U01-LIB01-CT03A	67.3	mg/Kg	0.11	0.11		
	U01-LIB01-CT03B	52.4	mg/Kg	0.12	0.12		
	U01-LIB01-CT03C	48.1	mg/Kg	0.12	0.12		
	U01-LIB01-CT03D	62.6	mg/Kg	0.11	0.11		
	U01-LIB01-CT03DB	60.6	mg/Kg	0.11	0.11		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	0.16	mg/Kg	0.03	0.06		
	U01-LIB01-AT01B	0.35	mg/Kg	0.03	0.06		
	U01-LIB01-AT01C	0.11	mg/Kg	0.03	0.06		
	U01-LIB01-AT01D	0.28	mg/Kg	0.03	0.06		
LIB01-AGR05	U01-LIB01-AT02A	0.21	mg/Kg	0.03	0.06		
	U01-LIB01-AT02AS	0.23	mg/Kg	0.03	0.06		
	U01-LIB01-AT02B	1.12	mg/Kg	0.13	0.25		
	U01-LIB01-AT02BS	1.12	mg/Kg	0.13	0.26		
	U01-LIB01-AT02C	0.19	mg/Kg	0.03	0.05		
	U01-LIB01-AT02CS	0.24	mg/Kg	0.03	0.06		
	U01-LIB01-AT02D	0.2	mg/Kg	0.03	0.05		
	U01-LIB01-AT02DS	0.21	mg/Kg	0.03	0.06		
LIB01-AGR07	U01-LIB01-AT03A	0.65	mg/Kg	0.03	0.05		
	U01-LIB01-AT03AB	0.34	mg/Kg	0.03	0.06		
	U01-LIB01-AT03B	0.49	mg/Kg	0.02	0.05		
	U01-LIB01-AT03BB	0.29	mg/Kg	0.03	0.06		
	U01-LIB01-AT03C	0.39	mg/Kg	0.03	0.06		
	U01-LIB01-AT03CB	0.24	mg/Kg	0.03	0.06		
	U01-LIB01-AT03D	0.34	mg/Kg	0.02	0.05		
	U01-LIB01-AT03DB	0.29	mg/Kg	0.03	0.06		
LIB01-AGR09	U01-LIB01-AT04A	0.17	mg/Kg	0.03	0.05		
	U01-LIB01-AT04B	0.23	mg/Kg	0.03	0.06		
	U01-LIB01-AT04C	0.4	mg/Kg	0.03	0.05		
	U01-LIB01-AT04D	0.42	mg/Kg	0.03	0.06		
LIB01-BGR01	U01-LIB01-BT01A	0.11	mg/Kg	0.03	0.06		
	U01-LIB01-BT01B	ND, U	mg/Kg	0.03	0.06		
	U01-LIB01-BT01C	0.05	mg/Kg	0.03	0.06	B	
	U01-LIB01-BT01D	0.08	mg/Kg	0.03	0.06		
LIB01-BGR03	U01-LIB01-BT02A	0.35	mg/Kg	0.03	0.06		
	U01-LIB01-BT02B	0.26	mg/Kg	0.03	0.05		
LIB01-BGR05	U01-LIB01-BT03A	0.31	mg/Kg	0.03	0.06		
	U01-LIB01-BT03B	0.25	mg/Kg	0.03	0.05		
	U01-LIB01-BT03C	0.25	mg/Kg	0.04	0.06		
LIB01-BGR08	U01-LIB01-BT04A	0.37	mg/Kg	0.03	0.06		
	U01-LIB01-BT04B	0.46	mg/Kg	0.04	0.06		
	U01-LIB01-BT04C	0.59	mg/Kg	0.03	0.05		
	U01-LIB01-BT04D	0.28	mg/Kg	0.04	0.06		
LIB01-CGR03	U01-LIB01-CT01A	0.31	mg/Kg	0.13	0.26		
	U01-LIB01-CT01B	0.32	mg/Kg	0.03	0.06		
	U01-LIB01-CT01C	0.37	mg/Kg	0.03	0.05		
	U01-LIB01-CT01D	0.36	mg/Kg	0.03	0.05		
	U01-LIB01-CT01DS	0.32	mg/Kg	0.03	0.05		
LIB01-CGR06	U01-LIB01-CT02A	0.2	mg/Kg	0.03	0.06		
	U01-LIB01-CT02B	0.29	mg/Kg	0.14	0.28		
	U01-LIB01-CT02C	0.28	mg/Kg	0.14	0.28	B	
	U01-LIB01-CT02D	0.67	mg/Kg	0.12	0.23		
LIB01-CGR08	U01-LIB01-CT03A	0.3	mg/Kg	0.14	0.28		
	U01-LIB01-CT03B	0.3	mg/Kg	0.15	0.29		
	U01-LIB01-CT03C	0.3	mg/Kg	0.15	0.29		
	U01-LIB01-CT03D	0.32	mg/Kg	0.14	0.27		
	U01-LIB01-CT03DB	0.29	mg/Kg	0.14	0.28		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	34000	mg/Kg	4	11		
	U01-LIB01-AT01B	85500	mg/Kg	5	11		
	U01-LIB01-AT01C	13800	mg/Kg	5	12		
	U01-LIB01-AT01D	27100	mg/Kg	4	11		
LIB01-AGR05	U01-LIB01-AT02A	67100	mg/Kg	5	12		
	U01-LIB01-AT02AS	63900	mg/Kg	5	12		
	U01-LIB01-AT02B	30200	mg/Kg	4	10		
	U01-LIB01-AT02BS	31900	mg/Kg	4	10		
	U01-LIB01-AT02C	59900	mg/Kg	4	11		
	U01-LIB01-AT02CS	63900	mg/Kg	5	13		
	U01-LIB01-AT02D	49600	mg/Kg	4	10		
	U01-LIB01-AT02DS	41600	mg/Kg	4	11		
LIB01-AGR07	U01-LIB01-AT03A	28100	mg/Kg	2	10.2		
	U01-LIB01-AT03AB	28300	mg/Kg	2.4	11.8		
	U01-LIB01-AT03B	22300	mg/Kg	2	9.8		
	U01-LIB01-AT03BB	23600	mg/Kg	2.4	11.9		
	U01-LIB01-AT03C	31500	mg/Kg	2.3	11.3		
	U01-LIB01-AT03CB	17900	mg/Kg	2.3	11.6		
	U01-LIB01-AT03D	34500	mg/Kg	1.9	9.4		
	U01-LIB01-AT03DB	65100	mg/Kg	2.5	12.3		
LIB01-AGR09	U01-LIB01-AT04A	39700	mg/Kg	2.1	10.6		
	U01-LIB01-AT04B	42100	mg/Kg	2.4	11.8		
	U01-LIB01-AT04C	37700	mg/Kg	2.1	10.7		
	U01-LIB01-AT04D	38300	mg/Kg	2.3	11.5		
LIB01-BGR01	U01-LIB01-BT01A	35400	mg/Kg	2.4	11.8		
	U01-LIB01-BT01B	2160	mg/Kg	2.4	12		
	U01-LIB01-BT01C	8700	mg/Kg	2.4	12.2		
	U01-LIB01-BT01D	5310	mg/Kg	2.4	12.2		
LIB01-BGR03	U01-LIB01-BT02A	23400	mg/Kg	2.3	11.5		
	U01-LIB01-BT02B	21100	mg/Kg	2.2	10.7		
LIB01-BGR05	U01-LIB01-BT03A	73300	mg/Kg	2.2	11		
	U01-LIB01-BT03B	14100	mg/Kg	1.9	9.5		
	U01-LIB01-BT03C	51800	mg/Kg	2.4	11.8		
LIB01-BGR08	U01-LIB01-BT04A	16300	mg/Kg	2.2	11.1		
	U01-LIB01-BT04B	28800	mg/Kg	2.4	11.9		
	U01-LIB01-BT04C	78500	mg/Kg	2.1	10.5		
	U01-LIB01-BT04D	86600	mg/Kg	2.4	12.2		
LIB01-CGR03	U01-LIB01-CT01A	76400	mg/Kg	2.1	10.5		
	U01-LIB01-CT01B	40500	mg/Kg	2.4	11.8		
	U01-LIB01-CT01C	21200	mg/Kg	2.1	10.6		
	U01-LIB01-CT01D	22100	mg/Kg	2.1	10.7		
	U01-LIB01-CT01DS	18800	mg/Kg	2.1	10.5		
LIB01-CGR06	U01-LIB01-CT02A	80900	mg/Kg	2.2	11.1		
	U01-LIB01-CT02B	27500	mg/Kg	2.2	11.2		
	U01-LIB01-CT02C	27300	mg/Kg	2.3	11.3		
	U01-LIB01-CT02D	19400	mg/Kg	1.8	9.2		
LIB01-CGR08	U01-LIB01-CT03A	80500	mg/Kg	2.2	11.1		
	U01-LIB01-CT03B	37500	mg/Kg	2.3	11.7		
	U01-LIB01-CT03C	36100	mg/Kg	2.3	11.6		
	U01-LIB01-CT03D	36100	mg/Kg	2.2	10.9		
	U01-LIB01-CT03DB	30800	mg/Kg	2.2	11.2		

[redacted]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	12.5	mg/Kg	0.03	0.22		
	U01-LIB01-AT01B	12.4	mg/Kg	0.03	0.23		
	U01-LIB01-AT01C	7.9	mg/Kg	0.04	0.24		
	U01-LIB01-AT01D	13.1	mg/Kg	0.03	0.22		
LIB01-AGR05	U01-LIB01-AT02A	14.2	mg/Kg	0.03	0.23		
	U01-LIB01-AT02AS	13.6	mg/Kg	0.03	0.23		
	U01-LIB01-AT02B	21.4	mg/Kg	0.15	1.01		
	U01-LIB01-AT02BS	23.3	mg/Kg	0.16	1.04		
	U01-LIB01-AT02C	10	mg/Kg	0.03	0.21		
	U01-LIB01-AT02CS	10.3	mg/Kg	0.04	0.25		
	U01-LIB01-AT02D	11.2	mg/Kg	0.03	0.21		
	U01-LIB01-AT02DS	9.59	mg/Kg	0.03	0.22		
LIB01-AGR07	U01-LIB01-AT03A	15	mg/Kg	0.03	0.2		
	U01-LIB01-AT03AB	13.2	mg/Kg	0.04	0.24		
	U01-LIB01-AT03B	17.2	mg/Kg	0.03	0.2		
	U01-LIB01-AT03BB	14.9	mg/Kg	0.04	0.24		
	U01-LIB01-AT03C	20.1	mg/Kg	0.03	0.23		
	U01-LIB01-AT03CB	12.3	mg/Kg	0.03	0.23		
	U01-LIB01-AT03D	12.7	mg/Kg	0.03	0.19		
	U01-LIB01-AT03DB	16	mg/Kg	0.04	0.25		
LIB01-AGR09	U01-LIB01-AT04A	12.8	mg/Kg	0.03	0.21		
	U01-LIB01-AT04B	12.4	mg/Kg	0.04	0.24		
	U01-LIB01-AT04C	23.3	mg/Kg	0.03	0.21		
	U01-LIB01-AT04D	22.7	mg/Kg	0.03	0.23		
LIB01-BGR01	U01-LIB01-BT01A	8.24	mg/Kg	0.04	0.24		
	U01-LIB01-BT01B	5.84	mg/Kg	0.04	0.24		
	U01-LIB01-BT01C	5.85	mg/Kg	0.04	0.24		
	U01-LIB01-BT01D	6.06	mg/Kg	0.04	0.24		
LIB01-BGR03	U01-LIB01-BT02A	17.8	mg/Kg	0.05	0.23		
	U01-LIB01-BT02B	10.1	mg/Kg	0.04	0.22		
LIB01-BGR05	U01-LIB01-BT03A	23	mg/Kg	0.04	0.22		
	U01-LIB01-BT03B	17.3	mg/Kg	0.04	0.19		
	U01-LIB01-BT03C	13.2	mg/Kg	0.05	0.24		
LIB01-BGR08	U01-LIB01-BT04A	24.9	mg/Kg	0.04	0.22		
	U01-LIB01-BT04B	28.1	mg/Kg	0.05	0.24		
	U01-LIB01-BT04C	33.1	mg/Kg	0.04	0.21		
	U01-LIB01-BT04D	13.1	mg/Kg	0.05	0.24		
LIB01-CGR03	U01-LIB01-CT01A	17.2	mg/Kg	0.16	1.05		
	U01-LIB01-CT01B	15.4	mg/Kg	0.04	0.24		
	U01-LIB01-CT01C	14.8	mg/Kg	0.03	0.21		
	U01-LIB01-CT01D	12.6	mg/Kg	0.03	0.21		
	U01-LIB01-CT01DS	13	mg/Kg	0.03	0.21		
LIB01-CGR06	U01-LIB01-CT02A	14.4	mg/Kg	0.03	0.22		
	U01-LIB01-CT02B	23.7	mg/Kg	0.17	1.12		
	U01-LIB01-CT02C	14.3	mg/Kg	0.17	1.13		
	U01-LIB01-CT02D	18.4	mg/Kg	0.14	0.92		
LIB01-CGR08	U01-LIB01-CT03A	16.3	mg/Kg	0.17	1.11		
	U01-LIB01-CT03B	18.3	mg/Kg	0.18	1.17		
	U01-LIB01-CT03C	15.4	mg/Kg	0.17	1.16		
	U01-LIB01-CT03D	18	mg/Kg	0.16	1.09		
	U01-LIB01-CT03DB	17.9	mg/Kg	0.17	1.12		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	11.4	mg/Kg	0.11	0.22		
	U01-LIB01-AT01B	12.9	mg/Kg	0.11	0.23		
	U01-LIB01-AT01C	5.04	mg/Kg	0.12	0.24		
	U01-LIB01-AT01D	14.5	mg/Kg	0.11	0.22		
LIB01-AGR05	U01-LIB01-AT02A	12.7	mg/Kg	0.12	0.23		
	U01-LIB01-AT02AS	11.8	mg/Kg	0.12	0.23		
	U01-LIB01-AT02B	41.2	mg/Kg	0.51	1.01		
	U01-LIB01-AT02BS	40.4	mg/Kg	0.52	1.04		
	U01-LIB01-AT02C	6.82	mg/Kg	0.11	0.21		
	U01-LIB01-AT02CS	9.36	mg/Kg	0.13	0.25		
	U01-LIB01-AT02D	9.21	mg/Kg	0.1	0.21		
	U01-LIB01-AT02DS	7.87	mg/Kg	0.11	0.22		
LIB01-AGR07	U01-LIB01-AT03A	28.6	mg/Kg	0.1	0.2		
	U01-LIB01-AT03AB	17.1	mg/Kg	0.12	0.24		
	U01-LIB01-AT03B	19.9	mg/Kg	0.1	0.2		
	U01-LIB01-AT03BB	13.6	mg/Kg	0.12	0.24		
	U01-LIB01-AT03C	21.3	mg/Kg	0.11	0.23		
	U01-LIB01-AT03CB	10.6	mg/Kg	0.12	0.23		
	U01-LIB01-AT03D	15.3	mg/Kg	0.09	0.19		
	U01-LIB01-AT03DB	17.3	mg/Kg	0.12	0.25		
LIB01-AGR09	U01-LIB01-AT04A	7.95	mg/Kg	0.11	0.21		
	U01-LIB01-AT04B	9.83	mg/Kg	0.12	0.24		
	U01-LIB01-AT04C	27.8	mg/Kg	0.11	0.21		
	U01-LIB01-AT04D	24.9	mg/Kg	0.12	0.23		
LIB01-BGR01	U01-LIB01-BT01A	5.21	mg/Kg	0.12	0.24		
	U01-LIB01-BT01B	2.91	mg/Kg	0.12	0.24		
	U01-LIB01-BT01C	3.42	mg/Kg	0.12	0.24		
	U01-LIB01-BT01D	3.48	mg/Kg	0.12	0.24		
LIB01-BGR03	U01-LIB01-BT02A	23.8	mg/Kg	0.06	0.12		
	U01-LIB01-BT02B	9.46	mg/Kg	0.05	0.11		
LIB01-BGR05	U01-LIB01-BT03A	20.8	mg/Kg	0.06	0.11		
	U01-LIB01-BT03B	10.7	mg/Kg	0.05	0.09		
	U01-LIB01-BT03C	9.67	mg/Kg	0.06	0.12		
LIB01-BGR08	U01-LIB01-BT04A	22.7	mg/Kg	0.06	0.11		
	U01-LIB01-BT04B	30.9	mg/Kg	0.06	0.12		
	U01-LIB01-BT04C	29.3	mg/Kg	0.05	0.11		
	U01-LIB01-BT04D	10.9	mg/Kg	0.06	0.12		
LIB01-CGR03	U01-LIB01-CT01A	16.4	mg/Kg	0.53	1.05		
	U01-LIB01-CT01B	11.8	mg/Kg	0.12	0.24		
	U01-LIB01-CT01C	13	mg/Kg	0.11	0.21		
	U01-LIB01-CT01D	13	mg/Kg	0.11	0.21		
	U01-LIB01-CT01DS	15	mg/Kg	0.11	0.21		
LIB01-CGR06	U01-LIB01-CT02A	9.96	mg/Kg	0.11	0.22		
	U01-LIB01-CT02B	23.9	mg/Kg	0.56	1.12		
	U01-LIB01-CT02C	14.6	mg/Kg	0.57	1.13		
	U01-LIB01-CT02D	26.6	mg/Kg	0.46	0.92		
LIB01-CGR08	U01-LIB01-CT03A	16.7	mg/Kg	0.55	1.11		
	U01-LIB01-CT03B	19	mg/Kg	0.58	1.17		
	U01-LIB01-CT03C	17.3	mg/Kg	0.58	1.16		
	U01-LIB01-CT03D	17.4	mg/Kg	0.55	1.09		
	U01-LIB01-CT03DB	13.8	mg/Kg	0.56	1.12		

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Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	19400	mg/Kg	0.8	4.5		
	U01-LIB01-AT01B	15600	mg/Kg	0.8	4.5		
	U01-LIB01-AT01C	8640	mg/Kg	0.8	4.8		
	U01-LIB01-AT01D	18100	mg/Kg	0.8	4.5		
LIB01-AGR05	U01-LIB01-AT02A	18600	mg/Kg	0.8	4.6		
	U01-LIB01-AT02AS	19100	mg/Kg	0.8	4.7		
	U01-LIB01-AT02B	26900	mg/Kg	0.7	4		
	U01-LIB01-AT02BS	29600	mg/Kg	0.7	4.2		
	U01-LIB01-AT02C	12600	mg/Kg	0.7	4.2		
	U01-LIB01-AT02CS	13400	mg/Kg	0.9	5		
	U01-LIB01-AT02D	13600	mg/Kg	0.7	4.1		
	U01-LIB01-AT02DS	11900	mg/Kg	0.8	4.4		
LIB01-AGR07	U01-LIB01-AT03A	26000	mg/Kg	2	4.1		
	U01-LIB01-AT03AB	15600	mg/Kg	2.4	4.7		
	U01-LIB01-AT03B	20400	mg/Kg	2	3.9		
	U01-LIB01-AT03BB	15400	mg/Kg	2.4	4.8		
	U01-LIB01-AT03C	24100	mg/Kg	2.3	4.5		
	U01-LIB01-AT03CB	27200	mg/Kg	2.3	4.6		
	U01-LIB01-AT03D	20700	mg/Kg	1.9	3.8		
	U01-LIB01-AT03DB	20900	mg/Kg	2.5	4.9		
LIB01-AGR09	U01-LIB01-AT04A	14700	mg/Kg	2.1	4.3		
	U01-LIB01-AT04B	13100	mg/Kg	2.4	4.7		
	U01-LIB01-AT04C	34000	mg/Kg	2.1	4.3		
	U01-LIB01-AT04D	30300	mg/Kg	2.3	4.6		
LIB01-BGR01	U01-LIB01-BT01A	9820	mg/Kg	2.4	4.7		
	U01-LIB01-BT01B	6620	mg/Kg	2.4	4.8		
	U01-LIB01-BT01C	7410	mg/Kg	2.4	4.9		
	U01-LIB01-BT01D	7370	mg/Kg	2.4	4.9		
LIB01-BGR03	U01-LIB01-BT02A	14400	mg/Kg	2.3	4.6		
	U01-LIB01-BT02B	15800	mg/Kg	2.2	4.3		
LIB01-BGR05	U01-LIB01-BT03A	18600	mg/Kg	2.2	4.4		
	U01-LIB01-BT03B	14800	mg/Kg	1.9	3.8		
	U01-LIB01-BT03C	13400	mg/Kg	2.4	4.7		
LIB01-BGR08	U01-LIB01-BT04A	21600	mg/Kg	2.2	4.4		
	U01-LIB01-BT04B	36000	mg/Kg	2.4	4.7		
	U01-LIB01-BT04C	28500	mg/Kg	2.1	4.2		
	U01-LIB01-BT04D	12700	mg/Kg	2.4	4.9		
LIB01-CGR03	U01-LIB01-CT01A	16800	mg/Kg	2.1	4.2		
	U01-LIB01-CT01B	23100	mg/Kg	2.4	4.7		
	U01-LIB01-CT01C	23300	mg/Kg	2.1	4.2		
	U01-LIB01-CT01D	23300	mg/Kg	2.1	4.3		
	U01-LIB01-CT01DS	20100	mg/Kg	2.1	4.2		
LIB01-CGR06	U01-LIB01-CT02A	16200	mg/Kg	2.2	4.4		
	U01-LIB01-CT02B	25100	mg/Kg	2.2	4.5		
	U01-LIB01-CT02C	16400	mg/Kg	2.3	4.5		
	U01-LIB01-CT02D	26900	mg/Kg	1.8	3.7		
LIB01-CGR08	U01-LIB01-CT03A	17300	mg/Kg	2.2	4.4		
	U01-LIB01-CT03B	20200	mg/Kg	2.3	4.7		
	U01-LIB01-CT03C	17800	mg/Kg	2.3	4.7		
	U01-LIB01-CT03D	13100	mg/Kg	2.2	4.4		
	U01-LIB01-CT03DB	14600	mg/Kg	2.2	4.5		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	7.15	mg/Kg	0.028	0.056		
	U01-LIB01-AT01B	6.61	mg/Kg	0.028	0.057		
	U01-LIB01-AT01C	2.33	mg/Kg	0.03	0.06		
	U01-LIB01-AT01D	6.73	mg/Kg	0.028	0.056		
LIB01-AGR05	U01-LIB01-AT02A	7.33	mg/Kg	0.029	0.058		
	U01-LIB01-AT02AS	7.11	mg/Kg	0.029	0.058		
	U01-LIB01-AT02B	13.3	mg/Kg	0.025	0.051		
	U01-LIB01-AT02BS	14.6	mg/Kg	0.026	0.052		
	U01-LIB01-AT02C	4.65	mg/Kg	0.026	0.052		
	U01-LIB01-AT02CS	4.61	mg/Kg	0.031	0.063		
	U01-LIB01-AT02D	5.03	mg/Kg	0.026	0.052		
	U01-LIB01-AT02DS	4.47	mg/Kg	0.028	0.055		
LIB01-AGR07	U01-LIB01-AT03A	11	mg/Kg	0.025	0.051		
	U01-LIB01-AT03AB	7.5	mg/Kg	0.03	0.059		
	U01-LIB01-AT03B	10.8	mg/Kg	0.024	0.049		
	U01-LIB01-AT03BB	8.01	mg/Kg	0.03	0.06		
	U01-LIB01-AT03C	12.7	mg/Kg	0.028	0.056		
	U01-LIB01-AT03CB	7.07	mg/Kg	0.029	0.058		
	U01-LIB01-AT03D	9.13	mg/Kg	0.024	0.047		
	U01-LIB01-AT03DB	11.5	mg/Kg	0.031	0.062		
LIB01-AGR09	U01-LIB01-AT04A	4.7	mg/Kg	0.027	0.053		
	U01-LIB01-AT04B	5.73	mg/Kg	0.029	0.059		
	U01-LIB01-AT04C	18.4	mg/Kg	0.027	0.054		
	U01-LIB01-AT04D	16.4	mg/Kg	0.029	0.058		
LIB01-BGR01	U01-LIB01-BT01A	4.33	mg/Kg	0.03	0.06		
	U01-LIB01-BT01B	3.22	mg/Kg	0.03	0.06		
	U01-LIB01-BT01C	3.29	mg/Kg	0.03	0.06		
	U01-LIB01-BT01D	3.54	mg/Kg	0.03	0.06		
LIB01-BGR03	U01-LIB01-BT02A	9.44	mg/Kg	0.05	0.06		
	U01-LIB01-BT02B	5.08	mg/Kg	0.04	0.05		
LIB01-BGR05	U01-LIB01-BT03A	10.9	mg/Kg	0.04	0.06		
	U01-LIB01-BT03B	5.77	mg/Kg	0.04	0.05		
	U01-LIB01-BT03C	5.77	mg/Kg	0.05	0.06		
LIB01-BGR08	U01-LIB01-BT04A	11.7	mg/Kg	0.04	0.06		
	U01-LIB01-BT04B	17.6	mg/Kg	0.05	0.06		
	U01-LIB01-BT04C	15.1	mg/Kg	0.04	0.05		
	U01-LIB01-BT04D	5.33	mg/Kg	0.05	0.06		
LIB01-CGR03	U01-LIB01-CT01A	9.53	mg/Kg	0.13	0.26		
	U01-LIB01-CT01B	8.4	mg/Kg	0.03	0.06		
	U01-LIB01-CT01C	9.2	mg/Kg	0.03	0.05		
	U01-LIB01-CT01D	8.52	mg/Kg	0.03	0.05		
	U01-LIB01-CT01DS	8.6	mg/Kg	0.03	0.05		
LIB01-CGR06	U01-LIB01-CT02A	7.62	mg/Kg	0.03	0.06		
	U01-LIB01-CT02B	13.5	mg/Kg	0.14	0.28		
	U01-LIB01-CT02C	7.51	mg/Kg	0.14	0.28		
	U01-LIB01-CT02D	12.8	mg/Kg	0.12	0.23		
LIB01-CGR08	U01-LIB01-CT03A	9.93	mg/Kg	0.14	0.28		
	U01-LIB01-CT03B	10	mg/Kg	0.15	0.29		
	U01-LIB01-CT03C	8.59	mg/Kg	0.15	0.29		
	U01-LIB01-CT03D	9.24	mg/Kg	0.14	0.27		
	U01-LIB01-CT03DB	7.59	mg/Kg	0.14	0.28		

