



HARTCROWSER

Earth and Environmental Technologies

***Subsurface Investigation
AFSC Plant No. 1
Anchorage, Alaska***

***A-8297-00
October 1992***

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**SUBSURFACE INVESTIGATION
AFSC PLANT NO. 1
ANCHORAGE, ALASKA**

INTRODUCTION

This report presents the results of a subsurface investigation conducted at the Anchorage Fueling & Service Company (AFSC) Plant No. 1. All activities were performed in accordance with our proposal dated July 29, 1992 as approved in your letter of August 10, 1992. The investigation was conducted in accordance with Hart Crowser's Quality Assurance Program Plan (QAPP), approved by the Alaska Department of Environmental Conservation (ADEC) on July 11, 1991.

The site is an 8-acre bulk fuel terminal located at 1331 Tidewater Road, Anchorage, Alaska (Figure 1) and has been used as a bulk storage and distribution facility for aviation and diesel fuels since 1962. Shell Oil Company leased the property from January 1962 to July 1981. AFSC has leased the property from the Municipality of Anchorage since 1981. During AFSC usage of the terminal, four separate spills totalling an estimated 127,000 gallons of Jet A fuel have been documented at the facility.

Hart Crowser performed work at the site on August 26 through September 2, 1992, to assess soil and groundwater conditions. This work consisted of drilling and collecting soil samples from nine vertical borings, the installation of monitoring wells in seven of these borings (Figure 1), and the development and sampling of groundwater from seven newly-installed and three preexisting wells.

The purpose of the subsurface investigation is to establish a baseline environmental assessment of the soils and groundwater at the site. These assessment results will also be used to direct further site investigation and/or remediation activities. The assessment results may also be incorporated in the development of a Risk Assessment for the Port of Anchorage Petroleum User's Group (PUG).

SUMMARY OF FINDINGS

A summary of findings is presented here. Please refer to the main body of the report for supporting information.

- ▶ With the exception of MW-9, the soils encountered while drilling the borings and monitoring wells (MW-3, MW-4, MW-5, MW-6,

MW-7, MW-8, SB-1, and SB-2) were advanced through similar geological deposits. The deposits consisted of 13 feet of gray-brown sand overlying gray silts.

- ▶ Discernible hydrocarbon odors and/or soil staining were noted during the drilling of all borings with the exception of MW-9, SB-1, and SB-2.
- ▶ TPH field screening results performed on all collected soil samples identified elevated TPH levels (sample concentrations greater than 100 mg/Kg) at all boring locations except for MW-6, SB-1, and SB-2.
- ▶ Total BTEX concentrations of 2.8 mg/Kg (15 mg/Kg in duplicate) and 137 mg/Kg were reported for MW-3 and MW-4, respectively. All remaining boring location samples had BTEX concentrations below the detection limit. MW-3 and MW-4 also had the highest VPH and EPH concentrations. Soil samples from MW-5, MW-7, and MW-8 were the only other locations where the EPH concentration was in excess of 100 mg/Kg.
- ▶ All soil samples analyzed for HVOs were below the laboratory detection limit.
- ▶ Laboratory results on three soil samples submitted for PCB analysis were below detection limits.
- ▶ Seven soil samples were analyzed for the metals arsenic, chromium, and lead. All seven samples contained chromium at concentrations of 13 to 23 mg/Kg. No arsenic was detected in any of the submitted samples; however, three of the samples contained lead at concentrations between 8.4 and 63 mg/Kg.
- ▶ Groundwater elevations recorded over several tidal cycles indicate that there is no tidal influence on the groundwater elevations at this site (Figure 2).
- ▶ Irregularities in the groundwater elevations observed beneath the site are inconclusive in determining an overall groundwater flow direction (Figure 3).
- ▶ All ten groundwater sampling locations contained detectable levels of EPH. Monitoring wells MW-2, MW-3, and MW-4 contained the greatest concentrations of BTEX, VPH, and EPH. Maximum concentrations of 2.9 mg/L total BTEX, 13 mg/L VPH, and

110 mg/L EPH were observed at MW-4 located adjacent to the truck loading rack.

SCOPE OF WORK

The scope of work performed was originally presented in Signature Flight Support's Request for Rebid of July 21, 1992 and Hart Crowser's proposal letter dated July 29, 1992, and approved on August 10, 1992. The specific tasks performed by Hart Crowser are as follows:

- ▶ Preparation of a site-specific Health and Safety Plan.
- ▶ Arranging for the location of all underground utilities by the responsible companies.
- ▶ Coordinating with contract driller, laboratory, and surveyor.
- ▶ Drilling, sampling soils, and installation of seven, 2-inch-diameter monitoring wells (MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, and MW-9).
- ▶ Drilling and sampling of soils in two vertical borings (SB-1 and SB-2) from the vicinity of the contaminated soils stockpile area.
- ▶ Field screening all soil samples for volatile organics using a photoionization detector (PID) and for total petroleum hydrocarbons (TPH) using a modification of EPA Method 418.1.
- ▶ Submitting selected soil samples for laboratory analysis of extractable petroleum hydrocarbons (EPH; EPA Method 3550/8100), volatile petroleum hydrocarbons (VPH; EPA Method 5030/8015), aromatic volatile organics (BTEX; EPA Method 5030/8020), metals (EPA Method 6010), Halogenated Volatile Organics (EPA Method 8010), and PCBs (EPA Method 8080).
- ▶ Development and collection of water samples from all seven newly-installed monitoring wells and three existing wells (MW-1, MW-2, and WP-5) for VPH/BTEX (EPA Method 5030/8015/8020) and EPH (EPA Method 3510/8100) analyses.
- ▶ Investigating possible tidal influences on groundwater by periodically recording groundwater level measurements during one complete tidal cycle.

- ▶ Preparation of report including field observations, laboratory analytical data, site plan, water table map, and boring logs.

SURFICIAL GEOLOGY

Hart Crowser installed monitoring wells MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, and MW-9; and drilled vertical borings SB-1 and SB-2 on August 26 and 27, 1992 (Figure 1). All monitoring wells were installed along the site perimeter with the exception of MW-5 which was installed in the central region of the site. Soil borings SB-1 and SB-2 were drilled in a former contaminated soil stockpile area located between Tanks 6 and 7. All monitoring wells were drilled to a total depth of 14 feet, with the exception of MW-6 and MW-9, which were drilled to 13.5 and 14.5 feet, respectively (Figures A-2 through A-5). Borings SB-1 and SB-2 were drilled to total depths of 6 feet (Figure A-6). Total depths for all monitoring wells were based on a 5-foot minimum penetration below the water table and/or encountering a silt-clay layer known to underlie the surficial deposits at the site.

All monitoring wells and borings, with the exception of MW-9, were advanced through similar geological deposits. The deposits consisted primarily of 13 feet of gray-brown gravelly sand. This unit was underlain by gray silt. Geologic material encountered in MW-9 consisted of 4 feet of gray, gravelly sand underlain by 1 foot of brown peat, followed by 9 feet of intermixed gray silt and brown peat. These units were similarly underlain by gray silt (Figure A-5).

The gray-brown gravelly sand unit appears to be comprised of artificial fill of varying thicknesses overlying landslide deposits. Schmoll and Dobrovlny (1972), described these gravelly sand/sandy gravel deposits as slide blocks of sand and gravel resting on beds of silt and clay. The blocks are interpreted to have moved laterally from their original positions on the adjoining bluffs. The lowermost unit encountered during drilling is a sequence of fine-grained silts and clays interpreted as tidal flat deposits of Cook Inlet. The upper contact of this unit is fairly flat with no apparent slope.

SOIL QUALITY

Field Screening

Hydrocarbon odors and/or soil staining were noted during all drilling activities with the exception of MW-9, SB-1, and SB-2. A total of 41 soil samples were collected during drilling operations. Each sample was field screened for volatile organics and total petroleum

hydrocarbons (TPH). The screening procedures included monitoring the sample headspace for volatile organics using a photoionization detector (PID) and analyzing the sample for TPH using an infrared spectrophotometer (IR). A detailed description of the field screening procedures is included in Appendix A. Field screening results for all collected samples are summarized in Table 2 and in Figures A-2 through A-6.