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Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	276	mg/Kg	0.06	1.12		
	U01-LIB01-AT01B	220	mg/Kg	0.06	1.13		
	U01-LIB01-AT01C	105	mg/Kg	0.06	1.21		
	U01-LIB01-AT01D	158	mg/Kg	0.06	1.12		
LIB01-AGR05	U01-LIB01-AT02A	196	mg/Kg	0.06	1.16		
	U01-LIB01-AT02AS	229	mg/Kg	0.06	1.16		
	U01-LIB01-AT02B	324	mg/Kg	0.05	1.01		
	U01-LIB01-AT02BS	353	mg/Kg	0.05	1.04		
	U01-LIB01-AT02C	255	mg/Kg	0.05	1.05		
	U01-LIB01-AT02CS	329	mg/Kg	0.06	1.25		
	U01-LIB01-AT02D	275	mg/Kg	0.05	1.03		
	U01-LIB01-AT02DS	225	mg/Kg	0.06	1.1		
LIB01-AGR07	U01-LIB01-AT03A	385	mg/Kg	1	1		
	U01-LIB01-AT03AB	273	mg/Kg	1.2	1.2		
	U01-LIB01-AT03B	206	mg/Kg	1	1		
	U01-LIB01-AT03BB	139	mg/Kg	1.2	1.2		
	U01-LIB01-AT03C	268	mg/Kg	1.1	1.1		
	U01-LIB01-AT03CB	245	mg/Kg	1.2	1.2		
	U01-LIB01-AT03D	210	mg/Kg	0.9	0.9		
	U01-LIB01-AT03DB	257	mg/Kg	1.2	1.2		
LIB01-AGR09	U01-LIB01-AT04A	135	mg/Kg	1.1	1.1		
	U01-LIB01-AT04B	144	mg/Kg	1.2	1.2		
	U01-LIB01-AT04C	351	mg/Kg	1.1	1.1		
	U01-LIB01-AT04D	321	mg/Kg	1.2	1.2		
LIB01-BGR01	U01-LIB01-BT01A	101	mg/Kg	1.2	1.2		
	U01-LIB01-BT01B	52.7	mg/Kg	1.2	1.2		
	U01-LIB01-BT01C	75.4	mg/Kg	1.2	1.2		
	U01-LIB01-BT01D	84.6	mg/Kg	1.2	1.2		
LIB01-BGR03	U01-LIB01-BT02A	134	mg/Kg	1.2	1.2		
	U01-LIB01-BT02B	391	mg/Kg	1.1	1.1		
LIB01-BGR05	U01-LIB01-BT03A	188	mg/Kg	1.1	1.1		
	U01-LIB01-BT03B	200	mg/Kg	0.9	0.9		
	U01-LIB01-BT03C	328	mg/Kg	1.2	1.2		
LIB01-BGR08	U01-LIB01-BT04A	204	mg/Kg	1.1	1.1		
	U01-LIB01-BT04B	520	mg/Kg	1.2	1.2		
	U01-LIB01-BT04C	392	mg/Kg	1.1	1.1		
	U01-LIB01-BT04D	262	mg/Kg	1.2	1.2		
LIB01-CGR03	U01-LIB01-CT01A	183	mg/Kg	1.1	1.1		
	U01-LIB01-CT01B	236	mg/Kg	1.2	1.2		
	U01-LIB01-CT01C	241	mg/Kg	1.1	1.1		
	U01-LIB01-CT01D	320	mg/Kg	1.1	1.1		
	U01-LIB01-CT01DS	238	mg/Kg	1.1	1.1		
LIB01-CGR06	U01-LIB01-CT02A	175	mg/Kg	1.1	1.1		
	U01-LIB01-CT02B	178	mg/Kg	1.1	1.1		
	U01-LIB01-CT02C	157	mg/Kg	1.1	1.1		
	U01-LIB01-CT02D	738	mg/Kg	0.9	0.9		
LIB01-CGR08	U01-LIB01-CT03A	189	mg/Kg	1.1	1.1		
	U01-LIB01-CT03B	167	mg/Kg	1.2	1.2		
	U01-LIB01-CT03C	213	mg/Kg	1.2	1.2		
	U01-LIB01-CT03D	117	mg/Kg	1.1	1.1		
	U01-LIB01-CT03DB	145	mg/Kg	1.1	1.1		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-AT01B	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-AT01C	ND, U	mg/Kg	0.01	0.02		
	U01-LIB01-AT01D	0.04	mg/Kg	0.01	0.02		
LIB01-AGR05	U01-LIB01-AT02A	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-AT02AS	0.04	mg/Kg	0.01	0.01		
	U01-LIB01-AT02B	0.08	mg/Kg	0.01	0.02		
	U01-LIB01-AT02BS	0.09	mg/Kg	0.01	0.02		
	U01-LIB01-AT02C	0.01	mg/Kg	0.01	0.02	B	
	U01-LIB01-AT02CS	0.01	mg/Kg	0.01	0.02	B	
	U01-LIB01-AT02D	0.02	mg/Kg	0.01	0.02		
	U01-LIB01-AT02DS	0.02	mg/Kg	0.01	0.02		
LIB01-AGR07	U01-LIB01-AT03A	0.09	mg/Kg	0.01	0.02		
	U01-LIB01-AT03AB	0.05	mg/Kg	0.01	0.02		
	U01-LIB01-AT03B	0.05	mg/Kg	0.01	0.02		
	U01-LIB01-AT03BB	0.05	mg/Kg	0.01	0.02		
	U01-LIB01-AT03C	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-AT03CB	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-AT03D	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-AT03DB	0.06	mg/Kg	0.01	0.02		
LIB01-AGR09	U01-LIB01-AT04A	0.03	mg/Kg	0.01	0.02		
	U01-LIB01-AT04B	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-AT04C	0.07	mg/Kg	0.01	0.02		
	U01-LIB01-AT04D	0.06	mg/Kg	0.01	0.02		
LIB01-BGR01	U01-LIB01-BT01A	0.02	mg/Kg	0.01	0.02	B	
	U01-LIB01-BT01B	0.01	mg/Kg	0.01	0.02	B	
	U01-LIB01-BT01C	0.01	mg/Kg	0.01	0.02	B	
	U01-LIB01-BT01D	0.01	mg/Kg	0.01	0.02	B	
LIB01-BGR03	U01-LIB01-BT02A	0.05	mg/Kg	0.01	0.02		
	U01-LIB01-BT02B	0.02	mg/Kg	0.01	0.02		
LIB01-BGR05	U01-LIB01-BT03A	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-BT03B	0.02	mg/Kg	0.01	0.02		
	U01-LIB01-BT03C	0.08	mg/Kg	0.01	0.02		
LIB01-BGR08	U01-LIB01-BT04A	0.05	mg/Kg	0.01	0.02		
	U01-LIB01-BT04B	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-BT04C	0.05	mg/Kg	0.01	0.02		
	U01-LIB01-BT04D	0.01	mg/Kg	0.01	0.01		
LIB01-CGR03	U01-LIB01-CT01A	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-CT01B	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-CT01C	0.04	mg/Kg	0.01	0.01		
	U01-LIB01-CT01D	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-CT01DS	0.03	mg/Kg	0.01	0.02		
LIB01-CGR06	U01-LIB01-CT02A	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-CT02B	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-CT02C	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-CT02D	0.07	mg/Kg	0.01	0.02		
LIB01-CGR08	U01-LIB01-CT03A	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-CT03B	0.05	mg/Kg	0.01	0.02		
	U01-LIB01-CT03C	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-CT03D	0.04	mg/Kg	0.01	0.02		
	U01-LIB01-CT03DB	0.04	mg/Kg	0.01	0.01		

[redacted]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	19.3	mg/Kg	0.11	0.22		
	U01-LIB01-AT01B	17.8	mg/Kg	0.11	0.23		
	U01-LIB01-AT01C	9.41	mg/Kg	0.12	0.24		
	U01-LIB01-AT01D	17.4	mg/Kg	0.11	0.22		
LIB01-AGR05	U01-LIB01-AT02A	18.2	mg/Kg	0.12	0.23		
	U01-LIB01-AT02AS	18.5	mg/Kg	0.12	0.23		
	U01-LIB01-AT02B	35.3	mg/Kg	0.51	1.01		
	U01-LIB01-AT02BS	34.9	mg/Kg	0.52	1.04		
	U01-LIB01-AT02C	12.9	mg/Kg	0.11	0.21		
	U01-LIB01-AT02CS	13.9	mg/Kg	0.13	0.25		
	U01-LIB01-AT02D	14	mg/Kg	0.1	0.21		
	U01-LIB01-AT02DS	13.6	mg/Kg	0.11	0.22		
LIB01-AGR07	U01-LIB01-AT03A	25.2	mg/Kg	0.1	0.2		
	U01-LIB01-AT03AB	19.2	mg/Kg	0.12	0.24		
	U01-LIB01-AT03B	21.8	mg/Kg	0.1	0.2		
	U01-LIB01-AT03BB	18.1	mg/Kg	0.12	0.24		
	U01-LIB01-AT03C	25.9	mg/Kg	0.11	0.23		
	U01-LIB01-AT03CB	16.6	mg/Kg	0.12	0.23		
	U01-LIB01-AT03D	19.7	mg/Kg	0.09	0.19		
	U01-LIB01-AT03DB	20	mg/Kg	0.12	0.25		
LIB01-AGR09	U01-LIB01-AT04A	16.7	mg/Kg	0.11	0.21		
	U01-LIB01-AT04B	16.8	mg/Kg	0.12	0.24		
	U01-LIB01-AT04C	32.1	mg/Kg	0.11	0.21		
	U01-LIB01-AT04D	30.5	mg/Kg	0.12	0.23		
LIB01-BGR01	U01-LIB01-BT01A	10.5	mg/Kg	0.12	0.24		
	U01-LIB01-BT01B	6.48	mg/Kg	0.12	0.24		
	U01-LIB01-BT01C	7.13	mg/Kg	0.12	0.24		
	U01-LIB01-BT01D	7.34	mg/Kg	0.12	0.24		
LIB01-BGR03	U01-LIB01-BT02A	28.5	mg/Kg	0.35	0.23		
	U01-LIB01-BT02B	17.6	mg/Kg	0.32	0.22		
LIB01-BGR05	U01-LIB01-BT03A	31.4	mg/Kg	0.33	0.22		
	U01-LIB01-BT03B	18.1	mg/Kg	0.28	0.19		
	U01-LIB01-BT03C	18.8	mg/Kg	0.36	0.24		
LIB01-BGR08	U01-LIB01-BT04A	32.6	mg/Kg	0.33	0.22		
	U01-LIB01-BT04B	39.9	mg/Kg	0.36	0.24		
	U01-LIB01-BT04C	47.1	mg/Kg	0.31	0.21		
	U01-LIB01-BT04D	20.6	mg/Kg	0.37	0.24		
LIB01-CGR03	U01-LIB01-CT01A	22.7	mg/Kg	0.53	1.05		
	U01-LIB01-CT01B	19.6	mg/Kg	0.12	0.24		
	U01-LIB01-CT01C	20.1	mg/Kg	0.11	0.21		
	U01-LIB01-CT01D	19.5	mg/Kg	0.11	0.21		
	U01-LIB01-CT01DS	18.2	mg/Kg	0.11	0.21		
LIB01-CGR06	U01-LIB01-CT02A	16.8	mg/Kg	0.11	0.22		
	U01-LIB01-CT02B	36.2	mg/Kg	0.56	1.12		
	U01-LIB01-CT02C	22.5	mg/Kg	0.57	1.13		
	U01-LIB01-CT02D	26.9	mg/Kg	0.46	0.92		
LIB01-CGR08	U01-LIB01-CT03A	23.8	mg/Kg	0.55	1.11		
	U01-LIB01-CT03B	30.1	mg/Kg	0.58	1.17		
	U01-LIB01-CT03C	23.4	mg/Kg	0.58	1.16		
	U01-LIB01-CT03D	25.7	mg/Kg	0.55	1.09		
	U01-LIB01-CT03DB	25.3	mg/Kg	0.56	1.12		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	0.08	mg/Kg	0.006	0.022		
	U01-LIB01-AT01B	0.097	mg/Kg	0.006	0.023		
	U01-LIB01-AT01C	0.035	mg/Kg	0.006	0.024		
	U01-LIB01-AT01D	0.117	mg/Kg	0.006	0.022		
LIB01-AGR05	U01-LIB01-AT02A	0.105	mg/Kg	0.006	0.023		
	U01-LIB01-AT02AS	0.109	mg/Kg	0.006	0.023		
	U01-LIB01-AT02B	0.267	mg/Kg	0.005	0.02		
	U01-LIB01-AT02BS	0.297	mg/Kg	0.005	0.021		
	U01-LIB01-AT02C	0.043	mg/Kg	0.005	0.021		
	U01-LIB01-AT02CS	0.046	mg/Kg	0.006	0.025		
	U01-LIB01-AT02D	0.057	mg/Kg	0.005	0.021		
	U01-LIB01-AT02DS	0.056	mg/Kg	0.006	0.022		
LIB01-AGR07	U01-LIB01-AT03A	0.266	mg/Kg	0.005	0.02		
	U01-LIB01-AT03AB	0.139	mg/Kg	0.006	0.024		
	U01-LIB01-AT03B	0.131	mg/Kg	0.005	0.02		
	U01-LIB01-AT03BB	0.102	mg/Kg	0.006	0.024		
	U01-LIB01-AT03C	0.161	mg/Kg	0.006	0.023		
	U01-LIB01-AT03CB	0.129	mg/Kg	0.006	0.023		
	U01-LIB01-AT03D	0.125	mg/Kg	0.005	0.019		
	U01-LIB01-AT03DB	0.143	mg/Kg	0.006	0.025		
LIB01-AGR09	U01-LIB01-AT04A	0.066	mg/Kg	0.005	0.021		
	U01-LIB01-AT04B	0.07	mg/Kg	0.006	0.024		
	U01-LIB01-AT04C	0.229	mg/Kg	0.005	0.021		
	U01-LIB01-AT04D	0.226	mg/Kg	0.006	0.023		
LIB01-BGR01	U01-LIB01-BT01A	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-BT01B	0.03	mg/Kg	0.01	0.02		
	U01-LIB01-BT01C	0.03	mg/Kg	0.01	0.02		
	U01-LIB01-BT01D	0.02	mg/Kg	0.01	0.02	B	
LIB01-BGR03	U01-LIB01-BT02A	0.1	mg/Kg	0.01	0.02		
	U01-LIB01-BT02B	0.04	mg/Kg	0.01	0.02		
LIB01-BGR05	U01-LIB01-BT03A	0.11	mg/Kg	0.01	0.02		
	U01-LIB01-BT03B	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-BT03C	0.04	mg/Kg	0.01	0.02		
LIB01-BGR08	U01-LIB01-BT04A	0.14	mg/Kg	0.01	0.02		
	U01-LIB01-BT04B	0.2	mg/Kg	0.01	0.02		
	U01-LIB01-BT04C	0.17	mg/Kg	0.01	0.02		
	U01-LIB01-BT04D	0.05	mg/Kg	0.01	0.02		
LIB01-CGR03	U01-LIB01-CT01A	0.09	mg/Kg	0.01	0.02		
	U01-LIB01-CT01B	0.12	mg/Kg	0.01	0.02		
	U01-LIB01-CT01C	0.14	mg/Kg	0.01	0.02		
	U01-LIB01-CT01D	0.11	mg/Kg	0.01	0.02		
	U01-LIB01-CT01DS	0.09	mg/Kg	0.01	0.02		
LIB01-CGR06	U01-LIB01-CT02A	0.07	mg/Kg	0.01	0.02		
	U01-LIB01-CT02B	0.15	mg/Kg	0.01	0.02		
	U01-LIB01-CT02C	0.07	mg/Kg	0.01	0.02		
	U01-LIB01-CT02D	0.21	mg/Kg	0.01	0.02		
LIB01-CGR08	U01-LIB01-CT03A	0.09	mg/Kg	0.01	0.02		
	U01-LIB01-CT03B	0.11	mg/Kg	0.01	0.02		
	U01-LIB01-CT03C	0.11	mg/Kg	0.01	0.02		
	U01-LIB01-CT03D	0.06	mg/Kg	0.01	0.02		
	U01-LIB01-CT03DB	0.08	mg/Kg	0.01	0.02		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	55.6	mg/Kg	0.11	0.56		
	U01-LIB01-AT01B	46.3	mg/Kg	0.11	0.57		
	U01-LIB01-AT01C	27.6	mg/Kg	0.12	0.6		
	U01-LIB01-AT01D	45.4	mg/Kg	0.11	0.56		
LIB01-AGR05	U01-LIB01-AT02A	50.7	mg/Kg	0.12	0.58		
	U01-LIB01-AT02AS	51.2	mg/Kg	0.12	0.58		
	U01-LIB01-AT02B	99.8	mg/Kg	0.51	2.53		
	U01-LIB01-AT02BS	99.6	mg/Kg	0.52	2.6		
	U01-LIB01-AT02C	30.6	mg/Kg	0.11	0.52		
	U01-LIB01-AT02CS	35.9	mg/Kg	0.13	0.63		
	U01-LIB01-AT02D	32	mg/Kg	0.1	0.52		
	U01-LIB01-AT02DS	30.4	mg/Kg	0.11	0.55		
LIB01-AGR07	U01-LIB01-AT03A	60.8	mg/Kg	0.1	0.51		
	U01-LIB01-AT03AB	46.4	mg/Kg	0.12	0.59		
	U01-LIB01-AT03B	67	mg/Kg	0.1	0.49		
	U01-LIB01-AT03BB	55.6	mg/Kg	0.12	0.6		
	U01-LIB01-AT03C	72.4	mg/Kg	0.11	0.56		
	U01-LIB01-AT03CB	47.7	mg/Kg	0.12	0.58		
	U01-LIB01-AT03D	50.4	mg/Kg	0.09	0.47		
	U01-LIB01-AT03DB	66.9	mg/Kg	0.12	0.62		
LIB01-AGR09	U01-LIB01-AT04A	46.3	mg/Kg	0.11	0.53		
	U01-LIB01-AT04B	44.7	mg/Kg	0.12	0.59		
	U01-LIB01-AT04C	95.5	mg/Kg	0.11	0.54		
	U01-LIB01-AT04D	89.3	mg/Kg	0.12	0.58		
LIB01-BGR01	U01-LIB01-BT01A	26.5	mg/Kg	0.1	0.6		
	U01-LIB01-BT01B	21	mg/Kg	0.1	0.6		
	U01-LIB01-BT01C	21	mg/Kg	0.1	0.6		
	U01-LIB01-BT01D	20.1	mg/Kg	0.1	0.6		
LIB01-BGR03	U01-LIB01-BT02A	67.9	mg/Kg	0.3	0.6		
	U01-LIB01-BT02B	44.4	mg/Kg	0.3	0.5		
LIB01-BGR05	U01-LIB01-BT03A	76.2	mg/Kg	0.3	0.6		
	U01-LIB01-BT03B	51.5	mg/Kg	0.3	0.5		
	U01-LIB01-BT03C	44.9	mg/Kg	0.4	0.6		
LIB01-BGR08	U01-LIB01-BT04A	87.3	mg/Kg	0.3	0.6		
	U01-LIB01-BT04B	108	mg/Kg	0.4	0.6		
	U01-LIB01-BT04C	110	mg/Kg	0.3	0.5		
	U01-LIB01-BT04D	39.8	mg/Kg	0.4	0.6		
LIB01-CGR03	U01-LIB01-CT01A	68.2	mg/Kg	0.5	2.6		
	U01-LIB01-CT01B	58.5	mg/Kg	0.1	0.6		
	U01-LIB01-CT01C	60.6	mg/Kg	0.1	0.5		
	U01-LIB01-CT01D	57.3	mg/Kg	0.1	0.5		
	U01-LIB01-CT01DS	55	mg/Kg	0.1	0.5		
LIB01-CGR06	U01-LIB01-CT02A	42.4	mg/Kg	0.1	0.6		
	U01-LIB01-CT02B	107	mg/Kg	0.6	2.8		
	U01-LIB01-CT02C	62.9	mg/Kg	0.6	2.8		
	U01-LIB01-CT02D	79.7	mg/Kg	0.5	2.3		
LIB01-CGR08	U01-LIB01-CT03A	69	mg/Kg	0.6	2.8		
	U01-LIB01-CT03B	83.7	mg/Kg	0.6	2.9		
	U01-LIB01-CT03C	64.1	mg/Kg	0.6	2.9		
	U01-LIB01-CT03D	72.3	mg/Kg	0.5	2.7		
	U01-LIB01-CT03DB	66.7	mg/Kg	0.6	2.8		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	37	ug/Kg	4	6.7		
	U01-LIB01-AT01B	8.3	ug/Kg	4	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-AT01D	22	ug/Kg	4	7.8		
LIB01-AGR05	U01-LIB01-AT02A	14	ug/Kg	4	6.9		
	U01-LIB01-AT02AS	15	ug/Kg	4	7		
	U01-LIB01-AT02B	19	ug/Kg	6	11		
	U01-LIB01-AT02BS	17	ug/Kg	6	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	4	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	4	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	4	6.6		
LIB01-AGR07	U01-LIB01-AT03A	52	ug/Kg	5	9.2		
	U01-LIB01-AT03AB	26	ug/Kg	4	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	5	8.7		
	U01-LIB01-AT03BB	5	ug/Kg	4	7.1	J	
	U01-LIB01-AT03C	12	ug/Kg	4	6.8		
	U01-LIB01-AT03CB	7	ug/Kg	4	8.1	J	
	U01-LIB01-AT03D	8.8	ug/Kg	5	8.4		
	U01-LIB01-AT03DB	7	ug/Kg	3	6.2		
LIB01-AGR09	U01-LIB01-AT04A	11	ug/Kg	4	7.4		
	U01-LIB01-AT04B	12	ug/Kg	4	7		
	U01-LIB01-AT04C	15	ug/Kg	4	6.4		
	U01-LIB01-AT04D	11	ug/Kg	4	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	3	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	3	6		
LIB01-BGR03	U01-LIB01-BT02A	27	ug/Kg	4	8.1		
	U01-LIB01-BT02B	5	ug/Kg	3	5.3	J	
LIB01-BGR05	U01-LIB01-BT03A	18	ug/Kg	4	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	5	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	4	7.1		
LIB01-BGR08	U01-LIB01-BT04A	8.4	ug/Kg	4	7.7		
	U01-LIB01-BT04B	12	ug/Kg	4	7.1		
	U01-LIB01-BT04C	11	ug/Kg	4	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	3	6.1		
LIB01-CGR03	U01-LIB01-CT01A	13	ug/Kg	4	6.3		
	U01-LIB01-CT01B	9	ug/Kg	3	5.9		
	U01-LIB01-CT01C	20	ug/Kg	4	6.3		
	U01-LIB01-CT01D	12	ug/Kg	4	6.4		
	U01-LIB01-CT01DS	11	ug/Kg	4	6.2		
LIB01-CGR06	U01-LIB01-CT02A	9.9	ug/Kg	4	6.6		
	U01-LIB01-CT02B	29	ug/Kg	4	7.8		
	U01-LIB01-CT02C	8.4	ug/Kg	4	6.8		
	U01-LIB01-CT02D	14	ug/Kg	5	10		
LIB01-CGR08	U01-LIB01-CT03A	8.6	ug/Kg	4	6.6		
	U01-LIB01-CT03B	20	ug/Kg	4	7		
	U01-LIB01-CT03C	9.1	ug/Kg	4	8.1		
	U01-LIB01-CT03D	6	ug/Kg	4	6.5	J	
	U01-LIB01-CT03DB	7.6	ug/Kg	4	6.7		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	ND, U	ug/Kg	2	6.7		
	U01-LIB01-AT01B	ND, U	ug/Kg	2	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	ND, U	ug/Kg	2	7.8		
LIB01-AGR05	U01-LIB01-AT02A	ND, U	ug/Kg	2	6.9		
	U01-LIB01-AT02AS	ND, U	ug/Kg	2	7		
	U01-LIB01-AT02B	ND, U	ug/Kg	3	11		
	U01-LIB01-AT02BS	ND, U	ug/Kg	3	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	2	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	ND, U	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-AT03CB	ND, U	ug/Kg	2	8.1		
	U01-LIB01-AT03D	ND, U	ug/Kg	3	8.4		
	U01-LIB01-AT03DB	ND, U	ug/Kg	2	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	2	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	2	7		
	U01-LIB01-AT04C	ND, U	ug/Kg	2	6.4		
	U01-LIB01-AT04D	ND, U	ug/Kg	2	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	ND, U	ug/Kg	2	8.1		
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	3	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	2	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	2	7.1		
	U01-LIB01-BT04C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01B	ND, U	ug/Kg	2	5.9		
	U01-LIB01-CT01C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01D	ND, U	ug/Kg	2	6.4		
	U01-LIB01-CT01DS	ND, U	ug/Kg	2	6.2		
LIB01-CGR06	U01-LIB01-CT02A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT02B	ND, U	ug/Kg	2	7.8		
	U01-LIB01-CT02C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	3	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT03B	ND, U	ug/Kg	2	7		
	U01-LIB01-CT03C	ND, U	ug/Kg	2	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	2	ug/Kg	2	6.7	J	

[redacted]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	ND, U	ug/Kg	2	6.7		
	U01-LIB01-AT01B	ND, U	ug/Kg	2	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	ND, U	ug/Kg	3	7.8		
LIB01-AGR05	U01-LIB01-AT02A	ND, U	ug/Kg	2	6.9		
	U01-LIB01-AT02AS	ND, U	ug/Kg	2	7		
	U01-LIB01-AT02B	ND, U	ug/Kg	3	11		
	U01-LIB01-AT02BS	ND, U	ug/Kg	3	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	2	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	ND, U	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-AT03CB	ND, U	ug/Kg	3	8.1		
	U01-LIB01-AT03D	ND, U	ug/Kg	3	8.4		
	U01-LIB01-AT03DB	ND, U	ug/Kg	2	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	2	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	2	7		
	U01-LIB01-AT04C	ND, U	ug/Kg	2	6.4		
	U01-LIB01-AT04D	ND, U	ug/Kg	2	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	ND, U	ug/Kg	3	8.1		
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	3	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	3	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	2	7.1		
	U01-LIB01-BT04C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01B	ND, U	ug/Kg	2	5.9		
	U01-LIB01-CT01C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01D	ND, U	ug/Kg	2	6.4		
	U01-LIB01-CT01DS	ND, U	ug/Kg	2	6.2		
LIB01-CGR06	U01-LIB01-CT02A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT02B	ND, U	ug/Kg	3	7.8		
	U01-LIB01-CT02C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	3	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT03B	ND, U	ug/Kg	2	7		
	U01-LIB01-CT03C	ND, U	ug/Kg	3	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	ND, U	ug/Kg	2	6.7		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	ND, U	ug/Kg	3	6.7		
	U01-LIB01-AT01B	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	ND, U	ug/Kg	3	7.8		
LIB01-AGR05	U01-LIB01-AT02A	ND, U	ug/Kg	3	6.9		
	U01-LIB01-AT02AS	ND, U	ug/Kg	3	7		
	U01-LIB01-AT02B	ND, U	ug/Kg	4	11		
	U01-LIB01-AT02BS	6	ug/Kg	4	11	J	
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	ND, U	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT03CB	ND, U	ug/Kg	3	8.1		
	U01-LIB01-AT03D	ND, U	ug/Kg	3	8.4		
	U01-LIB01-AT03DB	ND, U	ug/Kg	2	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	3	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	3	7		
	U01-LIB01-AT04C	ND, U	ug/Kg	2	6.4		
	U01-LIB01-AT04D	ND, U	ug/Kg	3	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	ND, U	ug/Kg	3	8.1		
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	3	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	3	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	3	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	3	7.1		
	U01-LIB01-BT04C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01B	ND, U	ug/Kg	2	5.9		
	U01-LIB01-CT01C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01D	ND, U	ug/Kg	2	6.4		
	U01-LIB01-CT01DS	ND, U	ug/Kg	2	6.2		
LIB01-CGR06	U01-LIB01-CT02A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT02B	ND, U	ug/Kg	3	7.8		
	U01-LIB01-CT02C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	4	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT03B	ND, U	ug/Kg	3	7		
	U01-LIB01-CT03C	ND, U	ug/Kg	3	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	ND, U	ug/Kg	3	6.7		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	5	ug/Kg	2	6.7	J	
	U01-LIB01-AT01B	ND, U	ug/Kg	2	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	2	ug/Kg	2	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	ND, U	ug/Kg	2	6.9		
	U01-LIB01-AT02AS	ND, U	ug/Kg	2	7		
	U01-LIB01-AT02B	ND, U	ug/Kg	3	11		
	U01-LIB01-AT02BS	6	ug/Kg	3	11	J	
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	2	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	5	ug/Kg	3	9.2	J	
	U01-LIB01-AT03AB	3	ug/Kg	2	7.1	J	
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-AT03CB	6	ug/Kg	2	8.1	J	
	U01-LIB01-AT03D	5	ug/Kg	3	8.4	J	
	U01-LIB01-AT03DB	ND, U	ug/Kg	2	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	2	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	2	7		
	U01-LIB01-AT04C	ND, U	ug/Kg	2	6.4		
	U01-LIB01-AT04D	ND, U	ug/Kg	2	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	4	ug/Kg	2	8.1	J	
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	3	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	2	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	2	7.1		
	U01-LIB01-BT04C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01B	2	ug/Kg	2	5.9	J	
	U01-LIB01-CT01C	4	ug/Kg	2	6.3	J	
	U01-LIB01-CT01D	2	ug/Kg	2	6.4	J	
	U01-LIB01-CT01DS	3	ug/Kg	2	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT02B	5	ug/Kg	2	7.8	J	
	U01-LIB01-CT02C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	3	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT03B	3	ug/Kg	2	7	J	
	U01-LIB01-CT03C	ND, U	ug/Kg	2	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	ND, U	ug/Kg	2	6.7		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	4	ug/Kg	3	6.7	J	
	U01-LIB01-AT01B	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-AT01D	ND, U	ug/Kg	4	7.8		
LIB01-AGR05	U01-LIB01-AT02A	ND, U	ug/Kg	3	6.9		
	U01-LIB01-AT02AS	ND, U	ug/Kg	3	7		
	U01-LIB01-AT02B	ND, U	ug/Kg	5	11		
	U01-LIB01-AT02BS	ND, U	ug/Kg	5	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	3	6.6		
LIB01-AGR07	U01-LIB01-AT03A	5	ug/Kg	4	9.2	J	
	U01-LIB01-AT03AB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	4	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT03CB	ND, U	ug/Kg	4	8.1		
	U01-LIB01-AT03D	ND, U	ug/Kg	4	8.4		
	U01-LIB01-AT03DB	ND, U	ug/Kg	3	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	3	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	3	7		
	U01-LIB01-AT04C	ND, U	ug/Kg	3	6.4		
	U01-LIB01-AT04D	ND, U	ug/Kg	3	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	3	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	3	6		
LIB01-BGR03	U01-LIB01-BT02A	ND, U	ug/Kg	4	8.1		
	U01-LIB01-BT02B	ND, U	ug/Kg	3	5.3		
LIB01-BGR05	U01-LIB01-BT03A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	4	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	3	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	4	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	3	7.1		
	U01-LIB01-BT04C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	3	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	3	6.3		
	U01-LIB01-CT01B	ND, U	ug/Kg	3	5.9		
	U01-LIB01-CT01C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-CT01D	ND, U	ug/Kg	3	6.4		
	U01-LIB01-CT01DS	ND, U	ug/Kg	3	6.2		
LIB01-CGR06	U01-LIB01-CT02A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-CT02B	ND, U	ug/Kg	4	7.8		
	U01-LIB01-CT02C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	5	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-CT03B	ND, U	ug/Kg	3	7		
	U01-LIB01-CT03C	ND, U	ug/Kg	4	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	3	6.5		
	U01-LIB01-CT03DB	ND, U	ug/Kg	3	6.7		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	8.6	ug/Kg	2	6.7		
	U01-LIB01-AT01B	3	ug/Kg	2	6.8	J	
	U01-LIB01-AT01C	2	ug/Kg	2	6	J	
	U01-LIB01-AT01D	5	ug/Kg	2	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	4	ug/Kg	2	6.9	J	
	U01-LIB01-AT02AS	4	ug/Kg	2	7	J	
	U01-LIB01-AT02B	5	ug/Kg	3	11	J	
	U01-LIB01-AT02BS	9	ug/Kg	3	11	J	
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	2	ug/Kg	2	6.3	J	
	U01-LIB01-AT02D	ND, U	ug/Kg	2	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	12	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	7.4	ug/Kg	2	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	2	ug/Kg	2	7.1	J	
	U01-LIB01-AT03C	6	ug/Kg	2	6.8	J	
	U01-LIB01-AT03CB	3	ug/Kg	2	8.1	J	
	U01-LIB01-AT03D	6	ug/Kg	3	8.4	J	
	U01-LIB01-AT03DB	5	ug/Kg	2	6.2	J	
LIB01-AGR09	U01-LIB01-AT04A	3	ug/Kg	2	7.4	J	
	U01-LIB01-AT04B	4	ug/Kg	2	7	J	
	U01-LIB01-AT04C	6.5	ug/Kg	2	6.4		
	U01-LIB01-AT04D	5	ug/Kg	2	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	2	ug/Kg	2	5.9	J	
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	7	ug/Kg	2	8.1	J	
	U01-LIB01-BT02B	3	ug/Kg	2	5.3	J	
LIB01-BGR05	U01-LIB01-BT03A	5	ug/Kg	2	6.6	J	
	U01-LIB01-BT03B	ND, U	ug/Kg	3	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	3	ug/Kg	2	7.7	J	
	U01-LIB01-BT04B	5	ug/Kg	2	7.1	J	
	U01-LIB01-BT04C	6	ug/Kg	2	6.3	J	
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	3	ug/Kg	2	6.3	J	
	U01-LIB01-CT01B	5	ug/Kg	2	5.9	J	
	U01-LIB01-CT01C	9.1	ug/Kg	2	6.3		
	U01-LIB01-CT01D	11	ug/Kg	2	6.4		
	U01-LIB01-CT01DS	6	ug/Kg	2	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	3	ug/Kg	2	6.6	J	
	U01-LIB01-CT02B	9	ug/Kg	2	7.8		
	U01-LIB01-CT02C	3	ug/Kg	2	6.8	J	
	U01-LIB01-CT02D	5	ug/Kg	3	10	J	
LIB01-CGR08	U01-LIB01-CT03A	2	ug/Kg	2	6.6	J	
	U01-LIB01-CT03B	6	ug/Kg	2	7	J	
	U01-LIB01-CT03C	3	ug/Kg	2	8.1	J	
	U01-LIB01-CT03D	3	ug/Kg	2	6.5	J	
	U01-LIB01-CT03DB	3	ug/Kg	2	6.7	J	

[redacted]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	8	ug/Kg	2	6.7		
	U01-LIB01-AT01B	3	ug/Kg	2	6.8	J	
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	4	ug/Kg	3	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	3	ug/Kg	2	6.9	J	
	U01-LIB01-AT02AS	3	ug/Kg	2	7	J	
	U01-LIB01-AT02B	ND, U	ug/Kg	4	11		
	U01-LIB01-AT02BS	5	ug/Kg	4	11	J	
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	8	ug/Kg	3	9.2	J	
	U01-LIB01-AT03AB	4	ug/Kg	2	7.1	J	
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03C	4	ug/Kg	2	6.8	J	
	U01-LIB01-AT03CB	ND, U	ug/Kg	3	8.1		
	U01-LIB01-AT03D	ND, U	ug/Kg	3	8.4		
	U01-LIB01-AT03DB	3	ug/Kg	2	6.2	J	
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	3	7.4		
	U01-LIB01-AT04B	3	ug/Kg	2	7	J	
	U01-LIB01-AT04C	5	ug/Kg	2	6.4	J	
	U01-LIB01-AT04D	4	ug/Kg	2	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	6	ug/Kg	3	8.1	J	
	U01-LIB01-BT02B	2	ug/Kg	2	5.3	J	
LIB01-BGR05	U01-LIB01-BT03A	4	ug/Kg	2	6.6	J	
	U01-LIB01-BT03B	4	ug/Kg	3	8.5	J	
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	3	7.7		
	U01-LIB01-BT04B	4	ug/Kg	2	7.1	J	
	U01-LIB01-BT04C	3	ug/Kg	2	6.3	J	
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	2	ug/Kg	2	6.3	J	
	U01-LIB01-CT01B	4	ug/Kg	2	5.9	J	
	U01-LIB01-CT01C	6.9	ug/Kg	2	6.3		
	U01-LIB01-CT01D	6	ug/Kg	2	6.4	J	
	U01-LIB01-CT01DS	6	ug/Kg	2	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	3	ug/Kg	2	6.6	J	
	U01-LIB01-CT02B	7	ug/Kg	3	7.8	J	
	U01-LIB01-CT02C	3	ug/Kg	2	6.8	J	
	U01-LIB01-CT02D	4	ug/Kg	3	10	J	
LIB01-CGR08	U01-LIB01-CT03A	2	ug/Kg	2	6.6	J	
	U01-LIB01-CT03B	5	ug/Kg	2	7	J	
	U01-LIB01-CT03C	ND, U	ug/Kg	3	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	2	ug/Kg	2	6.7	J	

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	ND, U	ug/Kg	3	6.7		
	U01-LIB01-AT01B	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-AT01D	ND, U	ug/Kg	3	7.8		
LIB01-AGR05	U01-LIB01-AT02A	ND, U	ug/Kg	3	6.9		
	U01-LIB01-AT02AS	ND, U	ug/Kg	3	7		
	U01-LIB01-AT02B	ND, U	ug/Kg	4	11		
	U01-LIB01-AT02BS	ND, U	ug/Kg	5	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	3	6.6		
LIB01-AGR07	U01-LIB01-AT03A	ND, U	ug/Kg	4	9.2		
	U01-LIB01-AT03AB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	4	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT03CB	ND, U	ug/Kg	3	8.1		
	U01-LIB01-AT03D	ND, U	ug/Kg	4	8.4		
	U01-LIB01-AT03DB	ND, U	ug/Kg	3	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	3	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	3	7		
	U01-LIB01-AT04C	ND, U	ug/Kg	3	6.4		
	U01-LIB01-AT04D	ND, U	ug/Kg	3	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	3	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	3	6		
LIB01-BGR03	U01-LIB01-BT02A	ND, U	ug/Kg	3	8.1		
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	4	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	3	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	3	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	3	7.1		
	U01-LIB01-BT04C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	3	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	3	6.3		
	U01-LIB01-CT01B	ND, U	ug/Kg	3	5.9		
	U01-LIB01-CT01C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-CT01D	ND, U	ug/Kg	3	6.4		
	U01-LIB01-CT01DS	ND, U	ug/Kg	3	6.2		
LIB01-CGR06	U01-LIB01-CT02A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-CT02B	ND, U	ug/Kg	3	7.8		
	U01-LIB01-CT02C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	4	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-CT03B	ND, U	ug/Kg	3	7		
	U01-LIB01-CT03C	ND, U	ug/Kg	3	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	3	6.5		
	U01-LIB01-CT03DB	ND, U	ug/Kg	3	6.7		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	18	ug/Kg	3	6.7		
	U01-LIB01-AT01B	6	ug/Kg	3	6.8	J	
	U01-LIB01-AT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-AT01D	10	ug/Kg	3	7.8		
LIB01-AGR05	U01-LIB01-AT02A	7.4	ug/Kg	3	6.9		
	U01-LIB01-AT02AS	7.6	ug/Kg	3	7		
	U01-LIB01-AT02B	13	ug/Kg	4	11		
	U01-LIB01-AT02BS	16	ug/Kg	5	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	3	6.6		
LIB01-AGR07	U01-LIB01-AT03A	22	ug/Kg	4	9.2		
	U01-LIB01-AT03AB	13	ug/Kg	3	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	4	8.7		
	U01-LIB01-AT03BB	4	ug/Kg	3	7.1	J	
	U01-LIB01-AT03C	10	ug/Kg	3	6.8		
	U01-LIB01-AT03CB	6	ug/Kg	3	8.1	J	
	U01-LIB01-AT03D	9.3	ug/Kg	4	8.4		
	U01-LIB01-AT03DB	7	ug/Kg	3	6.2		
LIB01-AGR09	U01-LIB01-AT04A	6	ug/Kg	3	7.4	J	
	U01-LIB01-AT04B	7	ug/Kg	3	7	J	
	U01-LIB01-AT04C	12	ug/Kg	3	6.4		
	U01-LIB01-AT04D	8.8	ug/Kg	3	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	3	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	3	6		
LIB01-BGR03	U01-LIB01-BT02A	14	ug/Kg	3	8.1		
	U01-LIB01-BT02B	6.7	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	10	ug/Kg	3	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	4	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	3	7.1		
LIB01-BGR08	U01-LIB01-BT04A	6	ug/Kg	3	7.7	J	
	U01-LIB01-BT04B	10	ug/Kg	3	7.1		
	U01-LIB01-BT04C	11	ug/Kg	3	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	3	6.1		
LIB01-CGR03	U01-LIB01-CT01A	7.3	ug/Kg	3	6.3		
	U01-LIB01-CT01B	9.9	ug/Kg	3	5.9		
	U01-LIB01-CT01C	16	ug/Kg	3	6.3		
	U01-LIB01-CT01D	15	ug/Kg	3	6.4		
	U01-LIB01-CT01DS	13	ug/Kg	3	6.2		
LIB01-CGR06	U01-LIB01-CT02A	7.1	ug/Kg	3	6.6		
	U01-LIB01-CT02B	16	ug/Kg	3	7.8		
	U01-LIB01-CT02C	6	ug/Kg	3	6.8	J	
	U01-LIB01-CT02D	10	ug/Kg	4	10		
LIB01-CGR08	U01-LIB01-CT03A	5	ug/Kg	3	6.6	J	
	U01-LIB01-CT03B	12	ug/Kg	3	7		
	U01-LIB01-CT03C	6	ug/Kg	3	8.1	J	
	U01-LIB01-CT03D	5	ug/Kg	3	6.5	J	
	U01-LIB01-CT03DB	6	ug/Kg	3	6.7	J	

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	ND, U	ug/Kg	3	6.7		
	U01-LIB01-AT01B	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	ND, U	ug/Kg	3	7.8		
LIB01-AGR05	U01-LIB01-AT02A	ND, U	ug/Kg	3	6.9		
	U01-LIB01-AT02AS	ND, U	ug/Kg	3	7		
	U01-LIB01-AT02B	ND, U	ug/Kg	4	11		
	U01-LIB01-AT02BS	ND, U	ug/Kg	4	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	3	6.6		
LIB01-AGR07	U01-LIB01-AT03A	ND, U	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	3	7.1		
	U01-LIB01-AT03C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-AT03CB	ND, U	ug/Kg	3	8.1		
	U01-LIB01-AT03D	ND, U	ug/Kg	3	8.4		
	U01-LIB01-AT03DB	ND, U	ug/Kg	2	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	3	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	3	7		
	U01-LIB01-AT04C	ND, U	ug/Kg	3	6.4		
	U01-LIB01-AT04D	ND, U	ug/Kg	3	6.9		
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	ND, U	ug/Kg	3	8.1		
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-BT03B	3	ug/Kg	3	8.5	J	
	U01-LIB01-BT03C	ND, U	ug/Kg	3	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	3	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	3	7.1		
	U01-LIB01-BT04C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	3	6.3		
	U01-LIB01-CT01B	ND, U	ug/Kg	2	5.9		
	U01-LIB01-CT01C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-CT01D	ND, U	ug/Kg	3	6.4		
	U01-LIB01-CT01DS	ND, U	ug/Kg	3	6.2		
LIB01-CGR06	U01-LIB01-CT02A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-CT02B	ND, U	ug/Kg	3	7.8		
	U01-LIB01-CT02C	ND, U	ug/Kg	3	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	4	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	3	6.6		
	U01-LIB01-CT03B	ND, U	ug/Kg	3	7		
	U01-LIB01-CT03C	ND, U	ug/Kg	3	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	3	6.5		
	U01-LIB01-CT03DB	ND, U	ug/Kg	3	6.7		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	9.5	ug/Kg	2	6.7		
	U01-LIB01-AT01B	2	ug/Kg	2	6.8	J	
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	5	ug/Kg	2	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	3	ug/Kg	2	6.9	J	
	U01-LIB01-AT02AS	3	ug/Kg	2	7	J	
	U01-LIB01-AT02B	4	ug/Kg	3	11	J	
	U01-LIB01-AT02BS	5	ug/Kg	3	11	J	
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	2	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	13	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	6	ug/Kg	2	7.1	J	
	U01-LIB01-AT03B	ND, U	ug/Kg	2	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03C	3	ug/Kg	2	6.8	J	
	U01-LIB01-AT03CB	ND, U	ug/Kg	2	8.1		
	U01-LIB01-AT03D	4	ug/Kg	2	8.4	J	
	U01-LIB01-AT03DB	2	ug/Kg	2	6.2	J	
LIB01-AGR09	U01-LIB01-AT04A	3	ug/Kg	2	7.4	J	
	U01-LIB01-AT04B	3	ug/Kg	2	7	J	
	U01-LIB01-AT04C	3	ug/Kg	2	6.4	J	
	U01-LIB01-AT04D	2	ug/Kg	2	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	7	ug/Kg	2	8.1	J	
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	4	ug/Kg	2	6.6	J	
	U01-LIB01-BT03B	ND, U	ug/Kg	2	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	2	7.7		
	U01-LIB01-BT04B	3	ug/Kg	2	7.1	J	
	U01-LIB01-BT04C	2	ug/Kg	2	6.3	J	
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	3	ug/Kg	2	6.3	J	
	U01-LIB01-CT01B	2	ug/Kg	2	5.9	J	
	U01-LIB01-CT01C	5	ug/Kg	2	6.3	J	
	U01-LIB01-CT01D	4	ug/Kg	2	6.4	J	
	U01-LIB01-CT01DS	3	ug/Kg	2	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	2	ug/Kg	2	6.6	J	
	U01-LIB01-CT02B	8.4	ug/Kg	2	7.8		
	U01-LIB01-CT02C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	3	10		
LIB01-CGR08	U01-LIB01-CT03A	2	ug/Kg	2	6.6	J	
	U01-LIB01-CT03B	5	ug/Kg	2	7	J	
	U01-LIB01-CT03C	2	ug/Kg	2	8.1	J	
	U01-LIB01-CT03D	ND, U	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	4	ug/Kg	2	6.7	J	

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	9.9	ug/Kg	2	6.7		
	U01-LIB01-AT01B	2	ug/Kg	2	6.8	J	
	U01-LIB01-AT01C	6	ug/Kg	2	6	J	
	U01-LIB01-AT01D	6	ug/Kg	3	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	4	ug/Kg	2	6.9	J	
	U01-LIB01-AT02AS	7	ug/Kg	2	7	J	
	U01-LIB01-AT02B	9	ug/Kg	4	11	J	
	U01-LIB01-AT02BS	10	ug/Kg	4	11	J	
	U01-LIB01-AT02C	2	ug/Kg	2	6.3	J	
	U01-LIB01-AT02CS	4	ug/Kg	2	6.3	J	
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	14	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	7.2	ug/Kg	2	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	3	ug/Kg	2	7.1	J	
	U01-LIB01-AT03C	4	ug/Kg	2	6.8	J	
	U01-LIB01-AT03CB	ND, U	ug/Kg	3	8.1		
	U01-LIB01-AT03D	6	ug/Kg	3	8.4	J	
	U01-LIB01-AT03DB	4	ug/Kg	2	6.2	J	
LIB01-AGR09	U01-LIB01-AT04A	3	ug/Kg	3	7.4	J	
	U01-LIB01-AT04B	4	ug/Kg	2	7	J	
	U01-LIB01-AT04C	4	ug/Kg	2	6.4	J	
	U01-LIB01-AT04D	3	ug/Kg	2	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	8	ug/Kg	3	8.1	J	
	U01-LIB01-BT02B	2	ug/Kg	2	5.3	J	
LIB01-BGR05	U01-LIB01-BT03A	4	ug/Kg	2	6.6	J	
	U01-LIB01-BT03B	ND, U	ug/Kg	3	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	3	7.7		
	U01-LIB01-BT04B	3	ug/Kg	2	7.1	J	
	U01-LIB01-BT04C	3	ug/Kg	2	6.3	J	
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	ND, U	ug/Kg	2	6.3		
	U01-LIB01-CT01B	4	ug/Kg	2	5.9	J	
	U01-LIB01-CT01C	7.2	ug/Kg	2	6.3		
	U01-LIB01-CT01D	6	ug/Kg	2	6.4	J	
	U01-LIB01-CT01DS	6	ug/Kg	2	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	3	ug/Kg	2	6.6	J	
	U01-LIB01-CT02B	9.4	ug/Kg	3	7.8		
	U01-LIB01-CT02C	4	ug/Kg	2	6.8	J	
	U01-LIB01-CT02D	4	ug/Kg	3	10	J	
LIB01-CGR08	U01-LIB01-CT03A	3	ug/Kg	2	6.6	J	
	U01-LIB01-CT03B	6	ug/Kg	2	7	J	
	U01-LIB01-CT03C	ND, U	ug/Kg	3	8.1		
	U01-LIB01-CT03D	2	ug/Kg	2	6.5	J	
	U01-LIB01-CT03DB	3	ug/Kg	2	6.7	J	

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	5	ug/Kg	2	6.7	J	
	U01-LIB01-AT01B	ND, U	ug/Kg	2	6.8		
	U01-LIB01-AT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-AT01D	2	ug/Kg	2	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	3	ug/Kg	2	6.9	J	
	U01-LIB01-AT02AS	3	ug/Kg	2	7	J	
	U01-LIB01-AT02B	4	ug/Kg	3	11	J	
	U01-LIB01-AT02BS	5	ug/Kg	3	11	J	
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	2	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	5	ug/Kg	3	9.2	J	
	U01-LIB01-AT03AB	3	ug/Kg	2	7.1	J	
	U01-LIB01-AT03B	ND, U	ug/Kg	2	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	2	7.1		
	U01-LIB01-AT03C	4	ug/Kg	2	6.8	J	
	U01-LIB01-AT03CB	ND, U	ug/Kg	2	8.1		
	U01-LIB01-AT03D	3	ug/Kg	2	8.4	J	
	U01-LIB01-AT03DB	ND, U	ug/Kg	2	6.2		
LIB01-AGR09	U01-LIB01-AT04A	ND, U	ug/Kg	2	7.4		
	U01-LIB01-AT04B	ND, U	ug/Kg	2	7		
	U01-LIB01-AT04C	4	ug/Kg	2	6.4	J	
	U01-LIB01-AT04D	3	ug/Kg	2	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	3	ug/Kg	2	8.1	J	
	U01-LIB01-BT02B	ND, U	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	4	ug/Kg	2	6.6	J	
	U01-LIB01-BT03B	ND, U	ug/Kg	2	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	2	7.7		
	U01-LIB01-BT04B	4	ug/Kg	2	7.1	J	
	U01-LIB01-BT04C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	3	ug/Kg	2	6.3	J	
	U01-LIB01-CT01B	3	ug/Kg	2	5.9	J	
	U01-LIB01-CT01C	6.8	ug/Kg	2	6.3		
	U01-LIB01-CT01D	4	ug/Kg	2	6.4	J	
	U01-LIB01-CT01DS	3	ug/Kg	2	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	2	ug/Kg	2	6.6	J	
	U01-LIB01-CT02B	6	ug/Kg	2	7.8	J	
	U01-LIB01-CT02C	ND, U	ug/Kg	2	6.8		
	U01-LIB01-CT02D	ND, U	ug/Kg	3	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	2	6.6		
	U01-LIB01-CT03B	3	ug/Kg	2	7	J	
	U01-LIB01-CT03C	ND, U	ug/Kg	2	8.1		
	U01-LIB01-CT03D	ND, U	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	4	ug/Kg	2	6.7	J	

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	3	ug/Kg	0.8	6.7	J	
	U01-LIB01-AT01B	1	ug/Kg	0.8	6.8	J	
	U01-LIB01-AT01C	1	ug/Kg	0.7	6	J	
	U01-LIB01-AT01D	2	ug/Kg	0.9	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	1	ug/Kg	0.8	6.9	J	
	U01-LIB01-AT02AS	1	ug/Kg	0.8	7	J	
	U01-LIB01-AT02B	ND, U	ug/Kg	2	11		
	U01-LIB01-AT02BS	ND, U	ug/Kg	2	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	0.7	6.3		
	U01-LIB01-AT02CS	0.9	ug/Kg	0.7	6.3	J	
	U01-LIB01-AT02D	ND, U	ug/Kg	0.8	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	0.7	6.6		
LIB01-AGR07	U01-LIB01-AT03A	2	ug/Kg	1	9.2	J	
	U01-LIB01-AT03AB	1	ug/Kg	0.8	7.1	J	
	U01-LIB01-AT03B	ND, U	ug/Kg	1	8.7		
	U01-LIB01-AT03BB	ND, U	ug/Kg	0.8	7.1		
	U01-LIB01-AT03C	1	ug/Kg	0.8	6.8	J	
	U01-LIB01-AT03CB	1	ug/Kg	0.9	8.1	J	
	U01-LIB01-AT03D	2	ug/Kg	0.9	8.4	J	
	U01-LIB01-AT03DB	2	ug/Kg	0.7	6.2	J	
LIB01-AGR09	U01-LIB01-AT04A	1	ug/Kg	0.8	7.4	J	
	U01-LIB01-AT04B	1	ug/Kg	0.8	7	J	
	U01-LIB01-AT04C	2	ug/Kg	0.7	6.4	J	
	U01-LIB01-AT04D	2	ug/Kg	0.8	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	0.8	ug/Kg	0.7	5.9	J	
	U01-LIB01-BT01B	ND, U	ug/Kg	0.7	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	0.7	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	0.7	6		
LIB01-BGR03	U01-LIB01-BT02A	2	ug/Kg	0.9	8.1	J	
	U01-LIB01-BT02B	1	ug/Kg	0.6	5.3	J	
LIB01-BGR05	U01-LIB01-BT03A	2	ug/Kg	0.8	6.6	J	
	U01-LIB01-BT03B	3	ug/Kg	1	8.5	J	
	U01-LIB01-BT03C	ND, U	ug/Kg	0.8	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	0.9	7.7		
	U01-LIB01-BT04B	1	ug/Kg	0.8	7.1	J	
	U01-LIB01-BT04C	1	ug/Kg	0.7	6.3	J	
	U01-LIB01-BT04D	ND, U	ug/Kg	0.7	6.1		
LIB01-CGR03	U01-LIB01-CT01A	0.9	ug/Kg	0.7	6.3	J	
	U01-LIB01-CT01B	1	ug/Kg	0.7	5.9	J	
	U01-LIB01-CT01C	3	ug/Kg	0.7	6.3	J	
	U01-LIB01-CT01D	2	ug/Kg	0.7	6.4	J	
	U01-LIB01-CT01DS	2	ug/Kg	0.7	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	0.8	ug/Kg	0.8	6.6	J	
	U01-LIB01-CT02B	2	ug/Kg	0.9	7.8	J	
	U01-LIB01-CT02C	1	ug/Kg	0.8	6.8	J	
	U01-LIB01-CT02D	ND, U	ug/Kg	2	10		
LIB01-CGR08	U01-LIB01-CT03A	ND, U	ug/Kg	0.8	6.6		
	U01-LIB01-CT03B	2	ug/Kg	0.8	7	J	
	U01-LIB01-CT03C	1	ug/Kg	0.9	8.1	J	
	U01-LIB01-CT03D	0.9	ug/Kg	0.7	6.5	J	
	U01-LIB01-CT03DB	ND, U	ug/Kg	0.8	6.7		