Both the PID and TPH screening analyses were able to discern the presence of petroleum hydrocarbons, however, the TPH screening results appear to be more quantitative and show better agreement with the analytical results. Except for MW-6, SB-1, and SB-2, all soil boring locations contained elevated TPH levels (sample concentrations greater than 100 mg/Kg). The greatest TPH concentrations were found at or above the water table surface (1.5 to 3.5 feet) except for MW-3 and MW-9. These latter borings had their greatest concentration at the 10-foot sampling interval. The fine-grained silt unit encountered at 12 to 13 feet below grade had TPH concentrations of less than 30 mg/Kg at all boring locations.

Analytical Samples

Of the 41 soil samples collected, a total of 9 samples, 1 sample from each of the 9 boring locations, were submitted to the contract laboratory for analysis of EPH, VPH, and BTEX. Additionally, one sample from each monitoring well location was submitted for metals and halogenated volatile organic (HVO) analyses. A total of 3 samples, collected from monitoring wells MW-4, MW-7, and MW-9 were submitted for PCB analysis. Submitted soil sample locations were selected based on geology, location of the water table, and field screening results. Analytical results for all laboratory analyses are presented in Tables 3A and 3B. Laboratory reports are included in Appendix B along with a review of data quality.

Petroleum Hydrocarbons

The sample exhibiting the greatest TPH screening value from each boring location was submitted for laboratory analysis. The petroleum hydrocarbon analyses included BTEX, VPH, and EPH. The two borings located at the downgradient edge of the site (MW-3 and MW-4) were the only locations where BTEX levels were found above the detection limit. A total BTEX concentration of 2.8 mg/Kg (15 mg/Kg in duplicate) and 137 mg/Kg was reported for MW-3 and MW-4, respectively. Similarly, these two wells also had the greatest VPH and EPH concentrations (Table 3A). Soil samples from MW-5, MW-7, and

MW-8 were the only other locations where the EPH concentration was in excess of 100 mg/Kg.

Halogenated Volatile Organics

All seven soil samples analyzed for HVO (EPA Method 8010) had concentrations below the detection limit (Table 3B). Although methylene chloride was reported by the laboratory in several of the samples, this compound is a common laboratory contaminant. The concentration levels and their sporadic occurrence indicate that the presence of methylene chloride in these samples were a result of laboratory contamination.

PCBs

Three soil samples from MW-4, MW-7, and MW-9 were analyzed for polychlorinated biphenyls (PCBs) (Table 3B). The PCB concentrations from all three samples were below the laboratory detection limit of 0.05 mg/Kg.

Metals

One soil sample from each of the monitoring well installation was analyzed for the metals arsenic, chromium, and lead (Table 3B). Arsenic concentrations were all below the detection limit of 10 mg/Kg. All seven samples contained chromium at concentrations of 13 mg/Kg to 23 mg/Kg. Three of the samples (MW-3, MW-7, and MW-9) contained lead at concentrations between 8.4 mg/Kg and 63 mg/Kg.

GROUNDWATER CONDITIONS

The AFSC Plant No. 1 Terminal is underlain by a shallow zone of saturated gravelly sands overlying a fine-grained silt unit. Unconfined conditions are present throughout the site. The saturated thickness of the materials overlying the silt unit was approximately 10 feet at the time of drilling. However, facility operators reported that there is often standing water within the tank farm. CMP sumps have been constructed within the diked area for the purpose of removing standing water.

A horizontal and vertical survey of the on-site monitoring wells, borings, and existing water well, was completed by land surveyors under contract to Hart Crowser (Appendix A - Field Methods). At the time of drilling (ATD), groundwater was encountered in all monitoring wells and borings at approximately 2 feet below grade. A complete set

of water levels and liquid hydrocarbon thickness measurements in all site monitoring wells was conducted on September 2, 1992 (Table 1).

Tidal Influence

During field surveying activities on September 29 and 30, 1992, periodic groundwater level measurements were recorded at both MW-3 and MW-4. The groundwater level measurements indicate steady groundwater elevations with minor fluctuations over the course of several tidal cycles (Figure 2). We conclude that there is no tidal influence on the groundwater elevations at this site.

Groundwater Flow

Groundwater elevations were observed to vary between 17.26 feet and 18.54 feet on September 2, 1992 (Table 1). Spatial variations in the groundwater elevations are irregular and do not form a consistent groundwater flow direction (Figure 3).

GROUNDWATER QUALITY

Groundwater bailed from each well prior to sampling (purge water) was observed for sheen and hydrocarbon odor. Of the wells purged in September 1992, three monitoring wells (MW-2, MW-3, and MW-4) had a continuous iridescent sheen and a strong petroleum odor. Three wells (MW-1, MW-5, and WP-5) had a discontinuous sheen and weak petroleum odor. No sheen or odor was observed on the purge water from MW-6, MW-7, MW-8, and MW-9.

Groundwater samples were collected from all seven newly-installed monitoring wells and also from existing wells MW-1, MW-2, and WP-5 (Appendix A - Field Methods). Wellpoint WP-1 could not be sampled due to its inaccessible location. All groundwater samples were analyzed for BTEX, VPH, and EPH. The analytical results have been summarized in Table 4, and the laboratory reports with data validation are presented in Appendix B.

All ten groundwater sampling locations contained detectable concentrations of EPH. The greatest concentrations were observed in MW-2 through MW-5, with MW-4 having the maximum at 110 mg/L (Table 4). The remaining monitoring locations had concentrations below 10 mg/L. Monitoring wells MW-2, MW-3, and MW-4 were also the wells with the greatest BTEX and VPH concentrations. The highest concentrations were from MW-4 with 2.9 mg/L of total BTEX and 13 mg/L of VPH.

DATA VALIDATION

We have determined that the laboratory data generated from analysis of soil and groundwater samples collected during field investigations at AFSC Plant No. 1 are valid and usable for the purposes of Signature Flight Support.

RECOMMENDATIONS

Based on the findings of the subsurface investigation we recommend the following actions be taken to address the presence of petroleum hydrocarbons noted at the site.

- ▶ Monthly water level and product thickness measurements be conducted for a period of one year to evaluate seasonal variations in the groundwater levels and groundwater flow directions.
- ▶ Quarterly groundwater sampling be conducted for a minimum of one year to establish groundwater quality data at the site. The groundwater samples should be analyzed for volatile aromatic hydrocarbons (BTEX).
- ▶ A water well records search be conducted to determine if there are any water supply wells located within a quarter mile of the facility.

Depending on the results of these activities additional actions may be warranted to address the presence of petroleum hydrocarbons at the site.

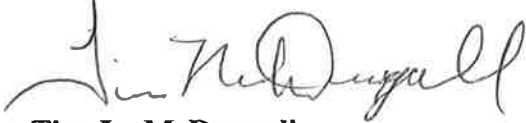
LIMITATIONS

The work of this project was performed and this report was prepared in accordance with generally accepted professional practices for the nature of the work completed in the same or similar localities at the time the work was performed. It is intended for the exclusive use of Signature Flight Support for specific application to the project site. This report is not meant to represent a legal opinion, and no other warranty, express or implied, is made.

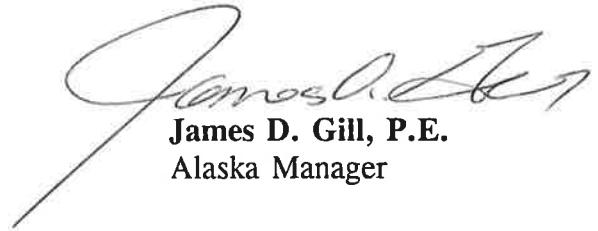
Any questions regarding the field work or report, the presentation of the information, or the interpretation of the data are welcome and should be referred to Tim McDougall or Debi Geyer at (907) 276-7475.

Sincerely,

HART CROWSER, INC.



Tim L. McDougall
Senior Project Hydrogeologist



James D. Gill, P.E.
Alaska Manager

DJG/kgd

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**TABLE 1: GROUNDWATER ELEVATIONS
AFSC PLANT NO. 1
ANCHORAGE, ALASKA**

<u>MONITORING WELL</u>	<u>MEASURING POINT ELEV. (feet) {1}</u>	<u>GROUNDWATER ELEVATION (feet)</u>	
		<u>9-2-92</u>	
MW-1	21.21	17.49	
MW-2	21.35	18.26	
MW-3	20.11	17.40	
MW-4	19.59	17.57	
MW-5	21.27	18.54	
MW-6	20.51	18.45	
MW-7	20.33	17.89	
MW-8	20.42	17.60	
MW-9	20.32	18.52	
WP-1	20.13	17.26	
WP-5	20.18	18.33	

NOTE: {1} Elevations referenced to mean sea level (MSL = 0.00 feet). Datum is from bench mark "Tidal 16" with an elevation of 23.23 feet.

**TABLE 2: SOIL QUALITY DATA – FIELD SCREENING
AFSC PLANT NO. 1
ANCHORAGE, ALASKA**

<u>BORING</u>	<u>SAMPLE</u>	<u>DEPTH (feet)</u>	<u>PID (ppmV)</u>	<u>TPH (mg/Kg)</u>
MW-3	S-1	1 – 1.5	0.2	17
	S-2	2.5 – 4	0.8	19
	S-3	5 – 5.5	50	680
	S-4	10 – 11.5	52	1,600
	S-5	13 – 14	1.0	ND
MW-4	S-1	1 – 1.5	250	1,900
	S-2 DUP	2.5 – 4	120	6,700 4,800
	S-3	5 – 6.5	120	1,700
	S-4 DUP	10 – 11.5	155	3,800 1,800
	S-5	13 – 14	0.0	ND
MW-5	S-1	1 – 1.5	0.0	ND
	S-2	2.5 – 4	70	560
	S-3	5 – 6	40	75
	S-4	10 – 11	1.0	15
	S-5	13 – 14	0.0	ND
MW-6	S-1	1 – 1.5	0.0	ND
	S-2	2.5 – 3.5	19	80
	S-3	5 – 6	54	70
	S-4	10 – 11	11.5	33
	S-5	13 – 13.5	0.0	ND

NOTES: {1} ND = Not Detected
{2} TPH results are reported on a wet weight basis.

TABLE 2: SOIL QUALITY DATA – FIELD SCREENING
(cont'd) AFSC PLANT NO. 1
ANCHORAGE, ALASKA

<u>BORING</u>	<u>SAMPLE</u>	<u>DEPTH (feet)</u>	<u>PID (ppmV)</u>	<u>TPH (mg/Kg)</u>
MW-7	S-1	1 – 1.5	50.8	1,300
	S-2	2.5 – 3.5	27.6	420
	S-3	5 – 6	9.8	120
	S-4	10 – 11	2.4	25
	S-5	13 – 14	0.8	ND
MW-8	S-1	1 – 1.5	288	2,800
	S-2	2.5 – 3.5	240	3,900
	S-3	5 – 6.5	62	560
	S-4 DUP	10 – 11	60	120 170
	S-5	13 – 14	17.8	27
MW-9	S-1	1 – 1.5	4.1	130
	S-2	2.5 – 3.5	1.6	ND
	S-3	5 – 6	4.1	ND
	S-4	10 – 11.5	41	19,000
	S-5	13 – 14.5	0.8	15
SB-1	S-1	1 – 1.5	3.2	21
	S-2	2.5 – 3.5	0.8	ND
	S-3 DUP	5 – 6	0.8	ND ND
SB-2	S-1	1 – 1.5	9.0	48
	S-2	2.5 – 4	3.2	ND
	S-3	5 – 6	4.9	25

NOTES: {1} ND = Not Detected
 {2} TPH results are reported on a wet weight basis.

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TABLE 3A: SOIL QUALITY DATA - PETROLEUM HYDROCARBONS
AFSC PLANT NO. 1
ANCHORAGE, ALASKA

BORING	SAMPLE	DEPTH (feet)	BENZENE (mg/Kg)	TOLUENE (mg/Kg)	ETHYL-			TOTAL		VPH (mg/Kg)	EPH (mg/Kg)
					BENZENE (mg/Kg)	XYLENES (mg/Kg)	BTEX (mg/Kg)	BTEX (mg/Kg)	BTEX (mg/Kg)		
MW-3	S-4 DUP#2	10 - 11.5	ND ND	ND ND	ND 2.4	2.8 13	2.8 15	400 1,300	330 870		
MW-4	S-2	2.5 - 4	1.3	4.3	11	120	137	5,000	6,900		
MW-5	S-2	2.5 - 4	ND	ND	ND	ND	ND	24	380		
MW-6	S-2	2.5 - 3.5	ND	ND	ND	ND	ND	6.1	13		
MW-7	S-1	1 - 1.5	ND	ND	ND	ND	ND	7.5	550		
MW-8	S-2	2.5 - 3.5	ND	ND	ND	ND	ND	3.2	100		
MW-9	S-4	10 - 11.5	ND	ND	ND	ND	ND	ND	22		
SB-1	S-1	1 - 1.5	ND	ND	ND	ND	ND	ND	52		
SB-2	S-1	1 - 1.5	ND	ND	ND	ND	ND	ND	93		

NOTES: {1} ND = Not Detected
{2} All results are reported on a dry weight basis.

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TABLE 3B: SOIL QUALITY DATA - METALS, HVO, AND PCB'S
AFSC PLANT NO. 1
ANCHORAGE, ALASKA

BORING	SAMPLE	DEPTH (feet)	METALS			{4} HVO (8010) METHYLENE CHLORIDE (mg/Kg)	(8080) TOTAL PCB's (mg/Kg)
			ARSENIC (mg/Kg)	CHROMIUM (mg/Kg)	LEAD (mg/Kg)		
MW-3	S-1	1 - 1.5	ND	23	11	NA	NA
	S-4	10 - 11.5	NA	NA	NA	0.25	NA
	DUP#2		NA	NA	NA	ND	NA
MW-4	S-2	2.5 - 4	ND	19	ND	0.26	ND
MW-5	S-1	1 - 1.5	ND	17	ND	NA	NA
	S-2	2.5 - 4	NA	NA	NA	ND	NA
MW-6	S-2	2.5 - 3.5	ND	17	ND	ND	NA
MW-7	S-1	1 - 1.5	ND	23	63	ND	ND
MW-8	S-1	1 - 1.5	ND	13	ND	NA	NA
	DUP		ND	21	ND	NA	NA
	S-2	2.5 - 3.5	NA	NA	NA	0.30	NA
MW-9	S-1	1 - 1.5	ND	20	8.4	NA	ND
	DUP		NA	NA	NA	NA	ND
	S-4	10 - 11.5	NA	NA	NA	0.37	NA

NOTES: {1} ND = Not Detected
 {2} NA = Not Analyzed
 {3} All results are reported on a dry weight basis.
 {4} Method 8010 includes 28 analytes, only those analytes which were detected in at least one sample are shown.

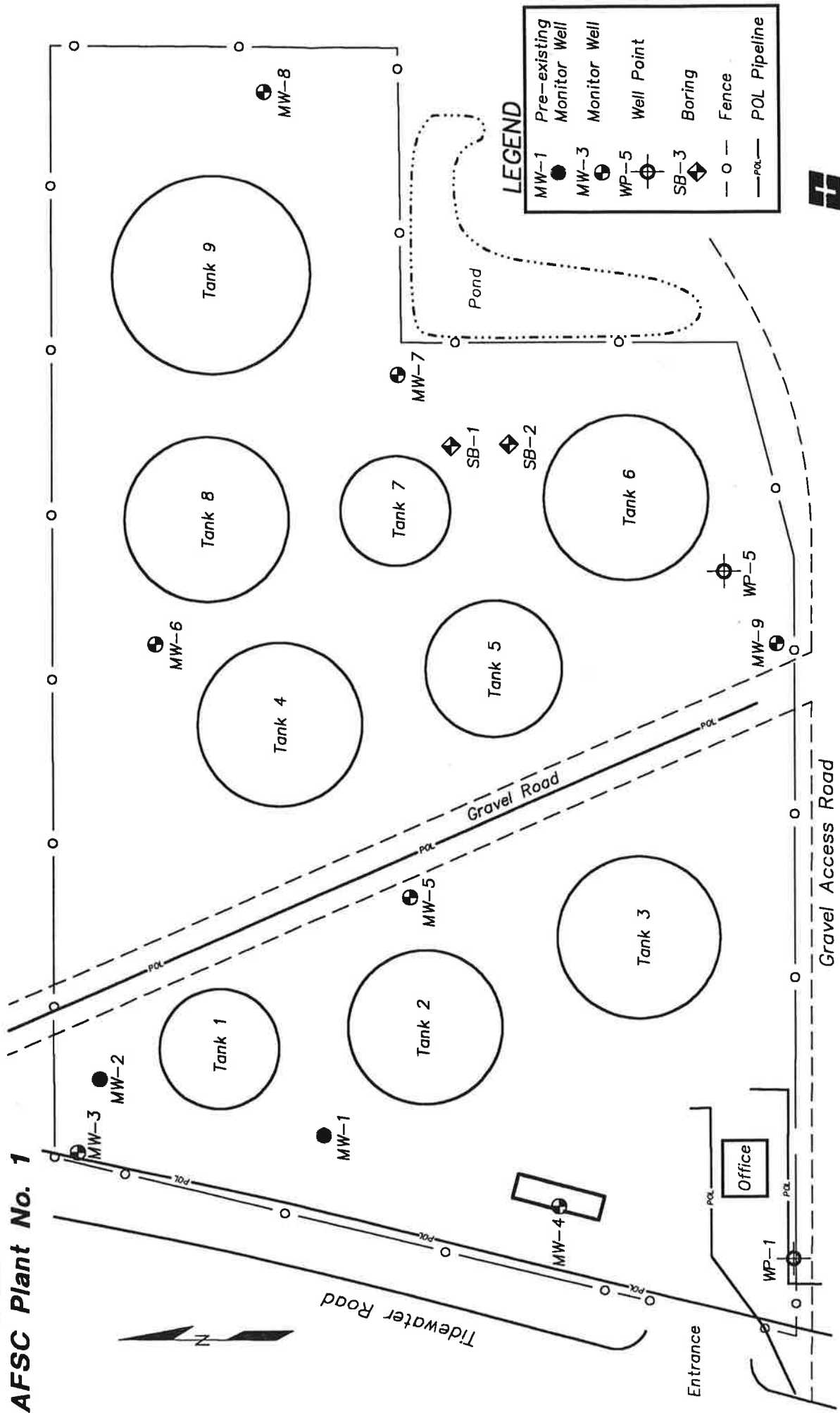
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**TABLE 4: GROUNDWATER QUALITY DATA
AFSC PLANT NO. 1
ANCHORAGE, ALASKA**