[illegible]

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	17	ug/Kg	3	6.7		
	U01-LIB01-AT01B	5	ug/Kg	3	6.8	J	
	U01-LIB01-AT01C	4	ug/Kg	3	6	J	
	U01-LIB01-AT01D	11	ug/Kg	3	7.8		
LIB01-AGR05	U01-LIB01-AT02A	7	ug/Kg	3	6.9	J	
	U01-LIB01-AT02AS	7.1	ug/Kg	3	7		
	U01-LIB01-AT02B	13	ug/Kg	4	11		
	U01-LIB01-AT02BS	13	ug/Kg	5	11		
	U01-LIB01-AT02C	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02CS	ND, U	ug/Kg	3	6.3		
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	3	6.6		
LIB01-AGR07	U01-LIB01-AT03A	28	ug/Kg	4	9.2		
	U01-LIB01-AT03AB	13	ug/Kg	3	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	4	8.7		
	U01-LIB01-AT03BB	4	ug/Kg	3	7.1	J	
	U01-LIB01-AT03C	6	ug/Kg	3	6.8	J	
	U01-LIB01-AT03CB	5	ug/Kg	3	8.1	J	
	U01-LIB01-AT03D	8.5	ug/Kg	4	8.4		
	U01-LIB01-AT03DB	3	ug/Kg	3	6.2	J	
LIB01-AGR09	U01-LIB01-AT04A	6	ug/Kg	3	7.4	J	
	U01-LIB01-AT04B	6	ug/Kg	3	7	J	
	U01-LIB01-AT04C	7.6	ug/Kg	3	6.4		
	U01-LIB01-AT04D	5	ug/Kg	3	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	3	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	3	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	3	6		
LIB01-BGR03	U01-LIB01-BT02A	11	ug/Kg	3	8.1		
	U01-LIB01-BT02B	2	ug/Kg	2	5.3	J	
LIB01-BGR05	U01-LIB01-BT03A	7.4	ug/Kg	3	6.6		
	U01-LIB01-BT03B	ND, U	ug/Kg	4	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	3	7.1		
LIB01-BGR08	U01-LIB01-BT04A	4	ug/Kg	3	7.7	J	
	U01-LIB01-BT04B	5	ug/Kg	3	7.1	J	
	U01-LIB01-BT04C	4	ug/Kg	3	6.3	J	
	U01-LIB01-BT04D	ND, U	ug/Kg	3	6.1		
LIB01-CGR03	U01-LIB01-CT01A	5	ug/Kg	3	6.3	J	
	U01-LIB01-CT01B	3	ug/Kg	3	5.9	J	
	U01-LIB01-CT01C	6.8	ug/Kg	3	6.3		
	U01-LIB01-CT01D	5	ug/Kg	3	6.4	J	
	U01-LIB01-CT01DS	4	ug/Kg	3	6.2	J	
LIB01-CGR06	U01-LIB01-CT02A	4	ug/Kg	3	6.6	J	
	U01-LIB01-CT02B	12	ug/Kg	3	7.8		
	U01-LIB01-CT02C	5	ug/Kg	3	6.8	J	
	U01-LIB01-CT02D	7	ug/Kg	4	10	J	
LIB01-CGR08	U01-LIB01-CT03A	4	ug/Kg	3	6.6	J	
	U01-LIB01-CT03B	8.6	ug/Kg	3	7		
	U01-LIB01-CT03C	5	ug/Kg	3	8.1	J	
	U01-LIB01-CT03D	3	ug/Kg	3	6.5	J	
	U01-LIB01-CT03DB	4	ug/Kg	3	6.7	J	

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	41	ug/Kg	2	6.7		
	U01-LIB01-AT01B	11	ug/Kg	2	6.8		
	U01-LIB01-AT01C	8.2	ug/Kg	2	6		
	U01-LIB01-AT01D	22	ug/Kg	3	7.8		
LIB01-AGR05	U01-LIB01-AT02A	16	ug/Kg	2	6.9		
	U01-LIB01-AT02AS	16	ug/Kg	2	7		
	U01-LIB01-AT02B	26	ug/Kg	4	11		
	U01-LIB01-AT02BS	24	ug/Kg	4	11		
	U01-LIB01-AT02C	4	ug/Kg	2	6.3	J	
	U01-LIB01-AT02CS	5	ug/Kg	2	6.3	J	
	U01-LIB01-AT02D	4	ug/Kg	3	7.2	J	
	U01-LIB01-AT02DS	3	ug/Kg	2	6.6	J	
LIB01-AGR07	U01-LIB01-AT03A	52	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	31	ug/Kg	2	7.1		
	U01-LIB01-AT03B	6	ug/Kg	3	8.7	J	
	U01-LIB01-AT03BB	8.7	ug/Kg	2	7.1		
	U01-LIB01-AT03C	20	ug/Kg	2	6.8		
	U01-LIB01-AT03CB	11	ug/Kg	3	8.1		
	U01-LIB01-AT03D	15	ug/Kg	3	8.4		
	U01-LIB01-AT03DB	13	ug/Kg	2	6.2		
LIB01-AGR09	U01-LIB01-AT04A	14	ug/Kg	3	7.4		
	U01-LIB01-AT04B	15	ug/Kg	2	7		
	U01-LIB01-AT04C	23	ug/Kg	2	6.4		
	U01-LIB01-AT04D	16	ug/Kg	2	6.9		
LIB01-BGR01	U01-LIB01-BT01A	2	ug/Kg	2	5.9	J	
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	32	ug/Kg	3	8.1		
	U01-LIB01-BT02B	8.5	ug/Kg	2	5.3		
LIB01-BGR05	U01-LIB01-BT03A	19	ug/Kg	2	6.6		
	U01-LIB01-BT03B	5	ug/Kg	3	8.5	J	
	U01-LIB01-BT03C	ND, U	ug/Kg	2	7.1		
LIB01-BGR08	U01-LIB01-BT04A	11	ug/Kg	3	7.7		
	U01-LIB01-BT04B	20	ug/Kg	2	7.1		
	U01-LIB01-BT04C	20	ug/Kg	2	6.3		
	U01-LIB01-BT04D	5	ug/Kg	2	6.1	J	
LIB01-CGR03	U01-LIB01-CT01A	13	ug/Kg	2	6.3		
	U01-LIB01-CT01B	15	ug/Kg	2	5.9		
	U01-LIB01-CT01C	26	ug/Kg	2	6.3		
	U01-LIB01-CT01D	20	ug/Kg	2	6.4		
	U01-LIB01-CT01DS	18	ug/Kg	2	6.2		
LIB01-CGR06	U01-LIB01-CT02A	11	ug/Kg	2	6.6		
	U01-LIB01-CT02B	36	ug/Kg	3	7.8		
	U01-LIB01-CT02C	11	ug/Kg	2	6.8		
	U01-LIB01-CT02D	14	ug/Kg	3	10		
LIB01-CGR08	U01-LIB01-CT03A	9.4	ug/Kg	2	6.6		
	U01-LIB01-CT03B	25	ug/Kg	2	7		
	U01-LIB01-CT03C	11	ug/Kg	3	8.1		
	U01-LIB01-CT03D	8.1	ug/Kg	2	6.5		
	U01-LIB01-CT03DB	11	ug/Kg	2	6.7		

Station ID	Sample ID	Result	Units	MDL	MRL	Qualifier	Validator
LIB01-AGR02	U01-LIB01-AT01A	11	ug/Kg	3	6.7		
	U01-LIB01-AT01B	4	ug/Kg	3	6.8	J	
	U01-LIB01-AT01C	6.2	ug/Kg	2	6		
	U01-LIB01-AT01D	6	ug/Kg	3	7.8	J	
LIB01-AGR05	U01-LIB01-AT02A	4	ug/Kg	3	6.9	J	
	U01-LIB01-AT02AS	4	ug/Kg	3	7	J	
	U01-LIB01-AT02B	10	ug/Kg	4	11	J	
	U01-LIB01-AT02BS	10	ug/Kg	4	11	J	
	U01-LIB01-AT02C	ND, U	ug/Kg	2	6.3		
	U01-LIB01-AT02CS	5	ug/Kg	2	6.3	J	
	U01-LIB01-AT02D	ND, U	ug/Kg	3	7.2		
	U01-LIB01-AT02DS	ND, U	ug/Kg	2	6.6		
LIB01-AGR07	U01-LIB01-AT03A	14	ug/Kg	3	9.2		
	U01-LIB01-AT03AB	8.6	ug/Kg	3	7.1		
	U01-LIB01-AT03B	ND, U	ug/Kg	3	8.7		
	U01-LIB01-AT03BB	3	ug/Kg	3	7.1	J	
	U01-LIB01-AT03C	5	ug/Kg	3	6.8	J	
	U01-LIB01-AT03CB	3	ug/Kg	3	8.1	J	
	U01-LIB01-AT03D	7	ug/Kg	3	8.4	J	
	U01-LIB01-AT03DB	4	ug/Kg	2	6.2	J	
LIB01-AGR09	U01-LIB01-AT04A	4	ug/Kg	3	7.4	J	
	U01-LIB01-AT04B	5	ug/Kg	3	7	J	
	U01-LIB01-AT04C	5	ug/Kg	2	6.4	J	
	U01-LIB01-AT04D	4	ug/Kg	3	6.9	J	
LIB01-BGR01	U01-LIB01-BT01A	ND, U	ug/Kg	2	5.9		
	U01-LIB01-BT01B	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01C	ND, U	ug/Kg	2	6		
	U01-LIB01-BT01D	ND, U	ug/Kg	2	6		
LIB01-BGR03	U01-LIB01-BT02A	9.3	ug/Kg	3	8.1		
	U01-LIB01-BT02B	2	ug/Kg	2	5.3	J	
LIB01-BGR05	U01-LIB01-BT03A	5	ug/Kg	2	6.6	J	
	U01-LIB01-BT03B	ND, U	ug/Kg	3	8.5		
	U01-LIB01-BT03C	ND, U	ug/Kg	3	7.1		
LIB01-BGR08	U01-LIB01-BT04A	ND, U	ug/Kg	3	7.7		
	U01-LIB01-BT04B	ND, U	ug/Kg	3	7.1		
	U01-LIB01-BT04C	5	ug/Kg	2	6.3	J	
	U01-LIB01-BT04D	ND, U	ug/Kg	2	6.1		
LIB01-CGR03	U01-LIB01-CT01A	3	ug/Kg	2	6.3	J	
	U01-LIB01-CT01B	5	ug/Kg	2	5.9	J	
	U01-LIB01-CT01C	8.6	ug/Kg	2	6.3		
	U01-LIB01-CT01D	8.6	ug/Kg	2	6.4		
	U01-LIB01-CT01DS	6.7	ug/Kg	2	6.2		
LIB01-CGR06	U01-LIB01-CT02A	3	ug/Kg	2	6.6	J	
	U01-LIB01-CT02B	10	ug/Kg	3	7.8		
	U01-LIB01-CT02C	4	ug/Kg	3	6.8	J	
	U01-LIB01-CT02D	5	ug/Kg	4	10	J	
LIB01-CGR08	U01-LIB01-CT03A	3	ug/Kg	2	6.6	J	
	U01-LIB01-CT03B	7	ug/Kg	3	7	J	
	U01-LIB01-CT03C	4	ug/Kg	3	8.1	J	
	U01-LIB01-CT03D	4	ug/Kg	2	6.5	J	
	U01-LIB01-CT03DB	4	ug/Kg	3	6.7	J	

[redacted]

Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Solids, Total	160.3M	68	PERCENT	NA	NA		
Solids, Total Volatile	160.4M	4.65	PERCENT	NA	NA		
Ammonia as Nitrogen	Plumb NH_3S1	2.6	mg/Kg	0.2	0.2		
Sulfide, Total	9030M	882	mg/Kg	100	200		
Carbon, Total Organic (TOC)	ASTM D4129-82M	4.04	PERCENT	0.02	0.05		
Antimony, Total	6020	0.12	mg/Kg	0.03	0.05	N	
Arsenic, Total	6020	8	mg/Kg	0.1	0.5		
Barium, Total	6010B	41.6	mg/Kg	0.1	1.1		
Cadmium, Total	6020	0.25	mg/Kg	0.03	0.05		
Calcium, Total	6010B	62800	mg/Kg	2.1	10.5		
Chromium, Total	6020	11.6	mg/Kg	0.03	0.21		
Copper, Total	6020	12	mg/Kg	0.11	0.21		
Iron, Total	6010B	16200	mg/Kg	2.1	4.2		
Lead, Total	6020	8.05	mg/Kg	0.03	0.05		
Manganese, Total	6010B	217	mg/Kg	1.1	1.1		
Mercury, Total	7471A	0.04	mg/Kg	0.01	0.02		
Nickel, Total	6020	18.1	mg/Kg	0.11	0.21		
Silver, Total	6020	0.095	mg/Kg	0.01	0.02		
Zinc, Total	6020	45.7	mg/Kg	0.11	0.53		
alpha-BHC	8081A	ND, U	ug/Kg	0.2	1.5		
beta-BHC	8081A	ND, U	ug/Kg	0.3	1.5		
gamma-BHC (Lindane)	8081A	ND, U	ug/Kg	0.7	1.5	i	
delta-BHC	8081A	ND, U	ug/Kg	0.6	1.5		
Heptachlor	8081A	ND, U	ug/Kg	0.2	1.5		
Aldrin	8081A	ND, U	ug/Kg	0.4	1.5		
Heptachlor Epoxide	8081A	ND, U	ug/Kg	0.2	1.5		
gamma-Chlordane	8081A	ND, U	ug/Kg	0.5	1.5	i	
Endosulfan I	8081A	ND, U	ug/Kg	0.2	1.5		
alpha-Chlordane	8081A	ND, U	ug/Kg	0.2	1.5		
Dieldrin	8081A	ND, U	ug/Kg	0.5	1.5		
4,4'-DDE	8081A	ND, U	ug/Kg	0.4	1.5		
Endrin	8081A	ND, U	ug/Kg	0.3	1.5	i	
Endosulfan II	8081A	ND, U	ug/Kg	0.4	1.5		
4,4'-DDD	8081A	ND, U	ug/Kg	0.5	1.5	i	
Endrin Aldehyde	8081A	ND, U	ug/Kg	0.6	1.5		
Endosulfan Sulfate	8081A	ND, U	ug/Kg	0.3	1.5		
4,4'-DDT	8081A	ND, U	ug/Kg	0.3	1.5		
Endrin Ketone	8081A	ND, U	ug/Kg	0.3	1.5		
Methoxychlor	8081A	ND, U	ug/Kg	1.5	1.5	i	
Toxaphene	8081A	ND, U	ug/Kg	9	73		
Aroclor 1016	8082	ND, U	ug/Kg	3	10		
Aroclor 1221	8082	ND, U	ug/Kg	3	20		
Aroclor 1232	8082	ND, U	ug/Kg	3	10		
Aroclor 1242	8082	ND, U	ug/Kg	3	10		
Aroclor 1248	8082	ND, U	ug/Kg	3	10		
Aroclor 1254	8082	ND, U	ug/Kg	3	10		
Aroclor 1260	8082	ND, U	ug/Kg	3	10		

[redacted]

Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
1,3-Dichlorobenzene	8260B	ND, U	ug/Kg	1	2.7		
1,4-Dichlorobenzene	8260B	ND, U	ug/Kg	2	2.7		
1,2-Dichlorobenzene	8260B	ND, U	ug/Kg	1	2.7		
Bis(2-chloroethyl) Ether	8270C	ND, U	ug/Kg	3.4	15		
Phenol	8270C	32	ug/Kg	4.1	44	J	
2-Chlorophenol	8270C	ND, U	ug/Kg	4.3	15		
1,3-Dichlorobenzene	8270C	ND, U	ug/Kg	3.7	15		
1,4-Dichlorobenzene	8270C	ND, U	ug/Kg	3.9	15		
1,2-Dichlorobenzene	8270C	ND, U	ug/Kg	3.6	15		
Benzyl Alcohol	8270C	ND, U	ug/Kg	4.5	15		
Bis(2-chloroisopropyl) Ether	8270C	ND, U	ug/Kg	4.2	15		
2-Methylphenol	8270C	ND, U	ug/Kg	3.5	15		
Hexachloroethane	8270C	ND, U	ug/Kg	3.4	15		
N-Nitrosodi-n-propylamine	8270C	ND, U	ug/Kg	4.9	15		
4-Methylphenol	8270C	5.8	ug/Kg	3.9	15	J	
Nitrobenzene	8270C	ND, U	ug/Kg	4.4	15		
Isophorone	8270C	ND, U	ug/Kg	5.2	15		
2-Nitrophenol	8270C	ND, U	ug/Kg	3.7	15		
2,4-Dimethylphenol	8270C	ND, U	ug/Kg	27	73		
Bis(2-chloroethoxy)methane	8270C	ND, U	ug/Kg	4.6	15		
2,4-Dichlorophenol	8270C	ND, U	ug/Kg	4.6	15		
Benzoic Acid	8270C	57	ug/Kg	29	290	J, *	VLL
1,2,4-Trichlorobenzene	8270C	ND, U	ug/Kg	3.9	15		
Naphthalene	8270C	6.7	ug/Kg	2.2	15	J	
4-Chloroaniline	8270C	ND, U	ug/Kg	1.6	15		
Hexachlorobutadiene	8270C	ND, U	ug/Kg	4.5	15		
4-Chloro-3-methylphenol	8270C	ND, U	ug/Kg	4.5	15		
2-Methylnaphthalene	8270C	12	ug/Kg	4.4	15	J	
Hexachlorocyclopentadiene	8270C	ND, U	ug/Kg	8.1	73		
2,4,6-Trichlorophenol	8270C	ND, U	ug/Kg	5.5	15		
2,4,5-Trichlorophenol	8270C	ND, U	ug/Kg	5.4	15		
2-Chloronaphthalene	8270C	ND, U	ug/Kg	4.2	15		
2-Nitroaniline	8270C	ND, U	ug/Kg	3.6	29		
Acenaphthylene	8270C	ND, U	ug/Kg	2.4	15		
Dimethyl Phthalate	8270C	ND, U	ug/Kg	3.8	15		
2,6-Dinitrotoluene	8270C	ND, U	ug/Kg	3.7	15		
Acenaphthene	8270C	ND, U	ug/Kg	3.8	15		
3-Nitroaniline	8270C	ND, U	ug/Kg	5.1	29		
2,4-Dinitrophenol	8270C	ND, U	ug/Kg	24	290		
Dibenzofuran	8270C	ND, U	ug/Kg	4.7	15		
4-Nitrophenol	8270C	ND, U	ug/Kg	3.4	150		
2,4-Dinitrotoluene	8270C	ND, U	ug/Kg	3.6	15		
Fluorene	8270C	ND, U	ug/Kg	3.5	15		
4-Chlorophenyl Phenyl Ether	8270C	ND, U	ug/Kg	3.8	15		
Diethyl Phthalate	8270C	ND, U	ug/Kg	4.5	15		
4-Nitroaniline	8270C	ND, U	ug/Kg	4.7	29		
4,6-Dinitro-2-methylphenol	8270C	ND, U	ug/Kg	5	150		
N-Nitrosodiphenylamine	8270C	ND, U	ug/Kg	3.6	15		
4-Bromophenyl Phenyl Ether	8270C	ND, U	ug/Kg	3.4	15		
Hexachlorobenzene	8270C	ND, U	ug/Kg	4.9	15		
Pentachlorophenol (PCP)	8270C	ND, U	ug/Kg	3.8	73		

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Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Phenanthrene	8270C	15	ug/Kg	3	15	J	
Anthracene	8270C	ND, U	ug/Kg	3.4	15		
Di-n-butyl Phthalate	8270C	ND, U	ug/Kg	3.8	15		
Fluoranthene	8270C	ND, U	ug/Kg	4	15		
Pyrene	8270C	7.8	ug/Kg	3.8	15	J	
Butyl Benzyl Phthalate	8270C	ND, U	ug/Kg	2.5	15		
3,3'-Dichlorobenzidine	8270C	ND, U	ug/Kg	7.1	150		
Benz(a)anthracene	8270C	2.1	ug/Kg	1.6	15	J	
Chrysene	8270C	7.6	ug/Kg	1.6	15	J	
Bis(2-ethylhexyl) Phthalate	8270C	ND, U	ug/Kg	230	290		
Di-n-octyl Phthalate	8270C	ND, U	ug/Kg	2.4	15		
Benzo(b)fluoranthene	8270C	4	ug/Kg	1.8	15	J	
Benzo(k)fluoranthene	8270C	ND, U	ug/Kg	2.8	15		
Benzo(a)pyrene	8270C	ND, U	ug/Kg	1.9	15		
Indeno(1,2,3-cd)pyrene	8270C	ND, U	ug/Kg	0.74	15		
Dibenz(a,h)anthracene	8270C	ND, U	ug/Kg	1.9	15		
Benzo(g,h,i)perylene	8270C	4	ug/Kg	2	15	J	

[illegible]

Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Solids, Total	160.3M	79.7	PERCENT				
Solids, Total Volatile	160.4M	1.27	PERCENT				
Ammonia as Nitrogen	Plumb NH_3S1	0.7	mg/Kg	0.2	0.2		
Sulfide, Total	9030M	51.6	mg/Kg	5.0	10.0		
Carbon, Total Organic (TOC)	ASTM D4129-82M	0.8	PERCENT	0.02	0.05		
Antimony, Total	6020	0.1	mg/Kg	0.03	0.05	N	
Arsenic, Total	6020	5.1	mg/Kg	0.1	0.5		
Barium, Total	6010B	29.5	mg/Kg	0.1	1.1		
Cadmium, Total	6020	0.11	mg/Kg	0.03	0.05		
Calcium, Total	6010B	25100	mg/Kg	2.1	10.5		
Chromium, Total	6020	8.51	mg/Kg	0.03	0.21		
Copper, Total	6020	6.29	mg/Kg	0.11	0.21		
Iron, Total	6010B	11300	mg/Kg	2.1	4.2		
Lead, Total	6020	6.03	mg/Kg	0.03	0.05		
Manganese, Total	6010B	142	mg/Kg	1.1	1.1		
Mercury, Total	7471A	0.01	mg/Kg	0.01	0.02	B	
Nickel, Total	6020	12.4	mg/Kg	0.11	0.21		
Silver, Total	6020	0.033	mg/Kg	0.01	0.02		
Zinc, Total	6020	34.9	mg/Kg	0.11	0.52		
alpha-BHC	8081A	0.3	ug/Kg	0.2	1.3	J	
beta-BHC	8081A	ND, U	ug/Kg	0.2	1.3		
gamma-BHC (Lindane)	8081A	ND, U	ug/Kg	0.4	1.3		
delta-BHC	8081A	ND, U	ug/Kg	0.5	1.3		
Heptachlor	8081A	ND, U	ug/Kg	0.2	1.3		
Aldrin	8081A	ND, U	ug/Kg	0.3	1.3		
Heptachlor Epoxide	8081A	ND, U	ug/Kg	0.2	1.3		
gamma-Chlordane	8081A	ND, U	ug/Kg	0.2	1.3		
Endosulfan I	8081A	ND, U	ug/Kg	0.2	1.3		
alpha-Chlordane	8081A	ND, U	ug/Kg	0.2	1.3		
Dieldrin	8081A	ND, U	ug/Kg	0.4	1.3		
4,4'-DDE	8081A	ND, U	ug/Kg	0.4	1.3		
Endrin	8081A	ND, U	ug/Kg	0.2	1.3		
Endosulfan II	8081A	ND, U	ug/Kg	0.3	1.3		
4,4'-DDD	8081A	0.3	ug/Kg	0.2	1.3	J	
Endrin Aldehyde	8081A	ND, U	ug/Kg	0.5	1.3		
Endosulfan Sulfate	8081A	ND, U	ug/Kg	0.3	1.3		
4,4'-DDT	8081A	ND, U	ug/Kg	0.3	1.3		
Endrin Ketone	8081A	ND, U	ug/Kg	0.2	1.3		
Methoxychlor	8081A	ND, U	ug/Kg	0.3	1.3		
Toxaphene	8081A	ND, U	ug/Kg	8	63		
Aroclor 1016	8082	ND, U	ug/Kg	3	10		
Aroclor 1221	8082	ND, U	ug/Kg	3	20		
Aroclor 1232	8082	ND, U	ug/Kg	3	10		
Aroclor 1242	8082	ND, U	ug/Kg	3	10		
Aroclor 1248	8082	ND, U	ug/Kg	3	10		
Aroclor 1254	8082	ND, U	ug/Kg	3	10		
Aroclor 1260	8082	ND, U	ug/Kg	3	10		