MONITORING WELL	8020						8015	8100
	BENZENE (mg/L)	TOLUENE (mg/L)	BENZENE (mg/L)	ETHYL- BENZENE (mg/L)	TOTAL XYLENES (mg/L)	TOTAL BTEX (mg/L)	VPH (mg/L)	EPH (mg/L)
MW-1	0.0012	ND	0.0025	0.0023	0.0060	0.18	0.86	
MW-2	0.0041	0.0046	0.050	0.32	0.38	2.1	66	
MW-3	0.020	0.011	0.24	1.8	2.1	8.4	27	
MW-4 DUPLICATE	0.14 0.13	0.078 0.062	0.35 0.35	2.3 2.1	2.9 2.6	13 20	110 49	
MW-5	ND	ND	ND	ND	ND	0.22	35	
MW-6	0.00089	0.00068	0.0056	0.0016	0.0088	0.15	8.6	
MW-7	ND	ND	ND	ND	ND	ND	1.4	
MW-8	ND	ND	ND	ND	ND	ND	1.5	
MW-9	0.0013	0.0010	ND	0.0024	0.0047	ND	1.0	
WP-5	ND	ND	ND	ND	ND	ND	2.5	
RINSATE	ND	ND	ND	ND	ND	ND	ND	
TRIP BLANK	ND	ND	ND	ND	ND	ND	NA	

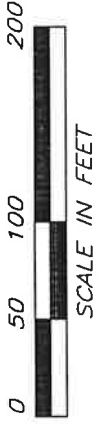
NOTES: {1} ND = Not Detected
{2} NA = Not Analyzed

Site Plan AFSC Plant No. 1



LEGEND	
MW-1	Pre-existing Monitor Well
MW-3	Monitor Well
WP-5	Well Point
SB-3	Boring
-○-	Fence
-POL-	POL Pipeline

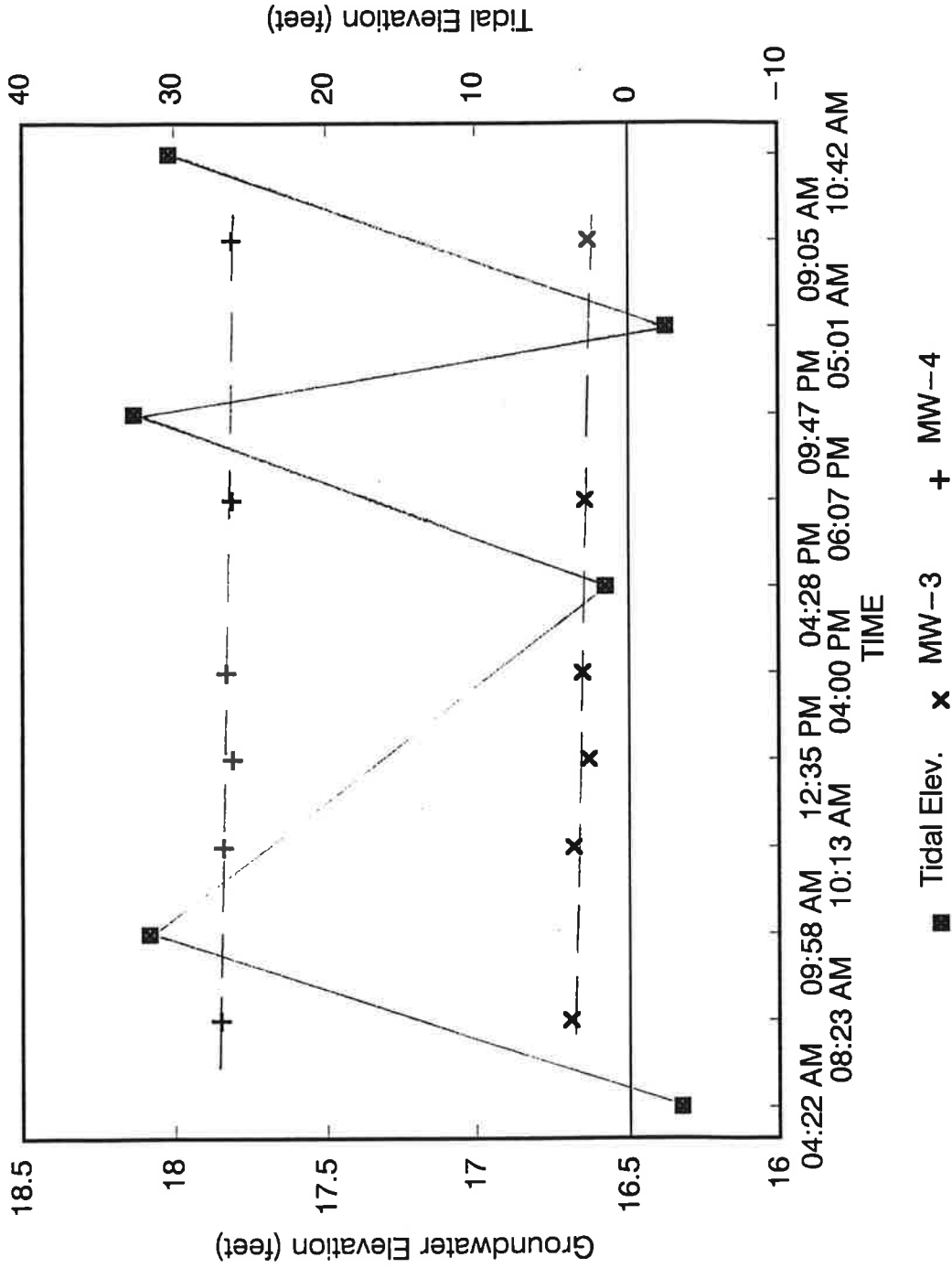
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FIGURE 1



Note: Base map prepared from drawing provided by client and from a survey conducted 9-92 by DOWL Engineers.

Groundwater Elevations vs. Tidal Fluctuations

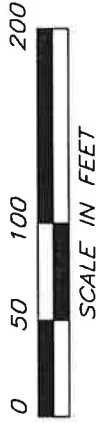
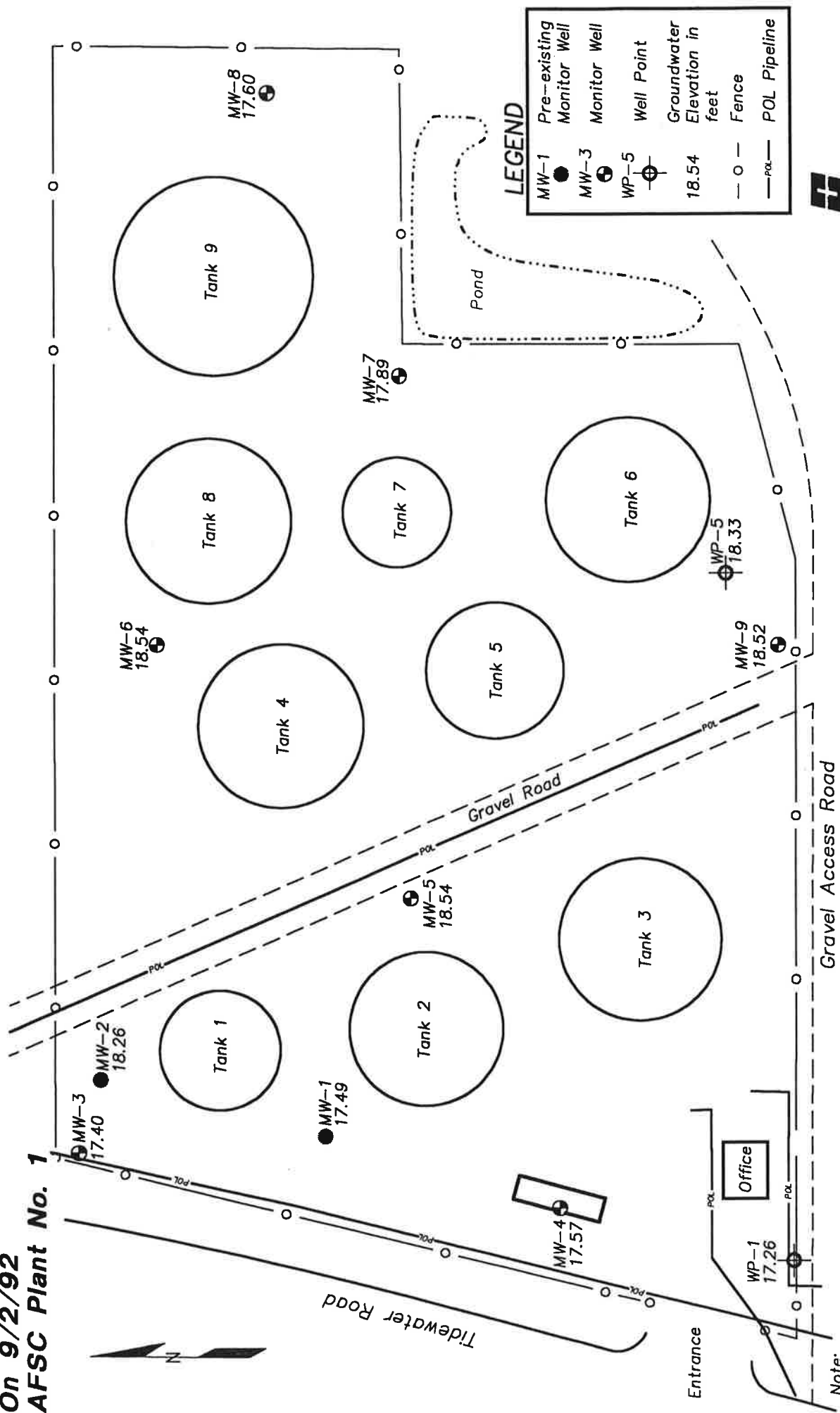
AFSC Plant No. 1



Water Table Elevations

On 9/2/92

AFSC Plant No. 1



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FIGURE 3

Note:
 1) Base map prepared from drawing provided by client and from a survey conducted 9-92 by DOWL Engineers.
 2) Elevation datum from bench mark "Tidal 16" and referenced to mean sea level (MSL = 0.00 feet)

APPENDIX A FIELD METHODS

This appendix documents the procedures Hart Crowser used in performing the field work related to this investigation. The discussion includes information on the following subjects:

- ▶ *Drilling and Sampling*
- ▶ *Field Screening*
- ▶ *Well Completion*
- ▶ *Well Development*
- ▶ *Water Level Measurements*
- ▶ *Water Quality Sampling*
- ▶ *Equipment Decontamination*
- ▶ *Well Location and Elevation Survey*

Drilling and Sampling

During the course of this investigation, seven, 2-inch-diameter monitoring wells (MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, and MW-9) were installed to a total depth of 13 feet below grade. In addition, two vertical soil borings SB-1 and SB-2 were completed at total depths of 6 feet. All monitoring wells and borings were drilled with a CME-75, truck-mounted drill rig advancing 3.25-inch ID hollow-stem augers, under subcontract to Hart Crowser, Inc. Drilling was accomplished under the continuous observation of a hydrogeologist of our firm. Detailed geologic field logs were prepared of each boring (Figures A-2 through A-6).

Soil samples were collected from MW-3, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, SB-1, and SB-2 at 2.5-foot intervals to 5 feet (including a surface sample) and thereafter collected every 5.0 feet and at the bottom of the boring. A 2.5-inch ID, split-spoon sampler, driven with a 300-lb hammer to a depth of 12 or 18 inches depending on the sampling interval, was used to collect the samples.

A split of each sample was placed in an appropriately sized glass jar for analysis. The jars were completely filled to minimize losses through volatilization, labelled, and placed in an insulated cooler with "blue ice" for shipping to North Creek Analytical, Inc., Bothell, Washington, under chain-of-custody procedures. A second split was placed in both a 1-quart "Ziploc" plastic bag and a 62.5-ml glass jar for field screening (see Field Screening).

Field Screening

Two field screening procedures were used to assess soil samples for possible petroleum hydrocarbon contamination. The screening procedures included soil headspace analysis for volatile organics and soil extraction analysis for total petroleum hydrocarbons (TPH). The combination of these screening methods is able to encompass the wide range of hydrocarbons present in petroleum products. The sample screening results were used to select the soil samples submitted for laboratory analysis of petroleum hydrocarbons.

Soil Headspace Analysis

The soil samples, placed in the 1-quart "Ziploc" plastic bags, were screened in the field for volatile organics using an OVM 580B or HNu photoionization detector equipped with an 10.0 or 11.7 eV lamp. After collection, samples were allowed to equilibrate to ambient temperature inside the field vehicle (~ 65°F) for a minimum of 15 minutes prior to screening; the headspace vapors within the sample bag were then analyzed with the field instrument.

The OVM or HNu was calibrated on a daily basis, using isobutylene as a calibration gas, and set to read directly in ppmV of benzene.

TPH Analysis

A weighed aliquot of soil from the 62.5-ml jar was transferred to a 40-ml VOA for extraction with freon. After extraction, the TPH concentration was determined by measurement with an infrared spectrophotometer (IR) using a modification of EPA Method 418.1. The analytical results are reported on a wet-weight basis in mg TPH per Kg of soil.

Well Completion

Installation of all monitoring wells immediately followed drilling. A 10-foot length of 2-inch-diameter, 0.020-inch slot, PVC well screen was placed at 3 to 13 feet below grade and is connected to the surface by a solid riser of flush-threaded PVC pipe (Figures A-2 through A-5). A sand pack filter of No. 10-20 silica sand was placed in the annulus adjacent to the screen and extended at least 0.5 feet above the top of the screen. Above the sand pack, the borehole was backfilled with approximately 1 foot of bentonite chips (hydrated in place) to within 1.5 feet of the ground surface. All monitoring wells, with the exception of MW-4, were provided with aboveground casings and a cement surface seal. MW-4 was completed using a flush-mounted aluminum well cap with a cement surface seal.

Well Development

Monitoring well development activities were conducted a minimum of 24 hours after well completion. Monitoring well development consisted of manually surging and bailing each monitoring well with a stainless steel bailer. A minimum of ten casing volumes of water (20 gallons for 2-inch monitoring wells) was bailed from each monitoring well. The total depth of the well was recorded prior to and on completion of well development activities to ensure no sediment accumulations remained within the well casing.

Although the wells were purged until the produced water was relatively sediment free, all monitoring wells continued to produce turbid water throughout the development process. All wells recovered promptly during well development activities with the exception of MW-1 and MW-9. These latter two wells bailed dry after 15 gallons and continued to show poor recovery throughout well development and water quality sampling procedures. All purge water produced during the development operations was containerized in 55-gallon drums for disposal by AFSC.

Water Level Measurements

The water level in each monitoring well was measured from a reference point or "measuring point" marked on the PVC casing or steel security casing (MW-1 and MW-2). A Flexidip oil/water interface probe was used to make the measurements, which were recorded to an accuracy of ± 0.01 feet. The oil/water interface probe was decontaminated prior to and between each of the well measurements (see Decontamination Procedures).