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Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
1,3-Dichlorobenzene	8260B	ND, U	ug/Kg	0.9	2.4		
1,4-Dichlorobenzene	8260B	ND, U	ug/Kg	1	2.4		
1,2-Dichlorobenzene	8260B	ND, U	ug/Kg	0.9	2.4		
Bis(2-chloroethyl) Ether	8270C	ND, U	ug/Kg	2.9	13		
Phenol	8270C	24	ug/Kg	3.5	38	J	
2-Chlorophenol	8270C	ND, U	ug/Kg	3.7	13		
1,3-Dichlorobenzene	8270C	ND, U	ug/Kg	3.6	13		
1,4-Dichlorobenzene	8270C	ND, U	ug/Kg	3.4	13		
1,2-Dichlorobenzene	8270C	ND, U	ug/Kg	3.5	13		
Benzyl Alcohol	8270C	ND, U	ug/Kg	3.5	13		
Bis(2-chloroisopropyl) Ether	8270C	ND, U	ug/Kg	3.6	13		
2-Methylphenol	8270C	ND, U	ug/Kg	3	13		
Hexachloroethane	8270C	ND, U	ug/Kg	2.9	13		
N-Nitrosodi-n-propylamine	8270C	ND, U	ug/Kg	4.2	13		
4-Methylphenol	8270C	ND, U	ug/Kg	3.4	13		
Nitrobenzene	8270C	ND, U	ug/Kg	4.2	13		
Isophorone	8270C	ND, U	ug/Kg	4.5	13		
2-Nitrophenol	8270C	ND, U	ug/Kg	3.6	13		
2,4-Dimethylphenol	8270C	ND, U	ug/Kg	19	63		
Bis(2-chloroethoxy)methane	8270C	ND, U	ug/Kg	3.9	13		
2,4-Dichlorophenol	8270C	ND, U	ug/Kg	4	13		
Benzoic Acid	8270C	45	ug/Kg	21	250	J, *	VLL
1,2,4-Trichlorobenzene	8270C	ND, U	ug/Kg	3.3	13		
Naphthalene	8270C	ND, U	ug/Kg	2.3	13		
4-Chloroaniline	8270C	ND, U	ug/Kg	1.8	13		
Hexachlorobutadiene	8270C	ND, U	ug/Kg	3.5	13		
4-Chloro-3-methylphenol	8270C	ND, U	ug/Kg	3.5	13		
2-Methylnaphthalene	8270C	ND, U	ug/Kg	3.8	13		
Hexachlorocyclopentadiene	8270C	ND, U	ug/Kg	7.4	63		
2,4,6-Trichlorophenol	8270C	ND, U	ug/Kg	4.7	13		
2,4,5-Trichlorophenol	8270C	ND, U	ug/Kg	4.6	13		
2-Chloronaphthalene	8270C	ND, U	ug/Kg	3.6	13		
2-Nitroaniline	8270C	ND, U	ug/Kg	2.7	25		
Acenaphthylene	8270C	ND, U	ug/Kg	2.5	13		
Dimethyl Phthalate	8270C	ND, U	ug/Kg	3.7	13		
2,6-Dinitrotoluene	8270C	ND, U	ug/Kg	2.8	13		
Acenaphthene	8270C	ND, U	ug/Kg	3.7	13		
3-Nitroaniline	8270C	ND, U	ug/Kg	4	25		
2,4-Dinitrophenol	8270C	ND, U	ug/Kg	21	250		
Dibenzofuran	8270C	ND, U	ug/Kg	3.6	13		
4-Nitrophenol	8270C	ND, U	ug/Kg	2.9	130		
2,4-Dinitrotoluene	8270C	ND, U	ug/Kg	3.5	13		
Fluorene	8270C	ND, U	ug/Kg	3.4	13		
4-Chlorophenyl Phenyl Ether	8270C	ND, U	ug/Kg	3.7	13		
Diethyl Phthalate	8270C	ND, U	ug/Kg	4.3	13		
4-Nitroaniline	8270C	ND, U	ug/Kg	4.5	25		
4,6-Dinitro-2-methylphenol	8270C	ND, U	ug/Kg	3.9	130		
N-Nitrosodiphenylamine	8270C	ND, U	ug/Kg	3.5	13		
4-Bromophenyl Phenyl Ether	8270C	ND, U	ug/Kg	2.9	13		
Hexachlorobenzene	8270C	ND, U	ug/Kg	3.8	13		
Pentachlorophenol (PCP)	8270C	ND, U	ug/Kg	3.3	63		

[illegible]

Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Phenanthrene	8270C	4.1	ug/Kg	3	13	J	
Anthracene	8270C	ND, U	ug/Kg	2.9	13		
Di-n-butyl Phthalate	8270C	ND, U	ug/Kg	3.7	13		
Fluoranthene	8270C	ND, U	ug/Kg	3.5	13		
Pyrene	8270C	ND, U	ug/Kg	3.7	13		
Butyl Benzyl Phthalate	8270C	ND, U	ug/Kg	2.2	13		
3,3'-Dichlorobenzidine	8270C	ND, U	ug/Kg	5.7	130		
Benz(a)anthracene	8270C	ND, U	ug/Kg	1.8	13		
Chrysene	8270C	2.7	ug/Kg	1.4	13	J	
Bis(2-ethylhexyl) Phthalate	8270C	ND, U	ug/Kg	200	250		
Di-n-octyl Phthalate	8270C	ND, U	ug/Kg	2.5	13		
Benzo(b)fluoranthene	8270C	ND, U	ug/Kg	1.2	13		
Benzo(k)fluoranthene	8270C	ND, U	ug/Kg	2	13		
Benzo(a)pyrene	8270C	ND, U	ug/Kg	1.2	13		
Indeno(1,2,3-cd)pyrene	8270C	ND, U	ug/Kg	0.64	13		
Dibenz(a,h)anthracene	8270C	ND, U	ug/Kg	1.7	13		
Benzo(g,h,i)perylene	8270C	ND, U	ug/Kg	1.3	13		

[illegible]

Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Solids, Total	160.3M	75.8	PERCENT				
Solids, Total Volatile	160.4M	3.54	PERCENT				
Ammonia as Nitrogen	Plumb NH_3S1	2.4	mg/Kg	0.2	0.2		
Sulfide, Total	9030M	68	mg/Kg	5.0	10.0		
Carbon, Total Organic (TOC)	ASTM D4129-82M	3.01	PERCENT	0.02	0.05		
Antimony, Total	6020	0.1	mg/Kg	0.03	0.06	N	
Arsenic, Total	6020	4.6	mg/Kg	0.1	0.6		
Barium, Total	6010B	38.2	mg/Kg	0.1	1.1		
Cadmium, Total	6020	0.34	mg/Kg	0.03	0.06		
Calcium, Total	6010B	64300	mg/Kg	2.2	11		
Chromium, Total	6020	13	mg/Kg	0.03	0.22		
Copper, Total	6020	12.4	mg/Kg	0.11	0.22		
Iron, Total	6010B	16500	mg/Kg	2.2	4.4		
Lead, Total	6020	7.82	mg/Kg	0.03	0.06		
Manganese, Total	6010B	256	mg/Kg	1.1	1.1		
Mercury, Total	7471A	0.04	mg/Kg	0.01	0.02		
Nickel, Total	6020	20.7	mg/Kg	0.11	0.22		
Silver, Total	6020	0.099	mg/Kg	0.01	0.02		
Zinc, Total	6020	57.8	mg/Kg	0.11	0.55		
alpha-BHC	8081A	ND, U	ug/Kg	0.2	1.3		
beta-BHC	8081A	ND, U	ug/Kg	0.2	1.3		
gamma-BHC (Lindane)	8081A	ND, U	ug/Kg	0.5	1.3	i	
delta-BHC	8081A	ND, U	ug/Kg	0.5	1.3		
Heptachlor	8081A	ND, U	ug/Kg	0.2	1.3		
Aldrin	8081A	ND, U	ug/Kg	0.4	1.3		
Heptachlor Epoxide	8081A	ND, U	ug/Kg	0.2	1.3		
gamma-Chlordane	8081A	ND, U	ug/Kg	0.2	1.3		
Endosulfan I	8081A	ND, U	ug/Kg	0.2	1.3		
alpha-Chlordane	8081A	ND, U	ug/Kg	0.2	1.3		
Dieldrin	8081A	ND, U	ug/Kg	0.5	1.3		
4,4'-DDE	8081A	ND, U	ug/Kg	0.4	1.3		
Endrin	8081A	ND, U	ug/Kg	0.2	1.3		
Endosulfan II	8081A	ND, U	ug/Kg	0.3	1.3		
4,4'-DDD	8081A	ND, U	ug/Kg	0.9	1.3	i	
Endrin Aldehyde	8081A	ND, U	ug/Kg	0.5	1.3		
Endosulfan Sulfate	8081A	ND, U	ug/Kg	0.3	1.3		
4,4'-DDT	8081A	ND, U	ug/Kg	0.3	1.3		
Endrin Ketone	8081A	ND, U	ug/Kg	0.3	1.3		
Methoxychlor	8081A	ND, U	ug/Kg	0.6	1.3	i	
Toxaphene	8081A	ND, U	ug/Kg	8	66		
Aroclor 1016	8082	ND, U	ug/Kg	3	10		
Aroclor 1221	8082	ND, U	ug/Kg	3	20		
Aroclor 1232	8082	ND, U	ug/Kg	3	10		
Aroclor 1242	8082	ND, U	ug/Kg	3	10		
Aroclor 1248	8082	ND, U	ug/Kg	3	10		
Aroclor 1254	8082	ND, U	ug/Kg	3	10		
Aroclor 1260	8082	ND, U	ug/Kg	3	10		

[redacted]

Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
1,3-Dichlorobenzene	8260B	ND, U	ug/Kg	0.9	2.5		
1,4-Dichlorobenzene	8260B	ND, U	ug/Kg	1	2.5		
1,2-Dichlorobenzene	8260B	ND, U	ug/Kg	0.9	2.5		
Bis(2-chloroethyl) Ether	8270C	ND, U	ug/Kg	3.5	13		
Phenol	8270C	34	ug/Kg	4.1	40	J	
2-Chlorophenol	8270C	ND, U	ug/Kg	3.9	13		
1,3-Dichlorobenzene	8270C	ND, U	ug/Kg	3.3	13		
1,4-Dichlorobenzene	8270C	ND, U	ug/Kg	3.1	13		
1,2-Dichlorobenzene	8270C	ND, U	ug/Kg	3.2	13		
Benzyl Alcohol	8270C	ND, U	ug/Kg	4.1	13		
Bis(2-chloroisopropyl) Ether	8270C	ND, U	ug/Kg	4.2	13		
2-Methylphenol	8270C	ND, U	ug/Kg	3.6	13		
Hexachloroethane	8270C	ND, U	ug/Kg	3.5	13		
N-Nitrosodi-n-propylamine	8270C	ND, U	ug/Kg	4.4	13		
4-Methylphenol	8270C	5.1	ug/Kg	3.1	13	J	
Nitrobenzene	8270C	ND, U	ug/Kg	4.4	13		
Isophorone	8270C	ND, U	ug/Kg	4.7	13		
2-Nitrophenol	8270C	ND, U	ug/Kg	3.3	13		
2,4-Dimethylphenol	8270C	ND, U	ug/Kg	20	66		
Bis(2-chloroethoxy)methane	8270C	ND, U	ug/Kg	4.1	13		
2,4-Dichlorophenol	8270C	ND, U	ug/Kg	3.7	13		
Benzoic Acid	8270C	37	ug/Kg	22	260	J, *	VLL
1,2,4-Trichlorobenzene	8270C	ND, U	ug/Kg	3.5	13		
Naphthalene	8270C	4.9	ug/Kg	2.4	13	J	
4-Chloroaniline	8270C	ND, U	ug/Kg	1.9	13		
Hexachlorobutadiene	8270C	ND, U	ug/Kg	4.1	13		
4-Chloro-3-methylphenol	8270C	ND, U	ug/Kg	4.1	13		
2-Methylnaphthalene	8270C	9.9	ug/Kg	4.4	13	J	
Hexachlorocyclopentadiene	8270C	ND, U	ug/Kg	7.3	66		
2,4,6-Trichlorophenol	8270C	ND, U	ug/Kg	4.9	13		
2,4,5-Trichlorophenol	8270C	ND, U	ug/Kg	5.3	13		
2-Chloronaphthalene	8270C	ND, U	ug/Kg	3.8	13		
2-Nitroaniline	8270C	ND, U	ug/Kg	3.3	26		
Acenaphthylene	8270C	ND, U	ug/Kg	2.6	13		
Dimethyl Phthalate	8270C	ND, U	ug/Kg	3.4	13		
2,6-Dinitrotoluene	8270C	ND, U	ug/Kg	3.4	13		
Acenaphthene	8270C	ND, U	ug/Kg	3.9	13		
3-Nitroaniline	8270C	ND, U	ug/Kg	4.2	26		
2,4-Dinitrophenol	8270C	ND, U	ug/Kg	22	260		
Dibenzofuran	8270C	ND, U	ug/Kg	3.8	13		
4-Nitrophenol	8270C	ND, U	ug/Kg	3.5	130		
2,4-Dinitrotoluene	8270C	ND, U	ug/Kg	3.2	13		
Fluorene	8270C	ND, U	ug/Kg	3.6	13		
4-Chlorophenyl Phenyl Ether	8270C	ND, U	ug/Kg	3.4	13		
Diethyl Phthalate	8270C	ND, U	ug/Kg	4	13		
4-Nitroaniline	8270C	ND, U	ug/Kg	4.7	26		
4,6-Dinitro-2-methylphenol	8270C	ND, U	ug/Kg	4.1	130		
N-Nitrosodiphenylamine	8270C	ND, U	ug/Kg	3.7	13		
4-Bromophenyl Phenyl Ether	8270C	ND, U	ug/Kg	3.5	13		
Hexachlorobenzene	8270C	ND, U	ug/Kg	4	13		
Pentachlorophenol (PCP)	8270C	ND, U	ug/Kg	3	66		

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Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Phenanthrene	8270C	14	ug/Kg	2.7	13		
Anthracene	8270C	ND, U	ug/Kg	3.5	13		
Di-n-butyl Phthalate	8270C	ND, U	ug/Kg	3.9	13		
Fluoranthene	8270C	ND, U	ug/Kg	3.2	13		
Pyrene	8270C	5	ug/Kg	3.4	13	J	
Butyl Benzyl Phthalate	8270C	ND, U	ug/Kg	2.3	13		
3,3'-Dichlorobenzidine	8270C	ND, U	ug/Kg	6	130		
Benz(a)anthracene	8270C	3.1	ug/Kg	1.4	13	J	
Chrysene	8270C	6.5	ug/Kg	1.9	13	J	
Bis(2-ethylhexyl) Phthalate	8270C	ND, U	ug/Kg	210	260		
Di-n-octyl Phthalate	8270C	ND, U	ug/Kg	2.6	13		
Benzo(b)fluoranthene	8270C	3	ug/Kg	1.7	13	J	
Benzo(k)fluoranthene	8270C	ND, U	ug/Kg	2.1	13		
Benzo(a)pyrene	8270C	1.5	ug/Kg	1.3	13	J	
Indeno(1,2,3-cd)pyrene	8270C	ND, U	ug/Kg	0.67	13		
Dibenz(a,h)anthracene	8270C	ND, U	ug/Kg	1.3	13		
Benzo(g,h,i)perylene	8270C	3.1	ug/Kg	1.4	13	J	

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Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Solids, Total	160.3M	71.3	PERCENT				
Solids, Total Volatile	160.4M	3.56	PERCENT				
Ammonia as Nitrogen	Plumb NH_3S1	3.3	mg/Kg	0.2	0.2		
Sulfide, Total	9030M	324	mg/Kg	10.0	20.0		
Carbon, Total Organic (TOC)	ASTM D4129-82M	3.67	PERCENT	0.02	0.05		
Antimony, Total	6020	0.17	mg/Kg	0.03	0.06	N	
Arsenic, Total	6020	6.8	mg/Kg	0.1	0.6		
Barium, Total	6010B	58.5	mg/Kg	0.1	1.2		
Cadmium, Total	6020	0.31	mg/Kg	0.03	0.06		
Calcium, Total	6010B	73200	mg/Kg	2.3	11.7		
Chromium, Total	6020	12.9	mg/Kg	0.04	0.23		
Copper, Total	6020	15.1	mg/Kg	0.12	0.23		
Iron, Total	6010B	16400	mg/Kg	2.3	4.7		
Lead, Total	6020	9.29	mg/Kg	0.03	0.06		
Manganese, Total	6010B	183	mg/Kg	1.2	1.2		
Mercury, Total	7471A	0.05	mg/Kg	0.01	0.02		
Nickel, Total	6020	19.2	mg/Kg	0.12	0.23		
Silver, Total	6020	0.105	mg/Kg	0.01	0.02		
Zinc, Total	6020	55.8	mg/Kg	0.12	0.58		
alpha-BHC	8081A	0.5	ug/Kg	0.2	1.4	J	
beta-BHC	8081A	ND, U	ug/Kg	0.3	1.4		
gamma-BHC (Lindane)	8081A	ND, U	ug/Kg	0.4	1.4		
delta-BHC	8081A	ND, U	ug/Kg	0.6	1.4		
Heptachlor	8081A	ND, U	ug/Kg	0.2	1.4		
Aldrin	8081A	ND, U	ug/Kg	0.4	1.4		
Heptachlor Epoxide	8081A	ND, U	ug/Kg	0.2	1.4		
gamma-Chlordane	8081A	0.4	ug/Kg	0.3	1.4	J	
Endosulfan I	8081A	ND, U	ug/Kg	0.2	1.4		
alpha-Chlordane	8081A	ND, U	ug/Kg	0.2	1.4		
Dieldrin	8081A	ND, U	ug/Kg	0.5	1.4		
4,4'-DDE	8081A	ND, U	ug/Kg	0.4	1.4		
Endrin	8081A	ND, U	ug/Kg	0.2	1.4		
Endosulfan II	8081A	ND, U	ug/Kg	0.4	1.4		
4,4'-DDD	8081A	ND, U	ug/Kg	0.8	1.4	i	
Endrin Aldehyde	8081A	ND, U	ug/Kg	0.5	1.4		
Endosulfan Sulfate	8081A	ND, U	ug/Kg	0.3	1.4		
4,4'-DDT	8081A	ND, U	ug/Kg	0.3	1.4		
Endrin Ketone	8081A	ND, U	ug/Kg	0.3	1.4		
Methoxychlor	8081A	ND, U	ug/Kg	1	1.4	i	
Toxaphene	8081A	ND, U	ug/Kg	8	70		
Aroclor 1016	8082	ND, U	ug/Kg	3	10		
Aroclor 1221	8082	ND, U	ug/Kg	3	20		
Aroclor 1232	8082	ND, U	ug/Kg	3	10		
Aroclor 1242	8082	ND, U	ug/Kg	3	10		
Aroclor 1248	8082	ND, U	ug/Kg	3	10		
Aroclor 1254	8082	ND, U	ug/Kg	3	10		
Aroclor 1260	8082	ND, U	ug/Kg	3	10		

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Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
1,3-Dichlorobenzene	8260B	ND, U	ug/Kg	1	2.6		
1,4-Dichlorobenzene	8260B	ND, U	ug/Kg	2	2.6		
1,2-Dichlorobenzene	8260B	ND, U	ug/Kg	1	2.6		
Bis(2-chloroethyl) Ether	8270C	ND, U	ug/Kg	3.7	14		
Phenol	8270C	35	ug/Kg	3.9	42	J	
2-Chlorophenol	8270C	ND, U	ug/Kg	4.1	14		
1,3-Dichlorobenzene	8270C	ND, U	ug/Kg	3.5	14		
1,4-Dichlorobenzene	8270C	ND, U	ug/Kg	3.3	14		
1,2-Dichlorobenzene	8270C	ND, U	ug/Kg	3.4	14		
Benzyl Alcohol	8270C	ND, U	ug/Kg	3.9	14		
Bis(2-chloroisopropyl) Ether	8270C	ND, U	ug/Kg	4	14		
2-Methylphenol	8270C	ND, U	ug/Kg	3.8	14		
Hexachloroethane	8270C	ND, U	ug/Kg	3.7	14		
N-Nitrosodi-n-propylamine	8270C	ND, U	ug/Kg	5.1	14		
4-Methylphenol	8270C	9.2	ug/Kg	3.3	14	J	
Nitrobenzene	8270C	ND, U	ug/Kg	4.2	14		
Isophorone	8270C	ND, U	ug/Kg	4.5	14		
2-Nitrophenol	8270C	ND, U	ug/Kg	4	14		
2,4-Dimethylphenol	8270C	ND, U	ug/Kg	26	70		
Bis(2-chloroethoxy)methane	8270C	ND, U	ug/Kg	4.8	14		
2,4-Dichlorophenol	8270C	ND, U	ug/Kg	4.4	14		
Benzoic Acid	8270C	37	ug/Kg	28	280	J, *	VLL
1,2,4-Trichlorobenzene	8270C	ND, U	ug/Kg	3.7	14		
Naphthalene	8270C	4.8	ug/Kg	2.1	14	J	
4-Chloroaniline	8270C	ND, U	ug/Kg	2	14		
Hexachlorobutadiene	8270C	ND, U	ug/Kg	3.9	14		
4-Chloro-3-methylphenol	8270C	ND, U	ug/Kg	3.9	14		
2-Methylnaphthalene	8270C	8.3	ug/Kg	4.2	14	J	
Hexachlorocyclopentadiene	8270C	ND, U	ug/Kg	8.2	70		
2,4,6-Trichlorophenol	8270C	ND, U	ug/Kg	5.7	14		
2,4,5-Trichlorophenol	8270C	ND, U	ug/Kg	5.6	14		
2-Chloronaphthalene	8270C	ND, U	ug/Kg	4	14		
2-Nitroaniline	8270C	ND, U	ug/Kg	3.5	28		
Acenaphthylene	8270C	ND, U	ug/Kg	2.3	14		
Dimethyl Phthalate	8270C	ND, U	ug/Kg	4.1	14		
2,6-Dinitrotoluene	8270C	ND, U	ug/Kg	3.1	14		
Acenaphthene	8270C	ND, U	ug/Kg	4.1	14		
3-Nitroaniline	8270C	ND, U	ug/Kg	4.9	28		
2,4-Dinitrophenol	8270C	ND, U	ug/Kg	23	280		
Dibenzofuran	8270C	ND, U	ug/Kg	4.5	14		
4-Nitrophenol	8270C	ND, U	ug/Kg	3.7	140		
2,4-Dinitrotoluene	8270C	ND, U	ug/Kg	3.4	14		
Fluorene	8270C	ND, U	ug/Kg	3.3	14		
4-Chlorophenyl Phenyl Ether	8270C	ND, U	ug/Kg	4.1	14		
Diethyl Phthalate	8270C	ND, U	ug/Kg	4.7	14		
4-Nitroaniline	8270C	ND, U	ug/Kg	4.5	28		
4,6-Dinitro-2-methylphenol	8270C	ND, U	ug/Kg	4.8	140		
N-Nitrosodiphenylamine	8270C	ND, U	ug/Kg	3.9	14		
4-Bromophenyl Phenyl Ether	8270C	ND, U	ug/Kg	3.2	14		
Hexachlorobenzene	8270C	ND, U	ug/Kg	4.7	14		
Pentachlorophenol (PCP)	8270C	ND, U	ug/Kg	3.2	70		

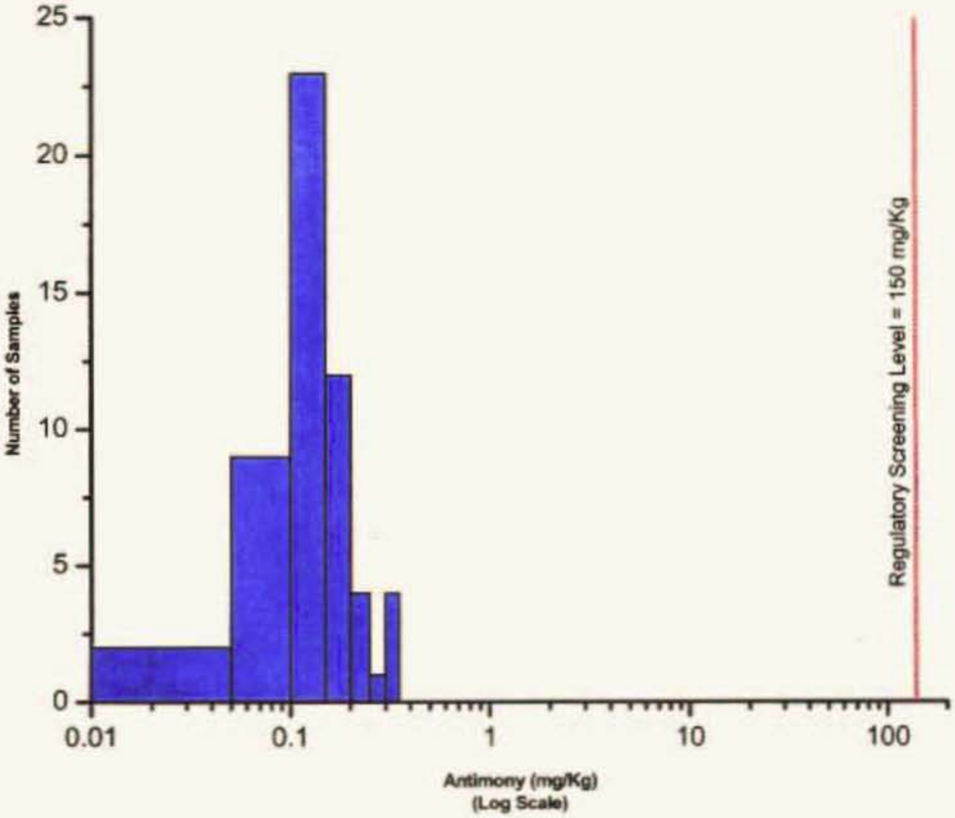
[illegible] Sediment Analyses [illegible] Sample ID [illegible]

Analyte	Method	Result	Units	MDL	MRL	Qualifier	Validator
Phenanthrene	8270C	11	ug/Kg	3.3	14	J	
Anthracene	8270C	ND, U	ug/Kg	3.7	14		
Di-n-butyl Phthalate	8270C	ND, U	ug/Kg	4.1	14		
Fluoranthene	8270C	ND, U	ug/Kg	3.4	14		
Pyrene	8270C	5	ug/Kg	4.1	14	J	
Butyl Benzyl Phthalate	8270C	ND, U	ug/Kg	2.4	14		
3,3'-Dichlorobenzidine	8270C	ND, U	ug/Kg	6.8	140		
Benz(a)anthracene	8270C	2.4	ug/Kg	1.5	14	J	
Chrysene	8270C	7.2	ug/Kg	2	14	J	
Bis(2-ethylhexyl) Phthalate	8270C	ND, U	ug/Kg	220	280		
Di-n-octyl Phthalate	8270C	ND, U	ug/Kg	2.3	14		
Benzo(b)fluoranthene	8270C	3.2	ug/Kg	1.3	14	J	
Benzo(k)fluoranthene	8270C	ND, U	ug/Kg	2.7	14		
Benzo(a)pyrene	8270C	3.8	ug/Kg	1.8	14	J	
Indeno(1,2,3-cd)pyrene	8270C	ND, U	ug/Kg	0.71	14		
Dibenz(a,h)anthracene	8270C	2.3	ug/Kg	1.8	14	J	
Benzo(g,h,i)perylene	8270C	2.9	ug/Kg	1.9	14	J	