Water Quality Sampling

Not less than 24 hours after well development, the monitoring wells were sampled. A minimum of three casing volumes were purged immediately prior to sampling. Each well was purged using a Redi-Flo2 submersible pump, and purging was considered complete when two of the three parameters of pH, conductivity, and temperature had stabilized within $\pm 10\%$.

Sampling was performed by lowering a decontaminated stainless steel bailer into the well with single-use polypropylene rope. Samples were collected in 40-ml glass VOA vials and 1-liter glass bottles provided by the contract laboratory. In instances where the well was bailed dry, a minimum of one casing volume was removed, the monitoring well was allowed to recover, and the well was sampled. A duplicate and rinsate sample were also collected with the samples. Immediately after collection, the samples were placed in a cooler with "blue ice" for shipment to the analytical laboratory under chain-of-custody procedures.

Equipment Decontamination

All augers, bits and drilling rods were thoroughly cleaned prior to and between each use with a high pressure, hot water wash. Sampling tools, including the split-spoon, water level probes, submersible pump, and bailer, were cleaned prior to and between sampling attempts using an anionic detergent wash (Alconox) followed by two potable water rinses. The bailer was additionally rinsed with methanol and distilled water.

Well Location and Elevation Survey

DOWL Engineers under subcontract to Hart Crowser performed a coordinate and elevation survey for the AFSC Plant No. 1 site. All work was conducted by a State of Alaska registered surveyor. All monitoring wells and soil boring locations were located horizontally with reference to the Alaska State Plane Coordinates. The coordinates are based on monumentation from the dock at the Port of Anchorage. The monuments are named "N. End" and "S. End". Monitoring well elevations are established to a reference point permanently marked on the PVC casing or steel security casing (MW-1 and MW-2). Elevations are based on bench mark "Tidal 16" also located at the Port. This bench mark has an elevation of 23.23 feet, datum is NGS 1972 adjust (MSL = 0.00 feet).

Ref:J:\REP\829700SI.APA

Key To Exploration Logs And Well Construction

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture conditions, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions are interpretative and actual changes may be gradual.

Water and product level observations are for the date indicated and may vary with time.

(ATD - At time of drilling)

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
<u>Density:</u>		<u>Consistency:</u>		
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

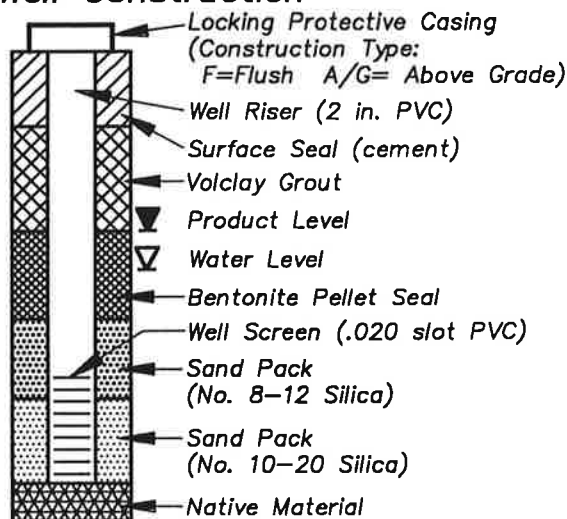
Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

Minor Constituents	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Well Construction



Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	QU
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer (Approximate Compressive Strength in TSF)
TV	Torvane (Approximate Shear Strength in TSF)
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits
CA	Chemical Analysis

Water Content in Percent

- Liquid Limit
- Natural
- Plastic Limit

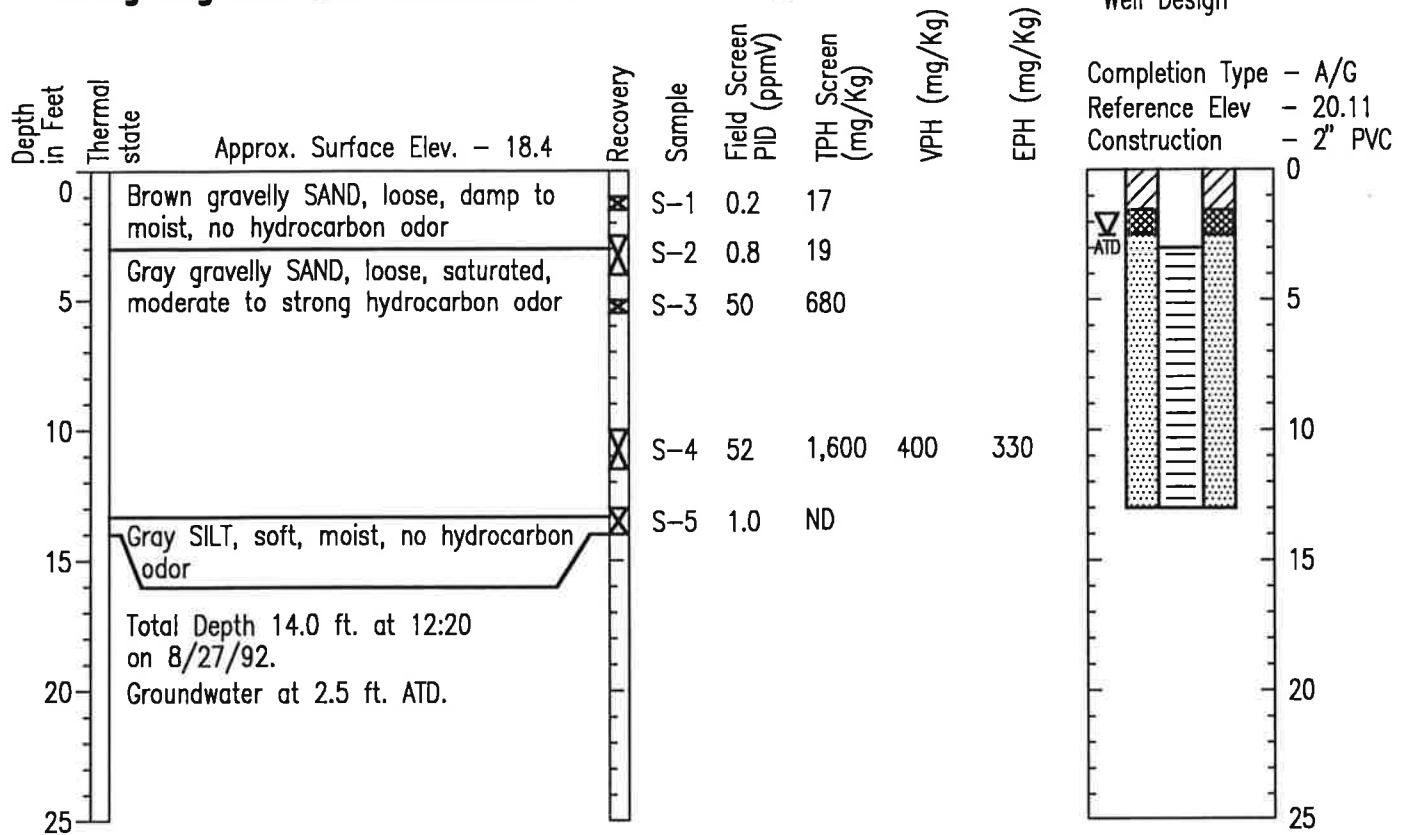
Sampling Test Symbols

BORING SAMPLES	BORING SAMPLES	Test Pit Samples
☒ Split Spoon	Core Run	☒ Grab (jar)
☒ Shelby Tube	* No sample Recovery	☒ Bag
☒ Cuttings	P Tube pushed, Not driven	☒ Shelby Tube