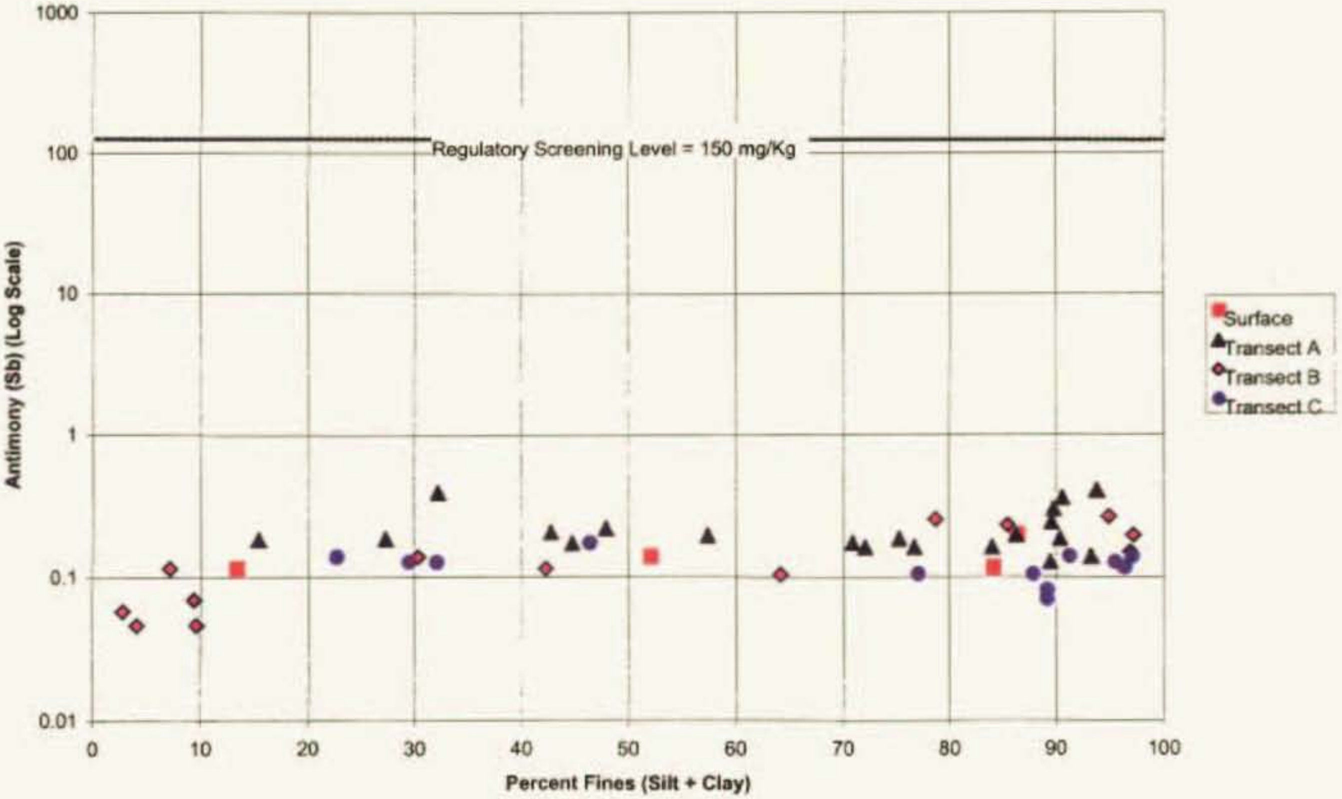
Appendix G

Comparison Charts of Metals and Fine-Grained Particle Size

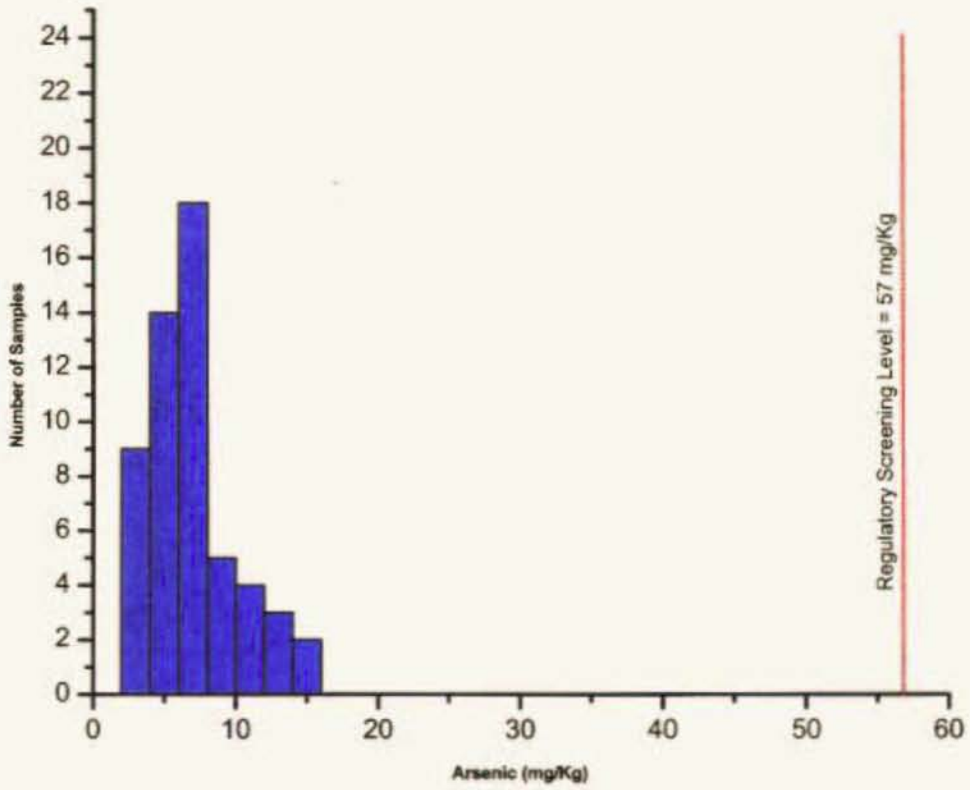
2001 Liberty Development Sediment Quality Samples
Antimony (Sb) Summary



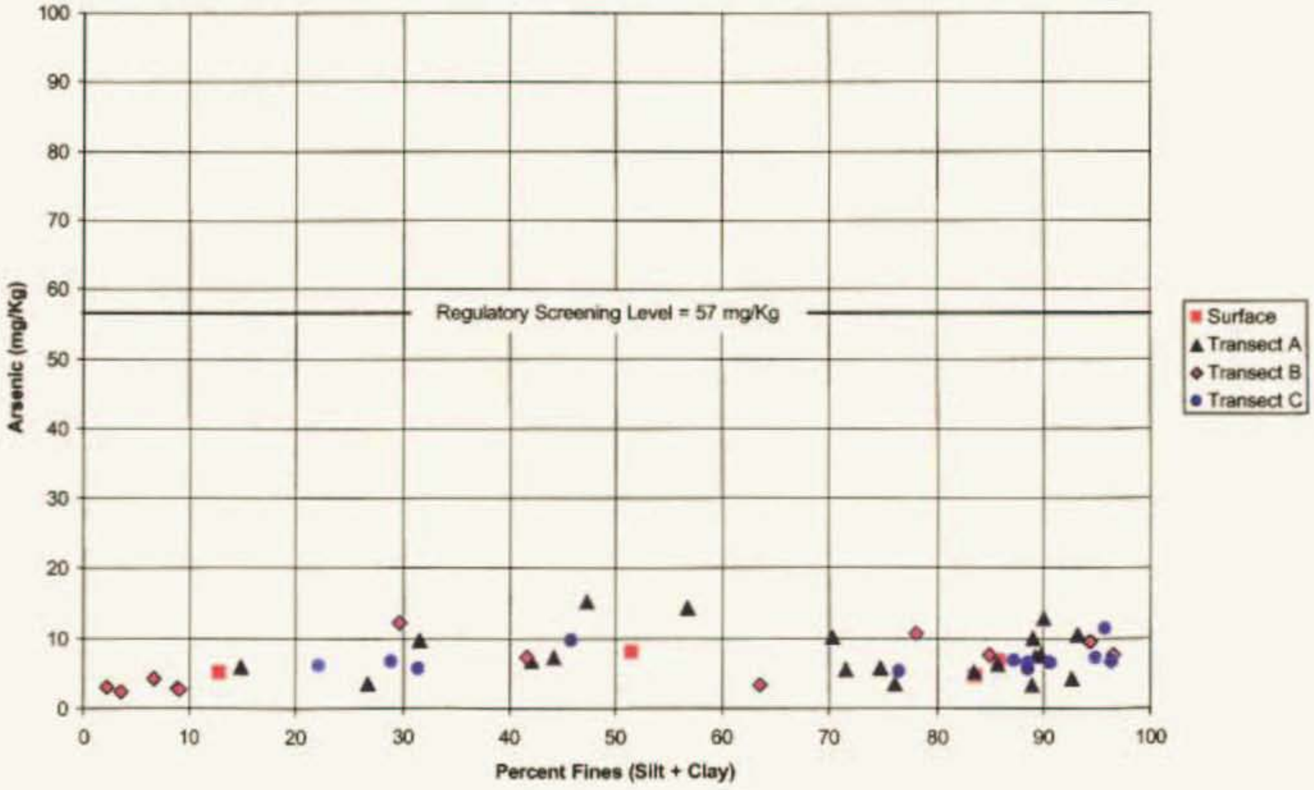
Antimony (Sb) vs Percent Fines



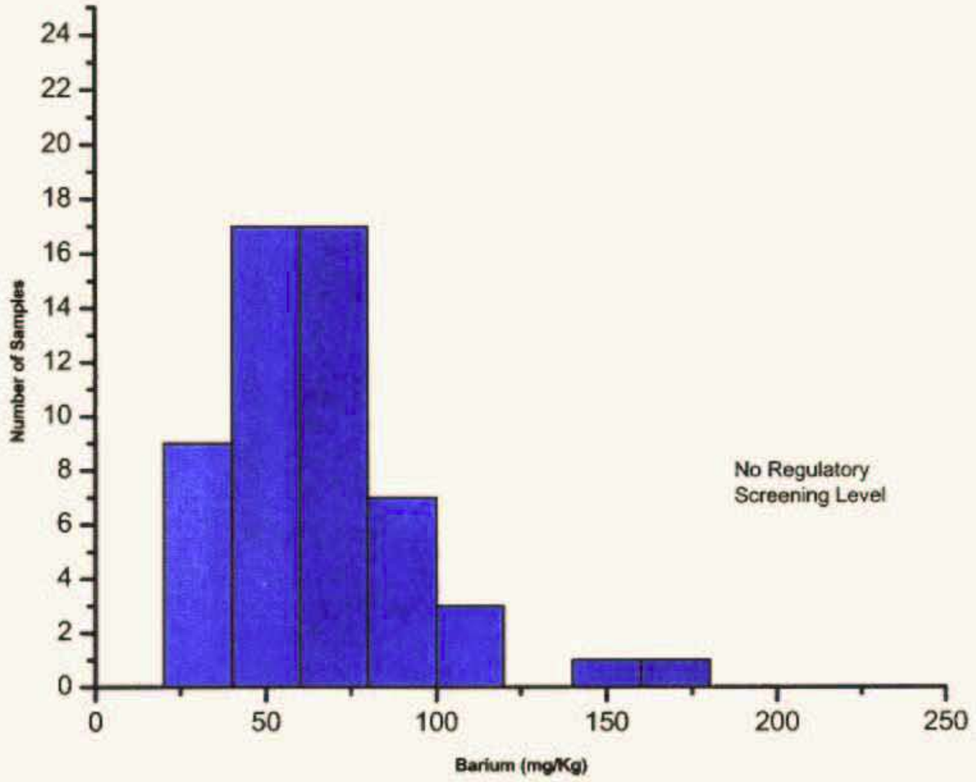
2001 Liberty Development Sediment Quality Samples
Arsenic (As) Summary



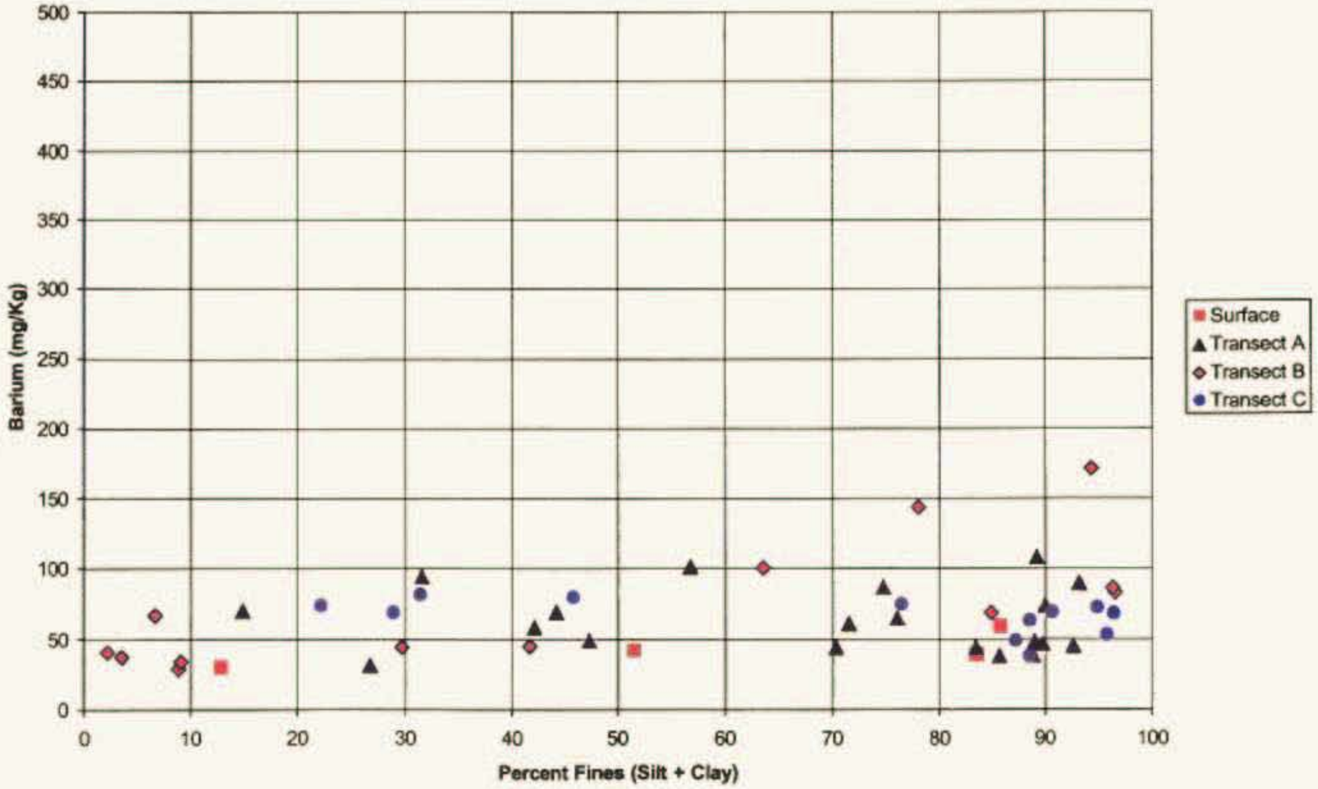
Arsenic (As) vs Percent Fines



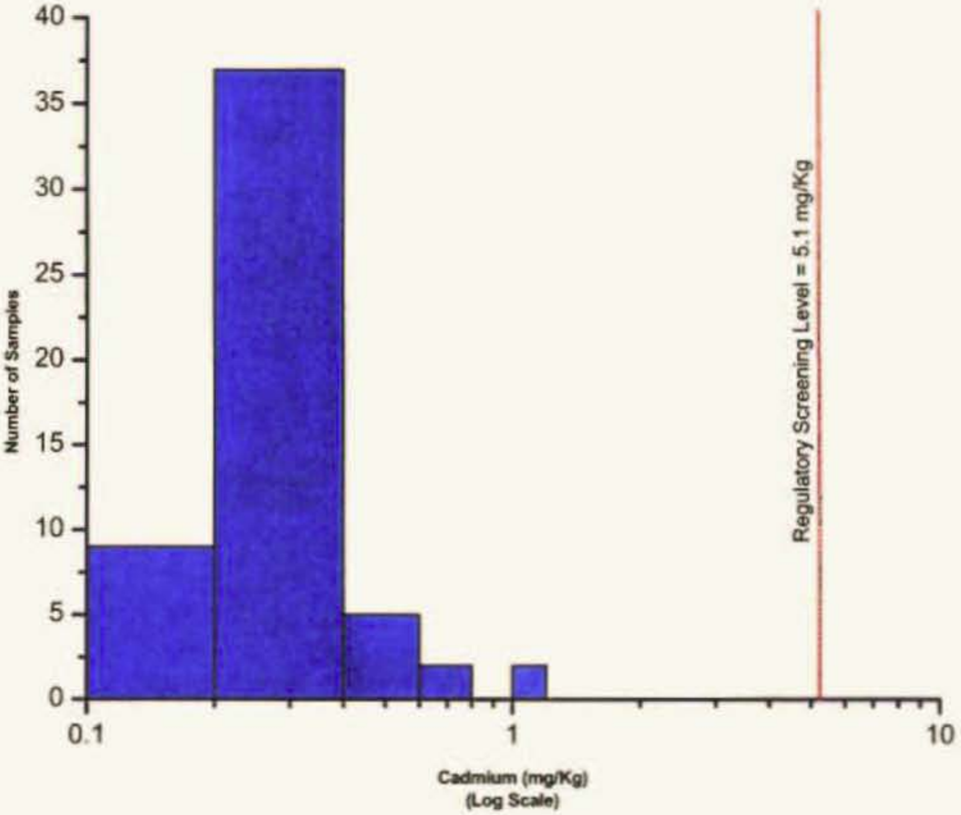
2001 Liberty Development Sediment Quality Samples
Barium (Ba) Summary



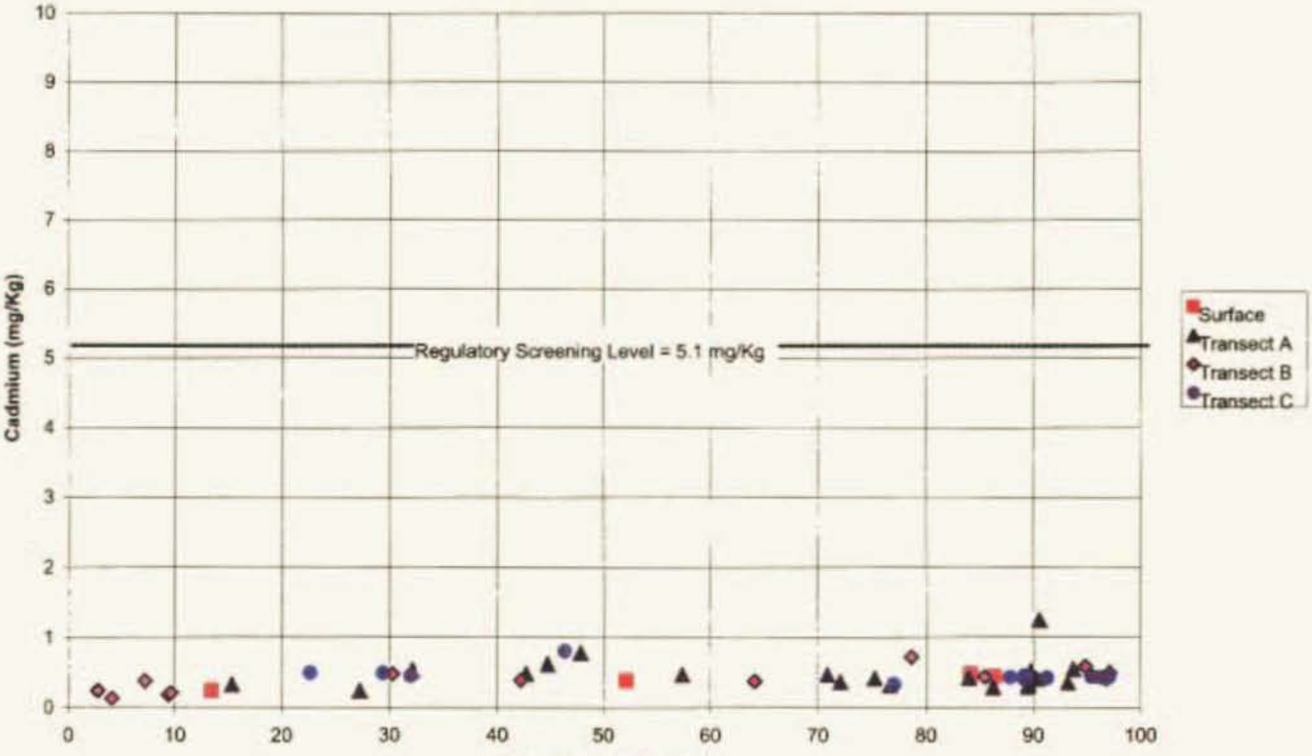
Barium (Ba) vs Percent Fines



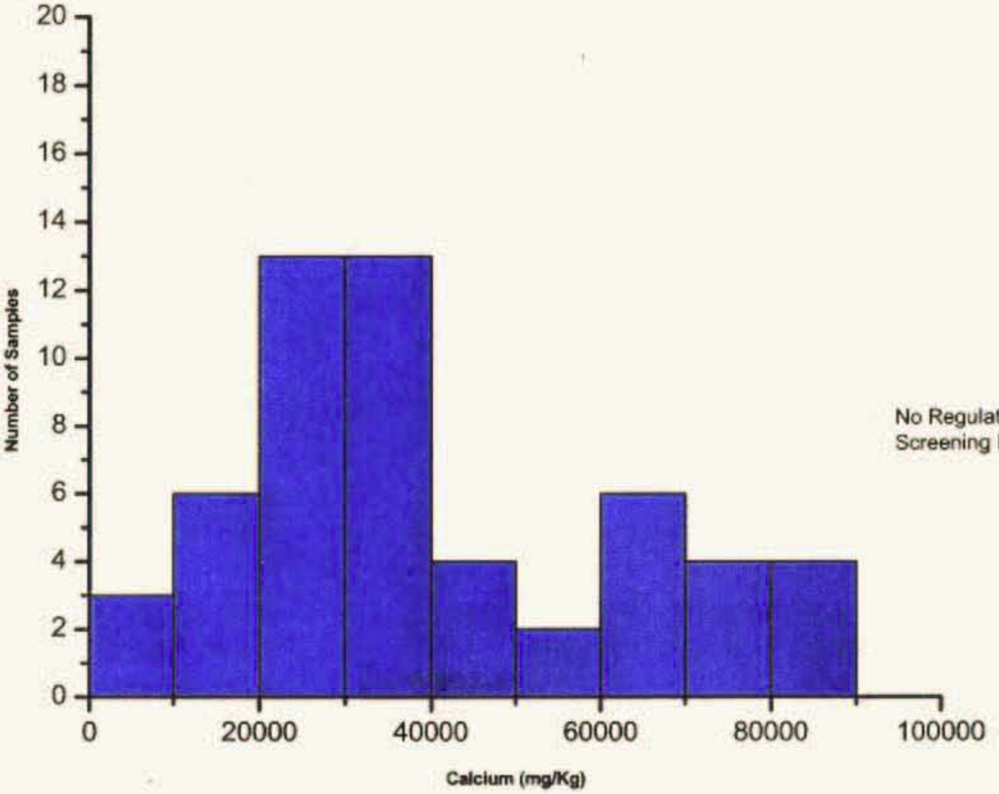
2001 Liberty Development Sediment Quality Samples
Cadmium (Cd) Summary



Cadmium (Cd) vs Percent Fines

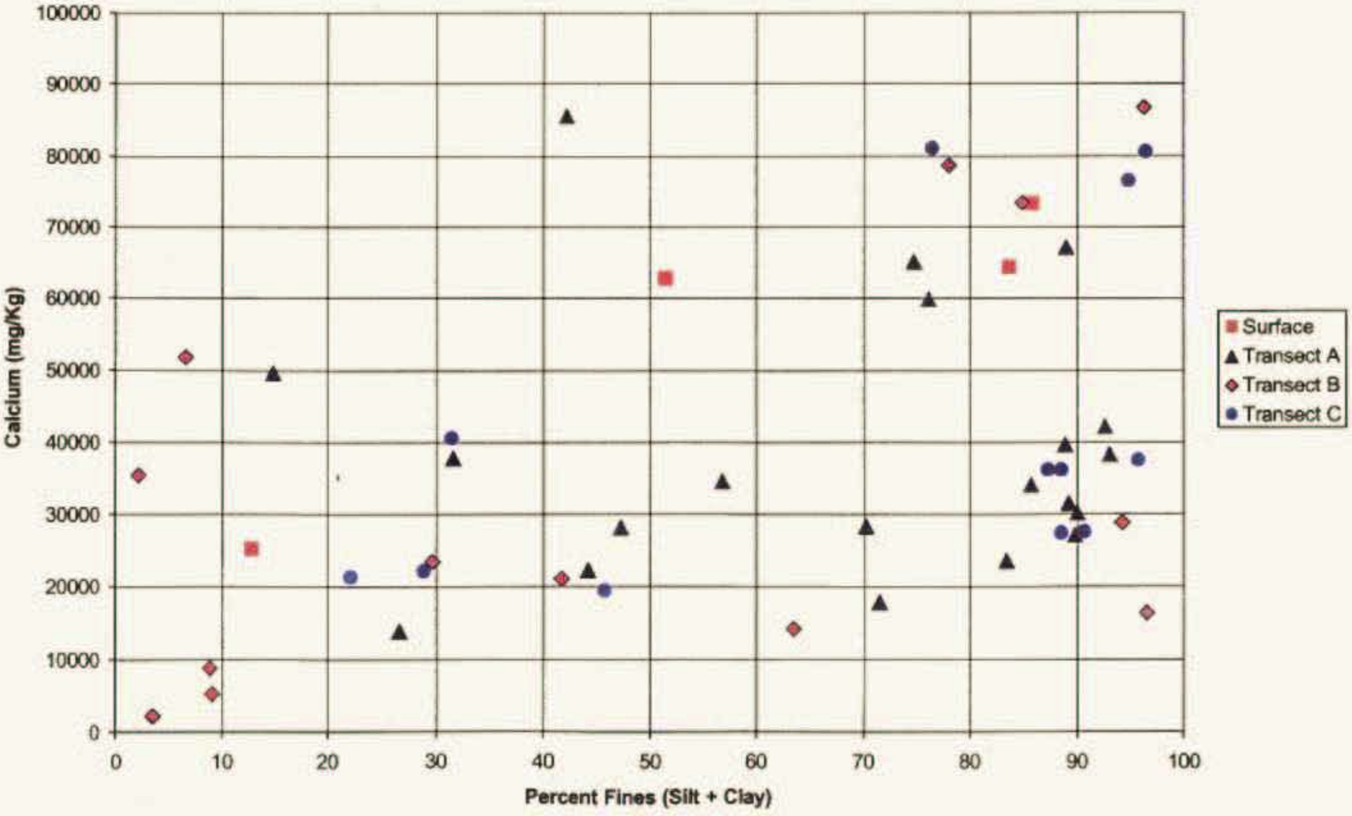


2001 Liberty Development Sediment Quality Samples
Calcium (Ca) Summary

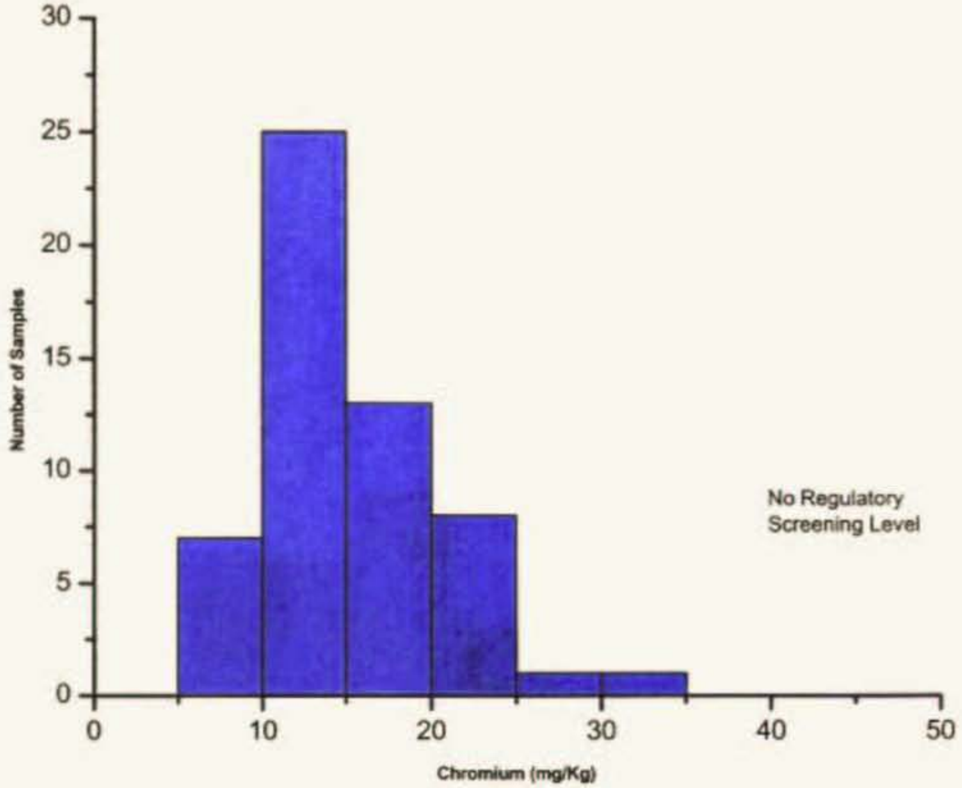


No Regulatory Screening Level

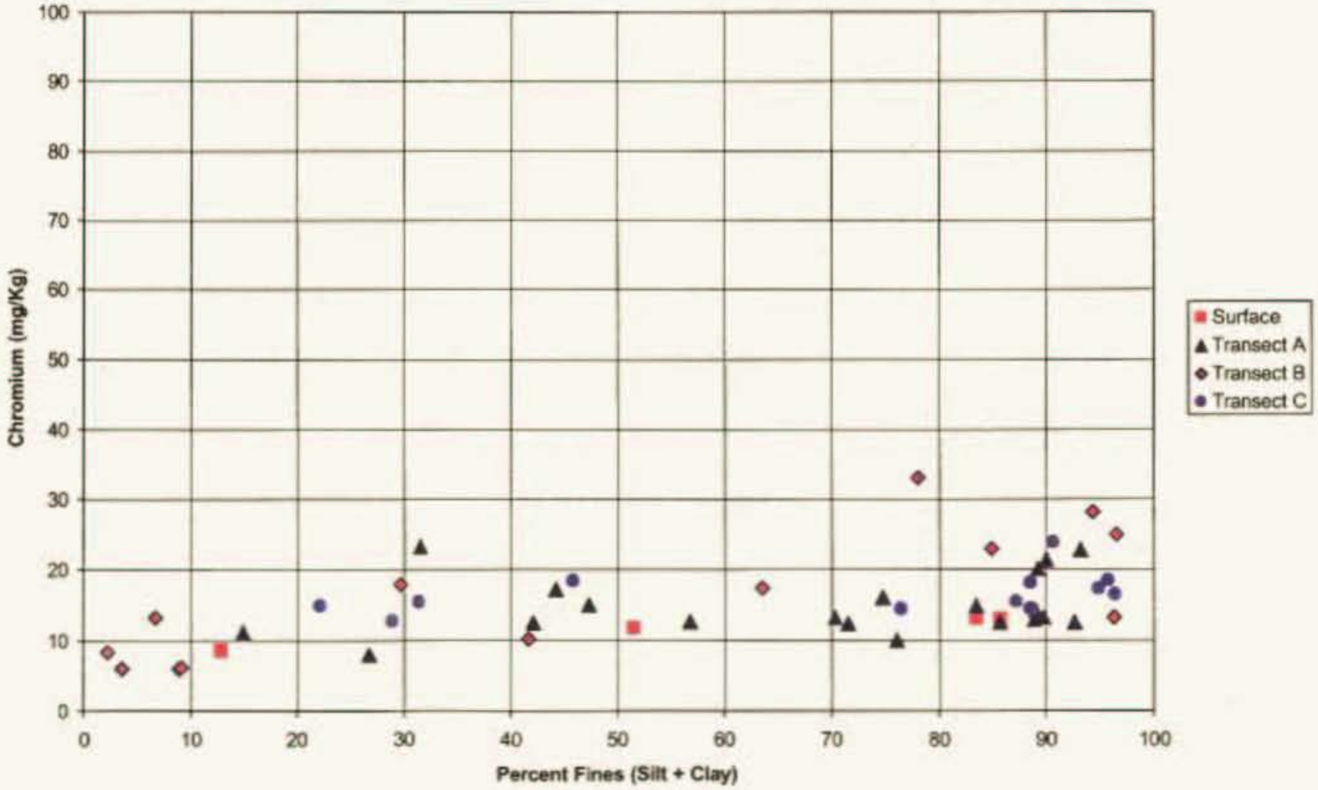
Calcium (Ca) vs Percent Fines



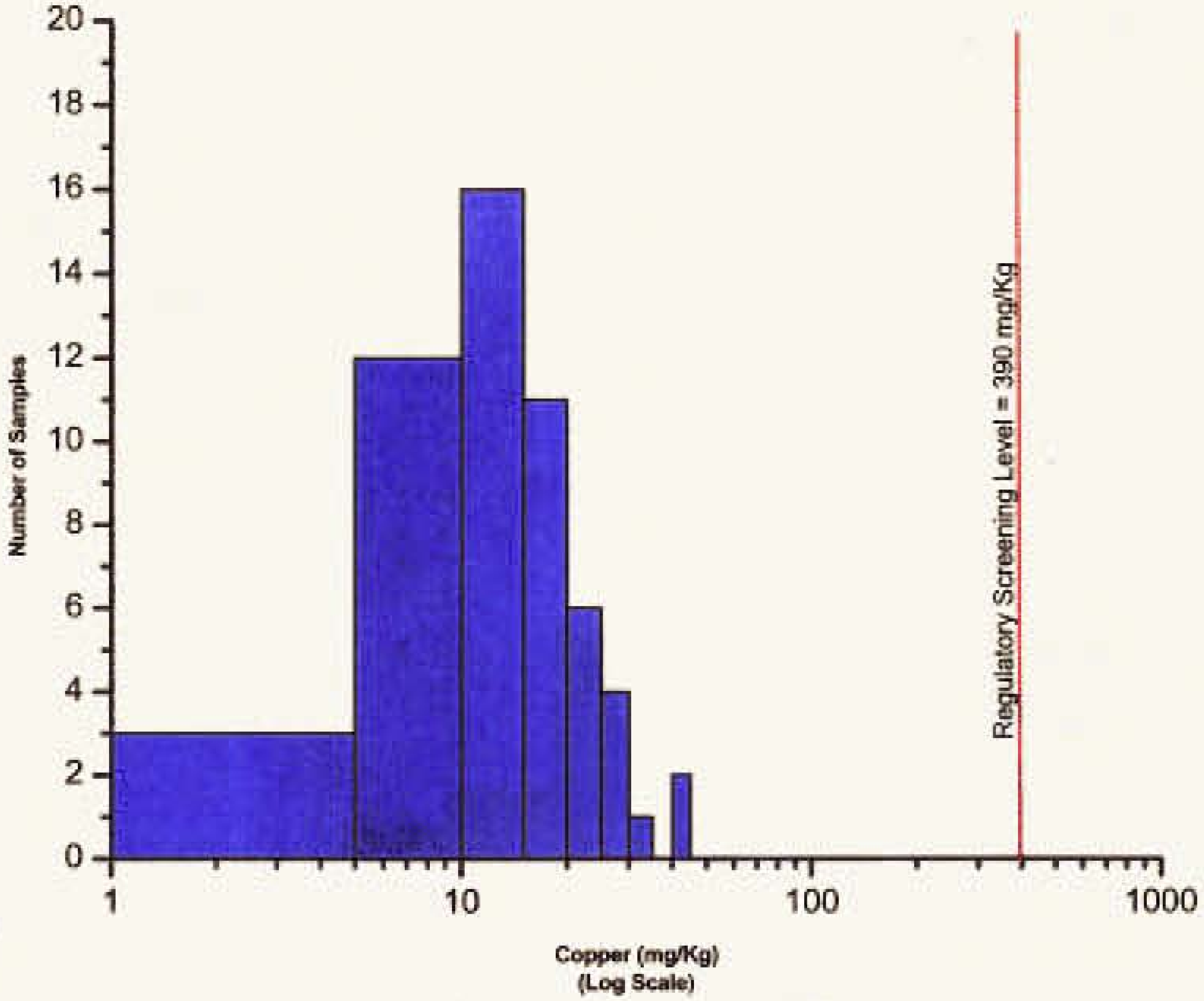
2001 Liberty Development Sediment Quality Samples
Chromium (Cr) Summary



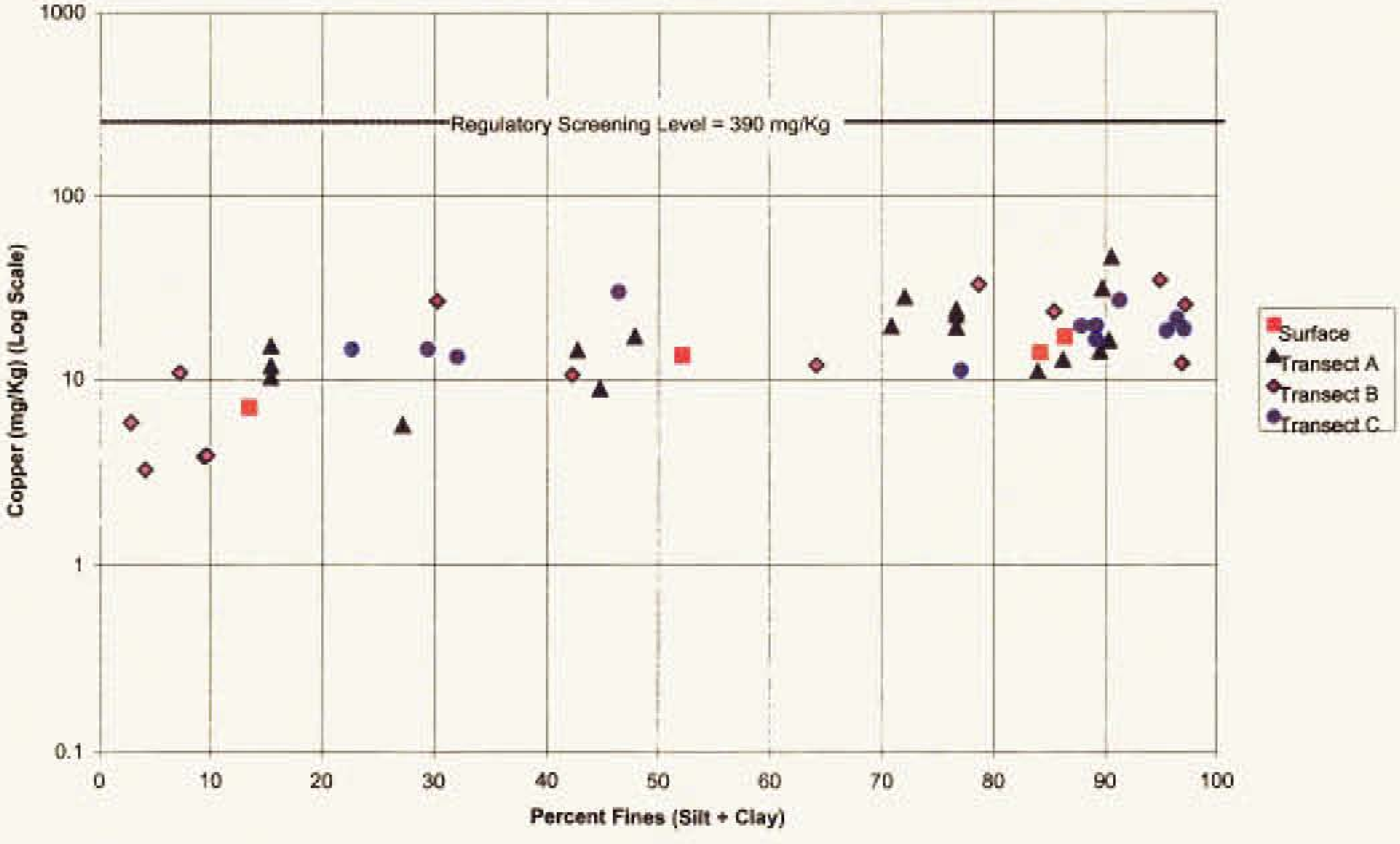
Chromium (Cr) vs Percent Fines



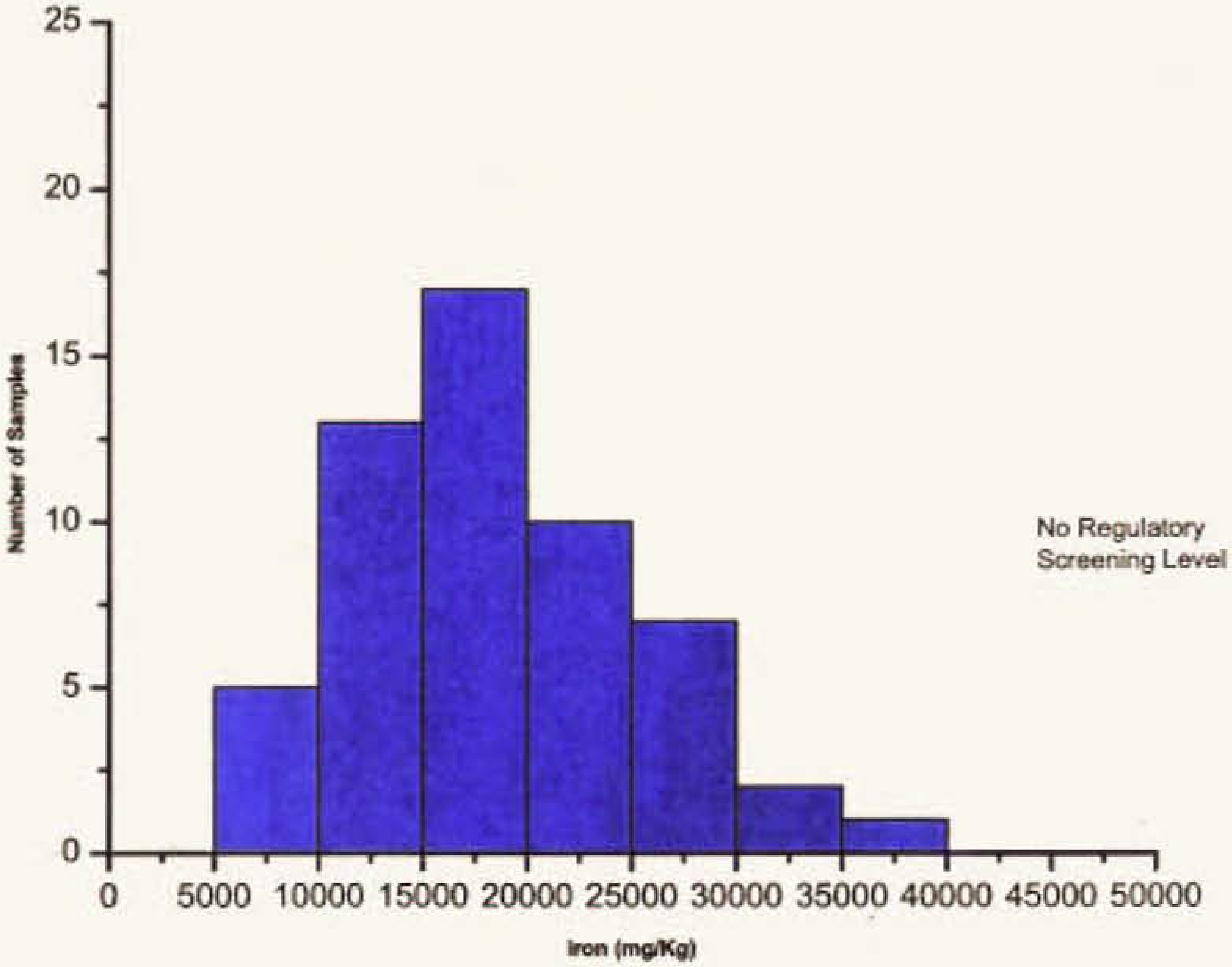
2001 Liberty Development Sediment Quality Samples
Copper (Cu) Summary



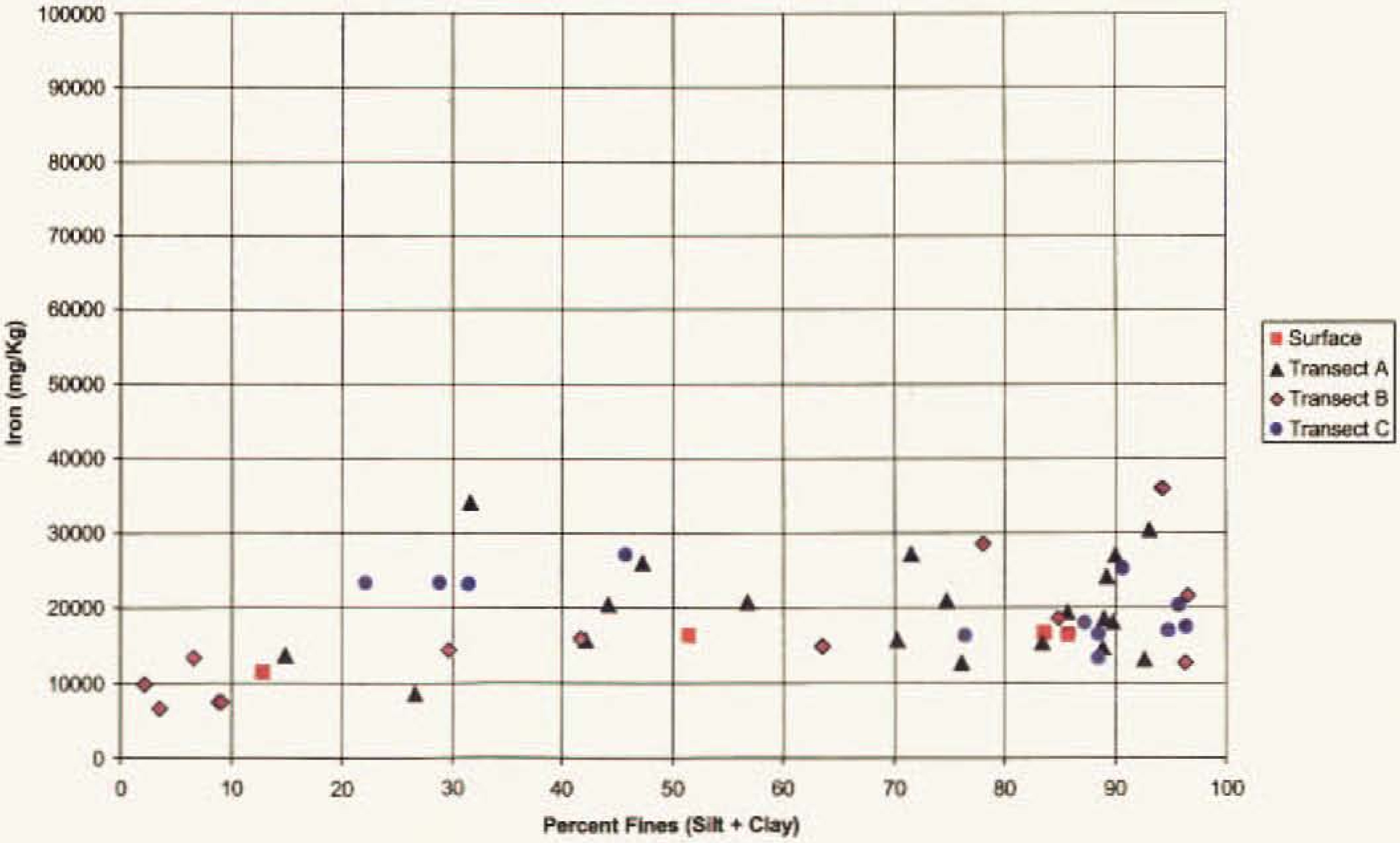
Copper (Cu) vs Percent Fines



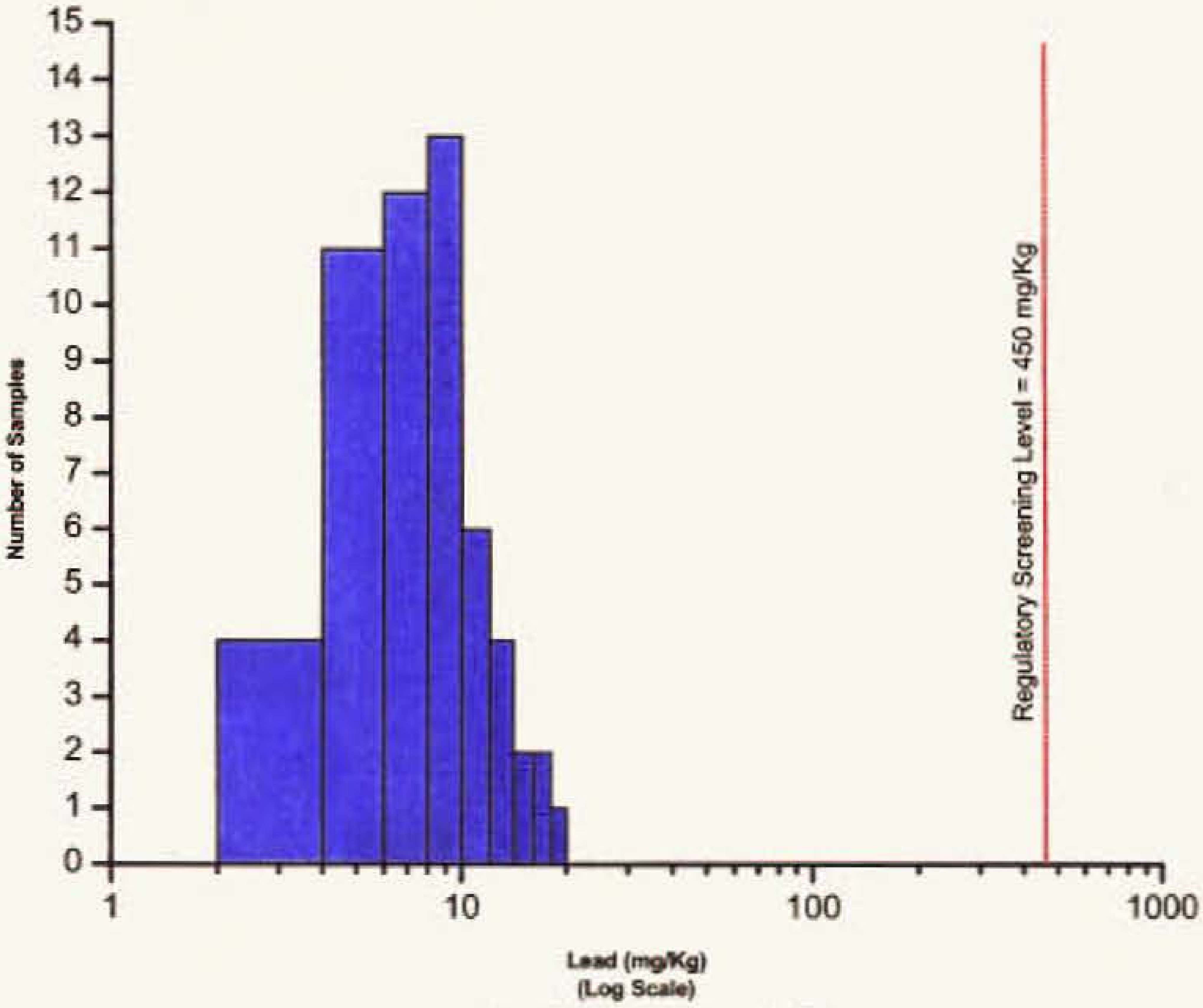
2001 Liberty Development Sediment Quality Samples
Iron (Fe) Summary



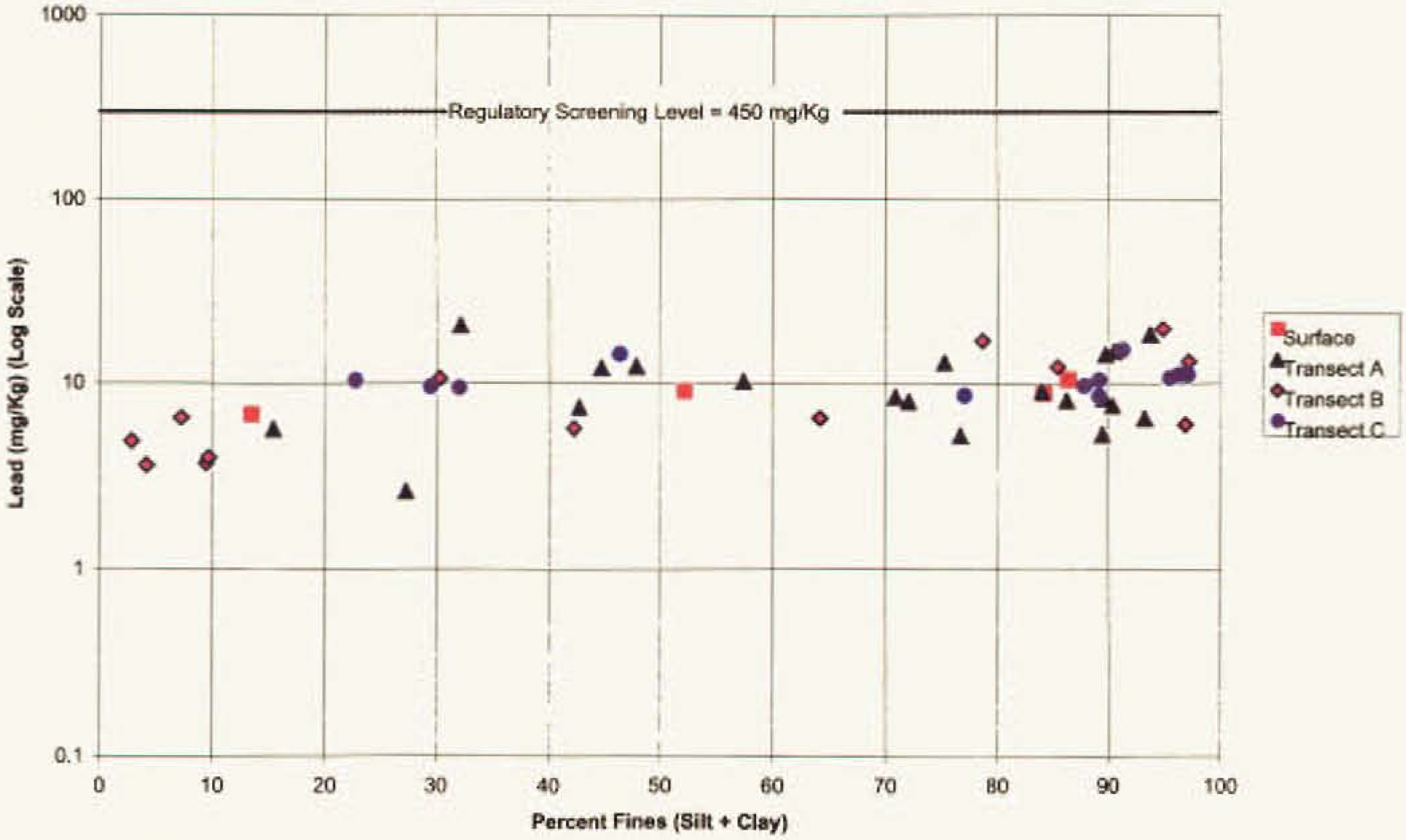
Iron (Fe) vs Percent Fines



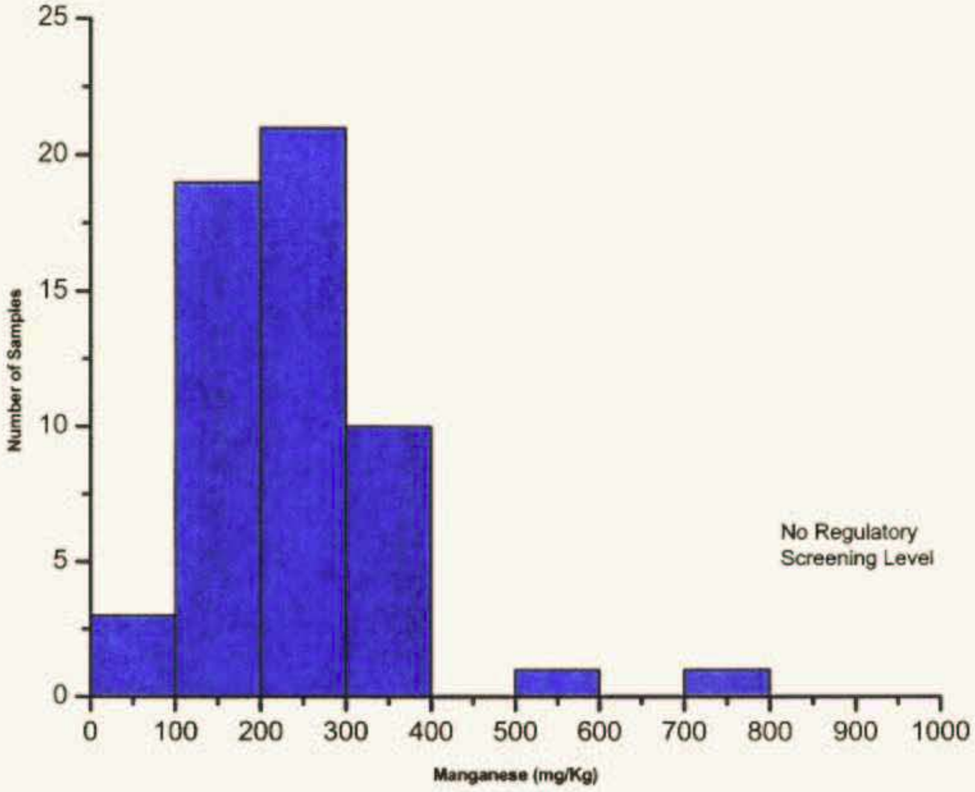
2001 Liberty Development Sediment Quality Samples
Lead (Pb) Summary