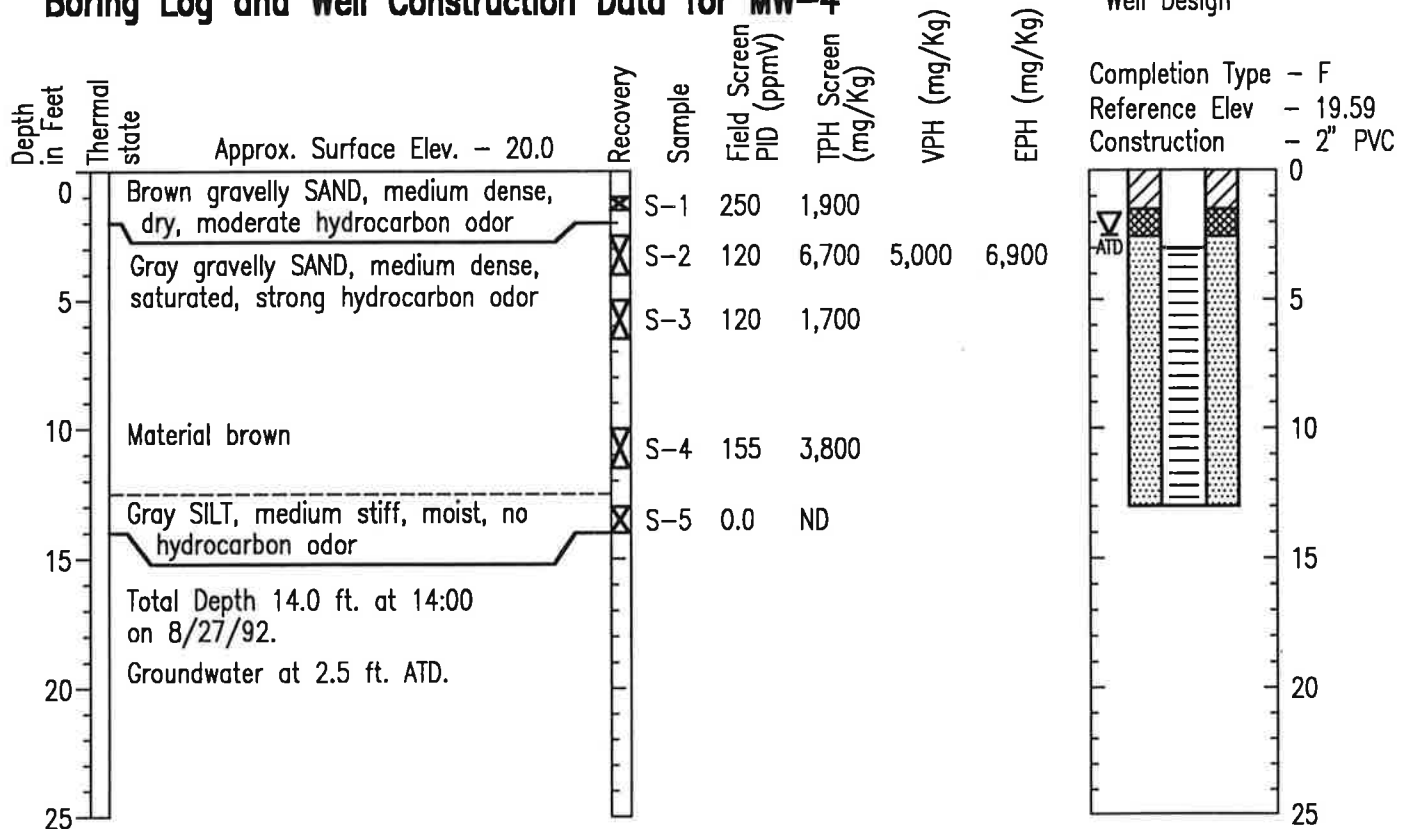
HARTCROWSER

A-8297-00 10-92
FIGURE A-1

Boring Log and Well Construction Data for MW-3

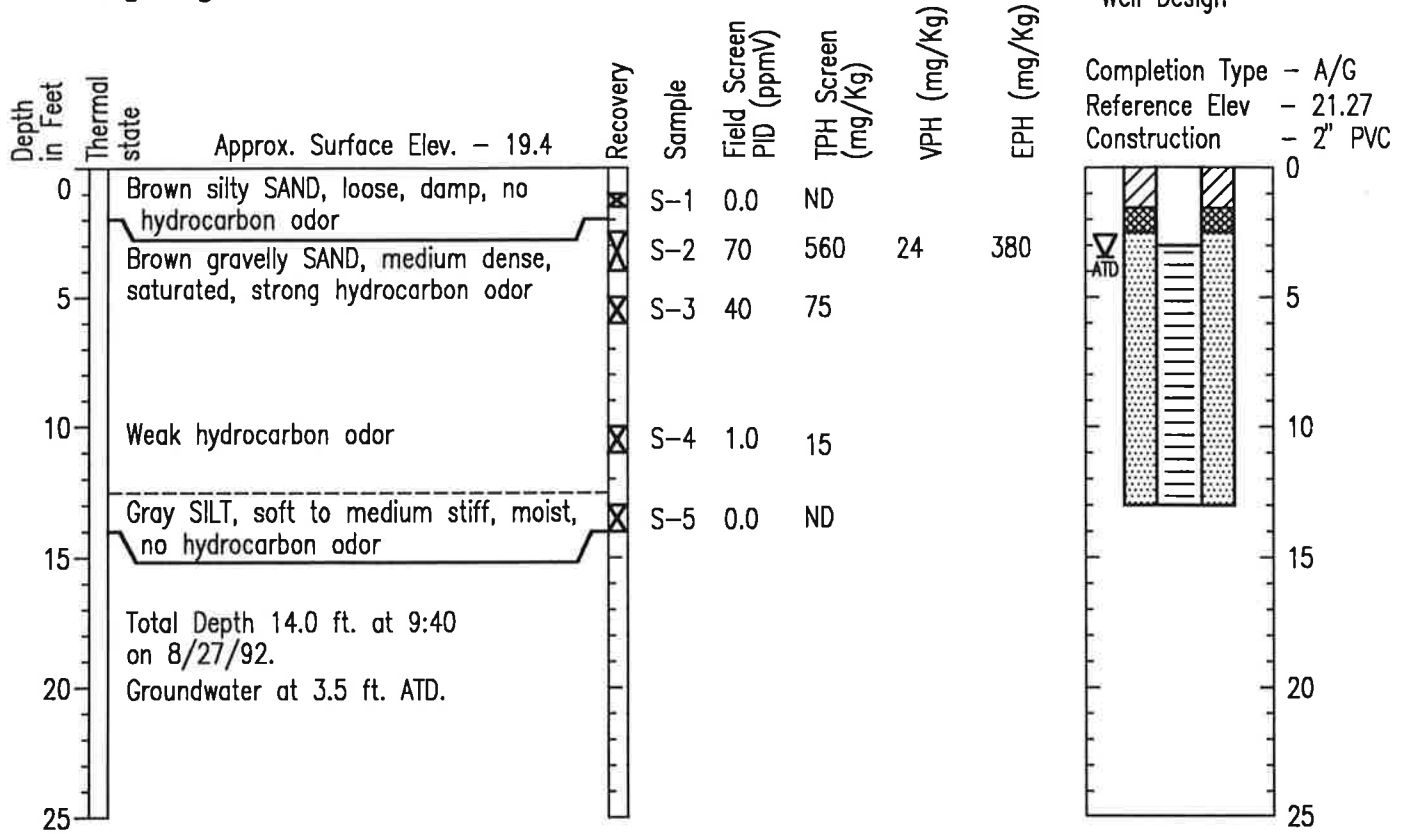


Boring Log and Well Construction Data for MW-4

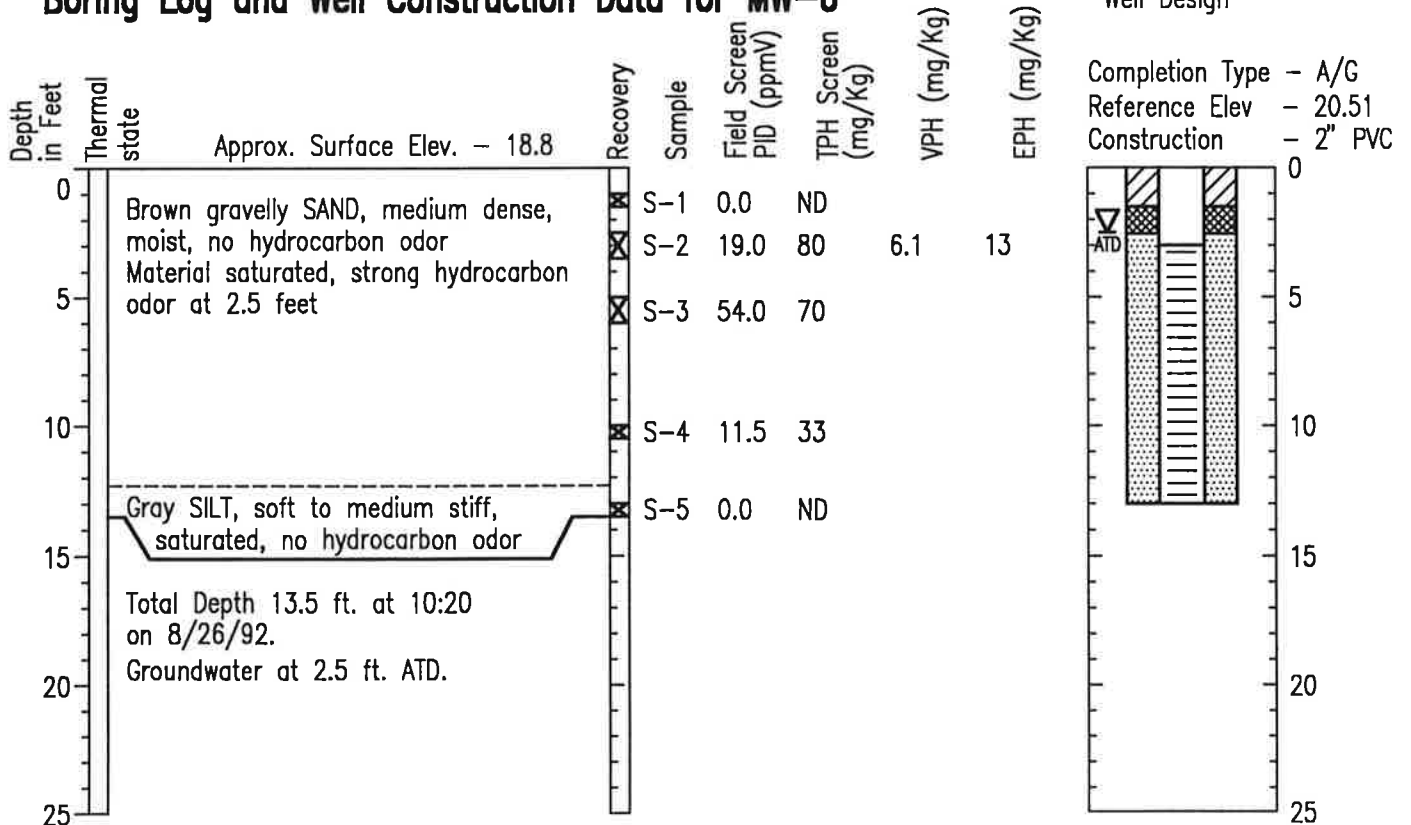


1. Soil descriptions are interpretative and actual changes may be gradual.
2. Water level is for date indicated and may vary with time of year. (ATD-At Time of Drilling)
3. Refer to Figure A-1 for key to exploration logs.