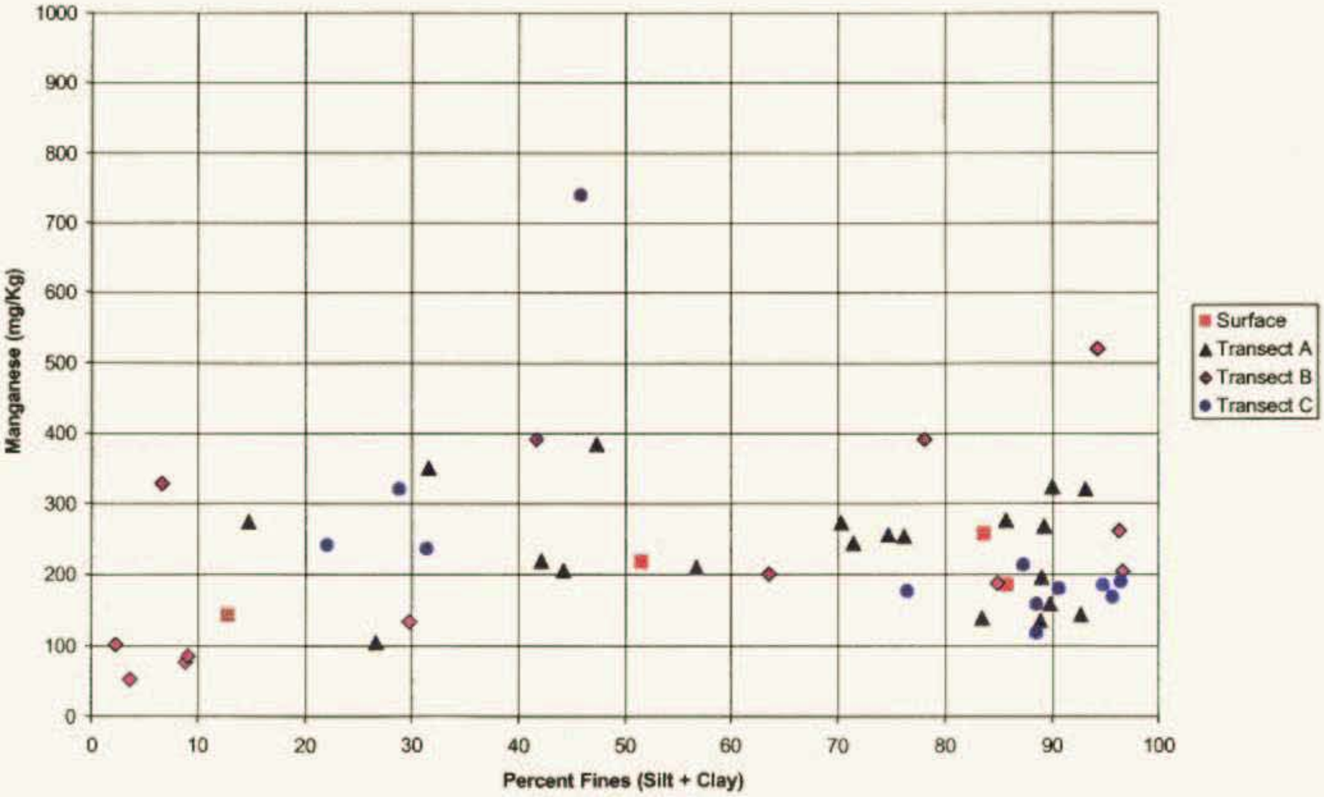
Lead (Pb) vs Percent Fines



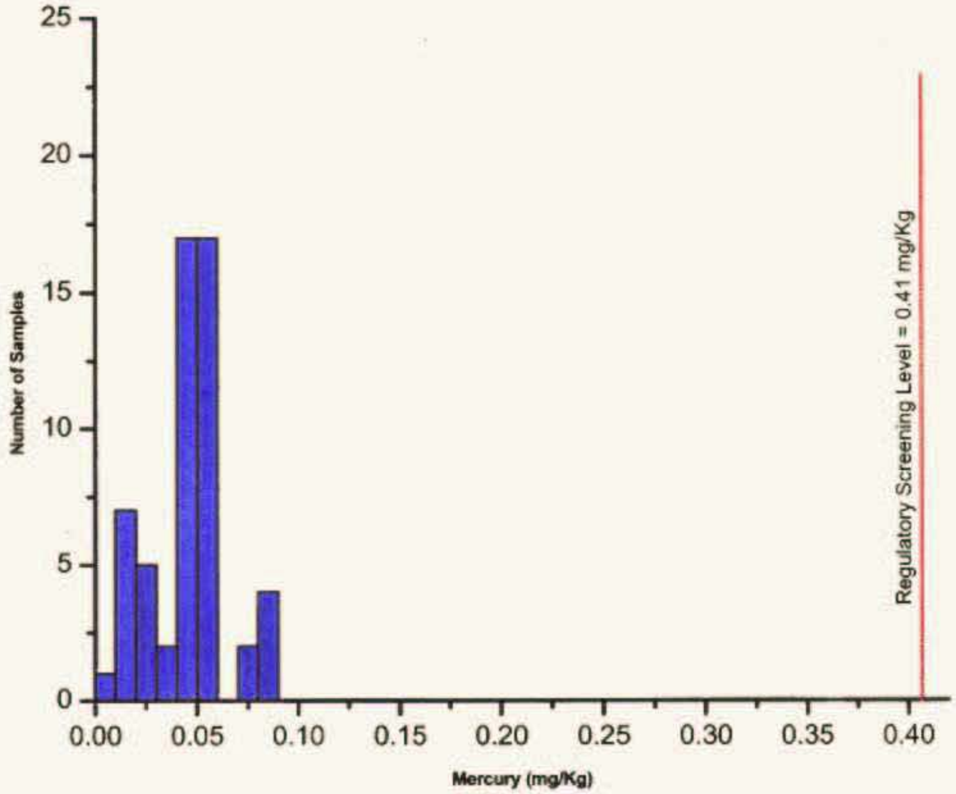
2001 Liberty Development Sediment Quality Samples
Manganese (Mn) Summary



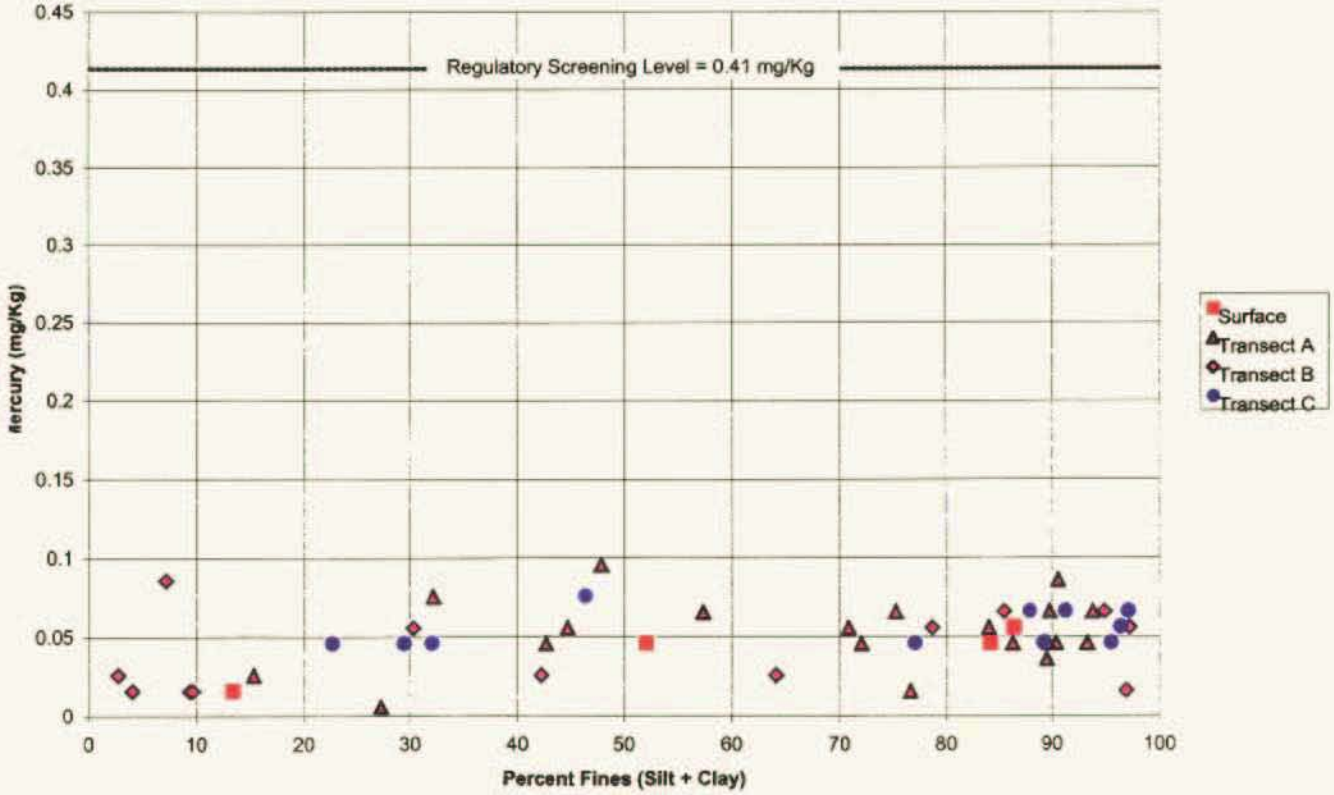
Manganese (Mn) vs Percent Fines



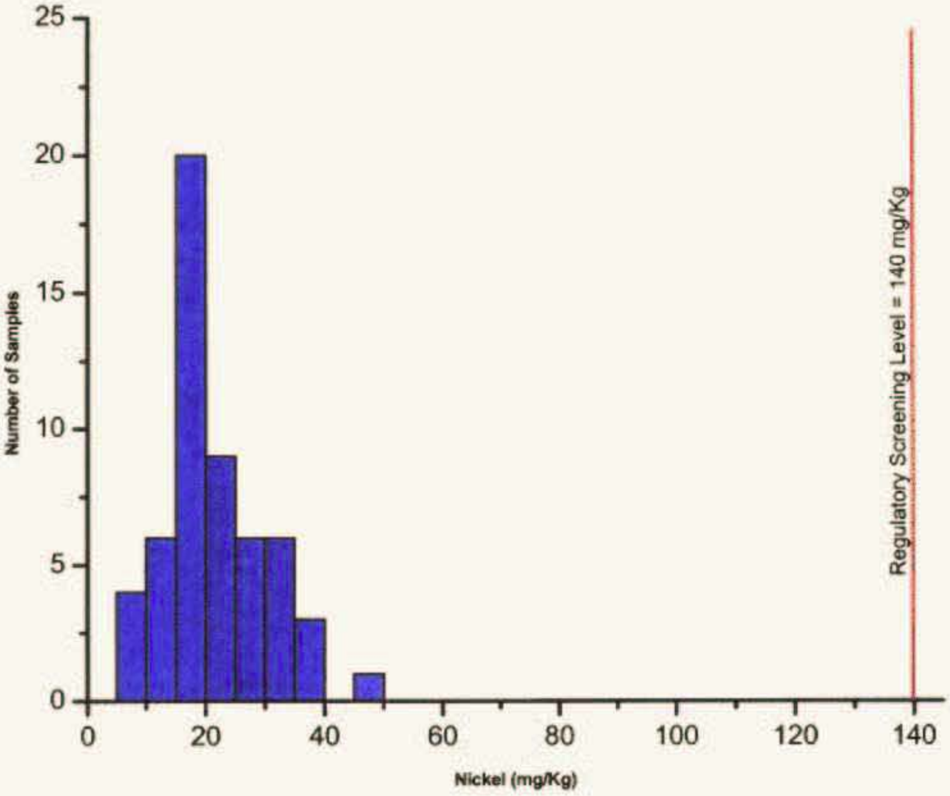
2001 Liberty Development Sediment Quality Samples
Mercury (Hg) Summary



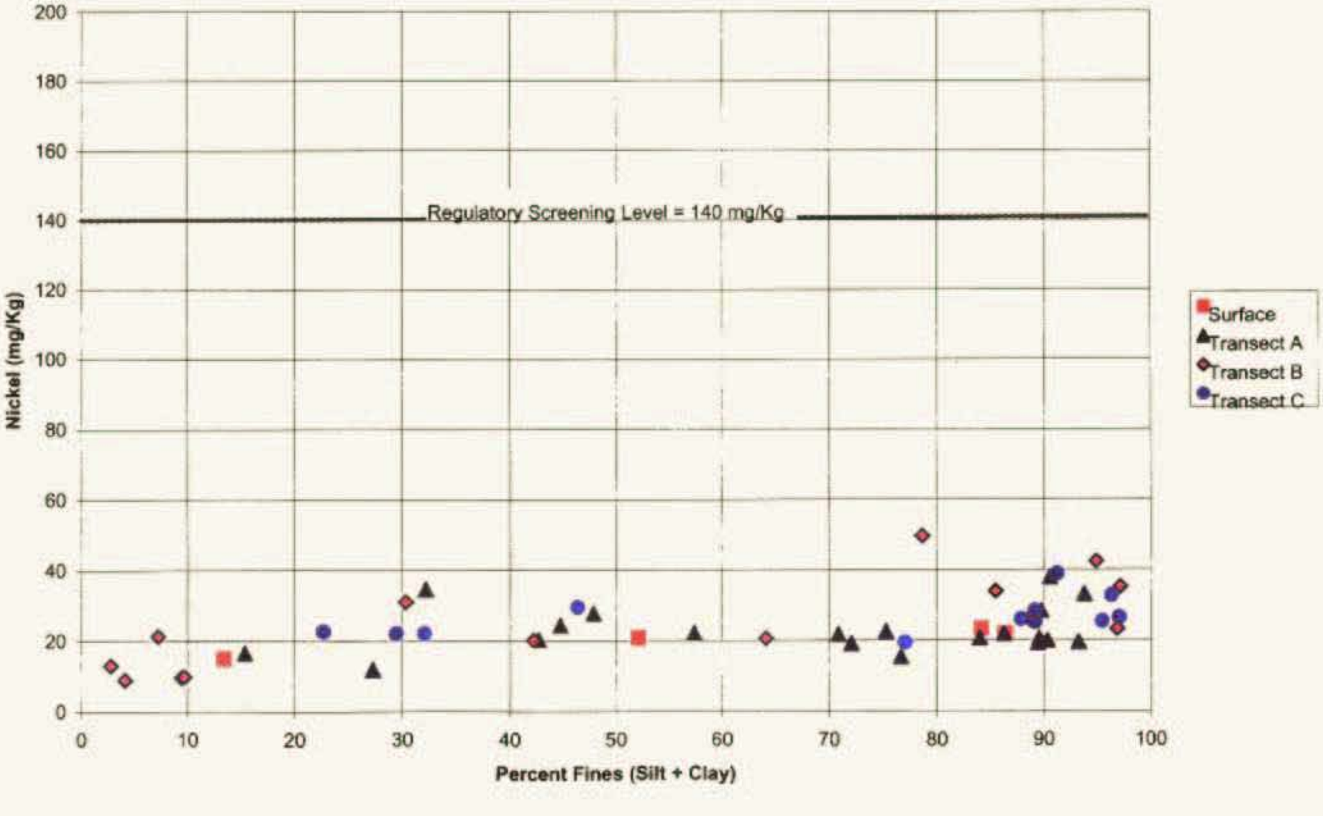
Mercury (Hg) vs Percent Fines



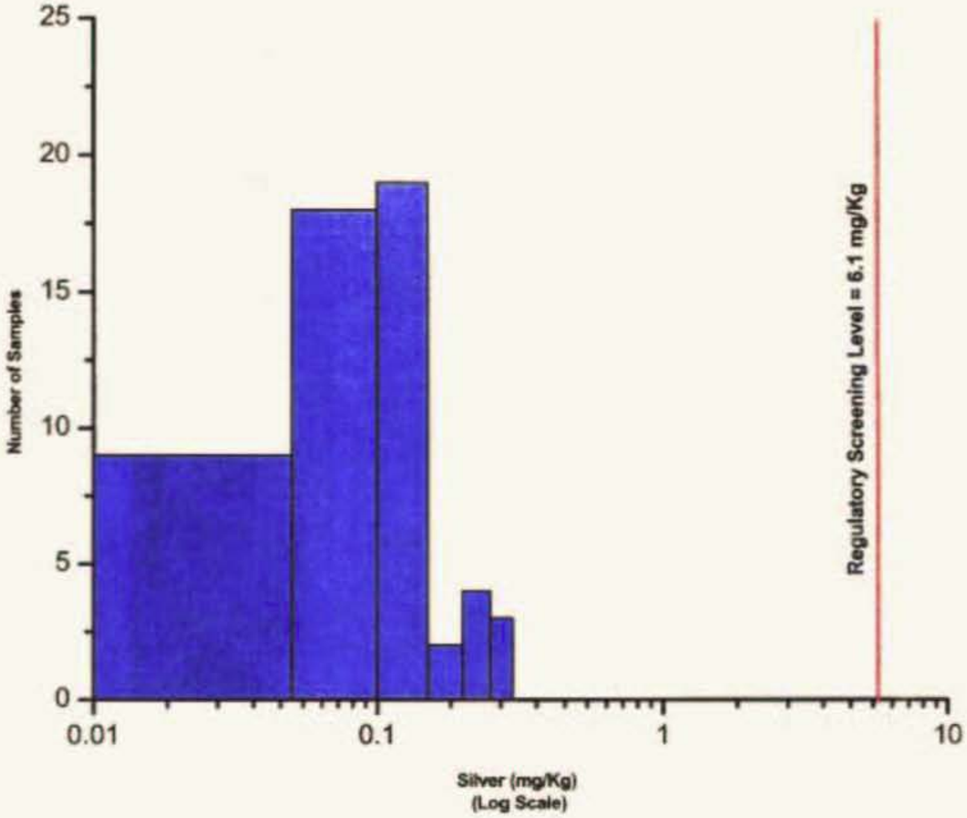
2001 Liberty Development Sediment Quality Samples
Nickel (Ni) Summary



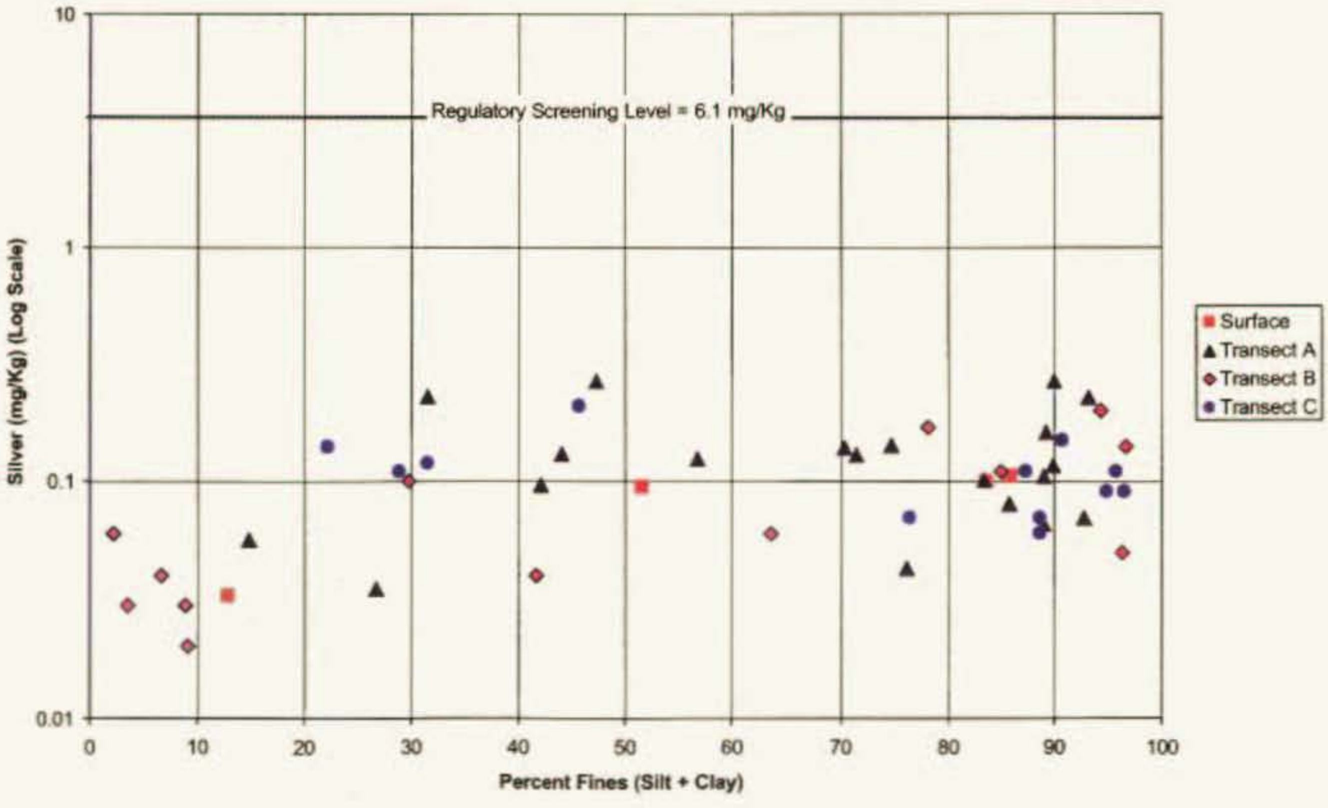
Nickel (Ni) vs Percent Fines



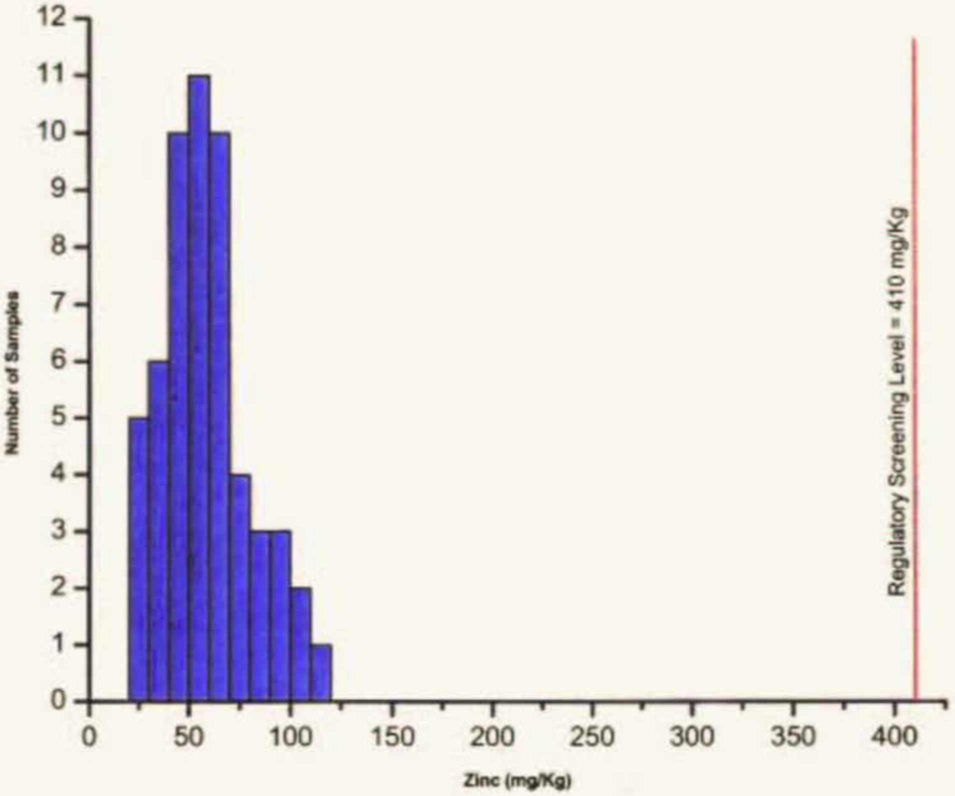
2001 Liberty Development Sediment Quality Samples
Silver (Ag) Summary



Silver (Ag) vs Percent Fines



2001 Liberty Development Sediment Quality Samples
Zinc (Zn) Summary



Zinc (Zn) vs Percent Fines