Boring Log and Well Construction Data for MW-5

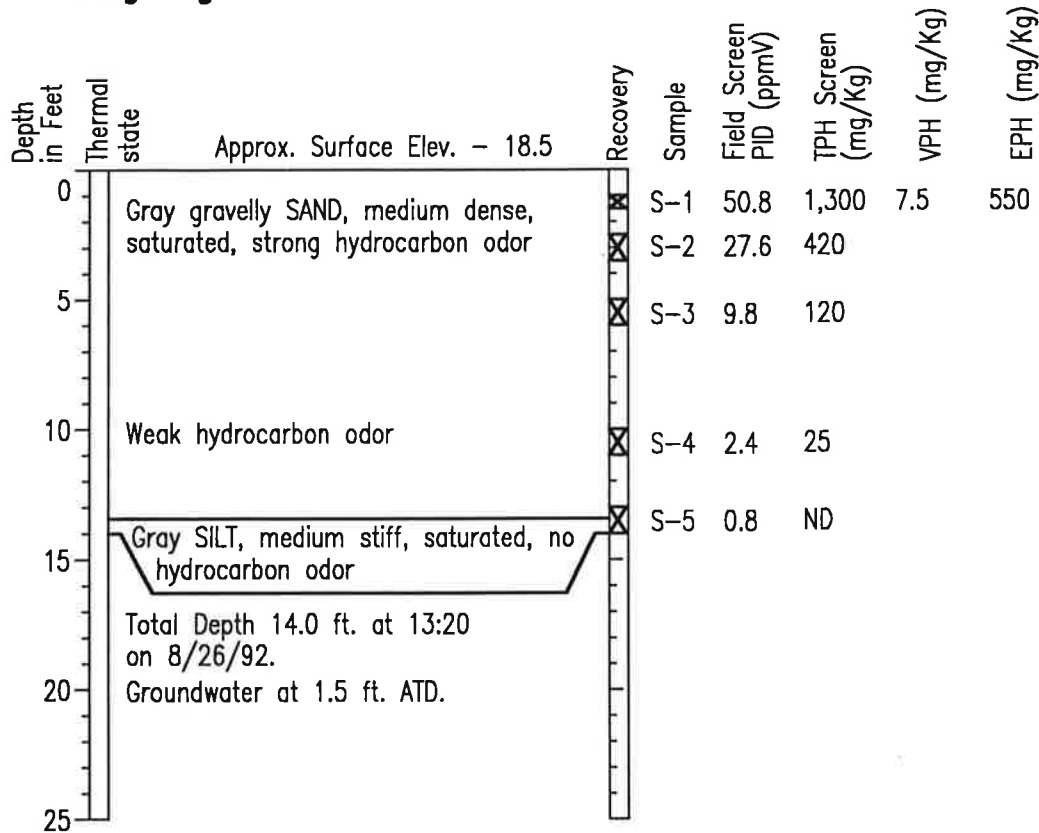


Boring Log and Well Construction Data for MW-6

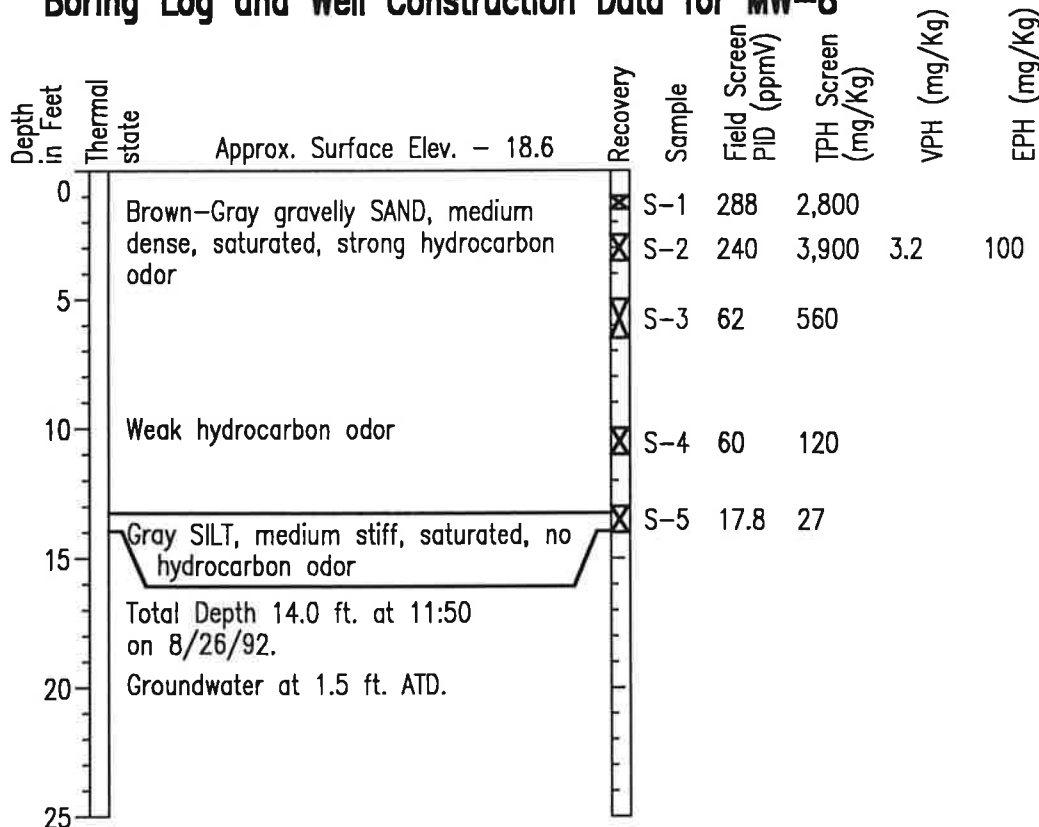


1. Soil descriptions are interpretative and actual changes may be gradual.
2. Water level is for date indicated and may vary with time of year. (ATD-At Time of Drilling)
3. Refer to Figure A-1 for key to exploration logs.

Boring Log and Well Construction Data for MW-7

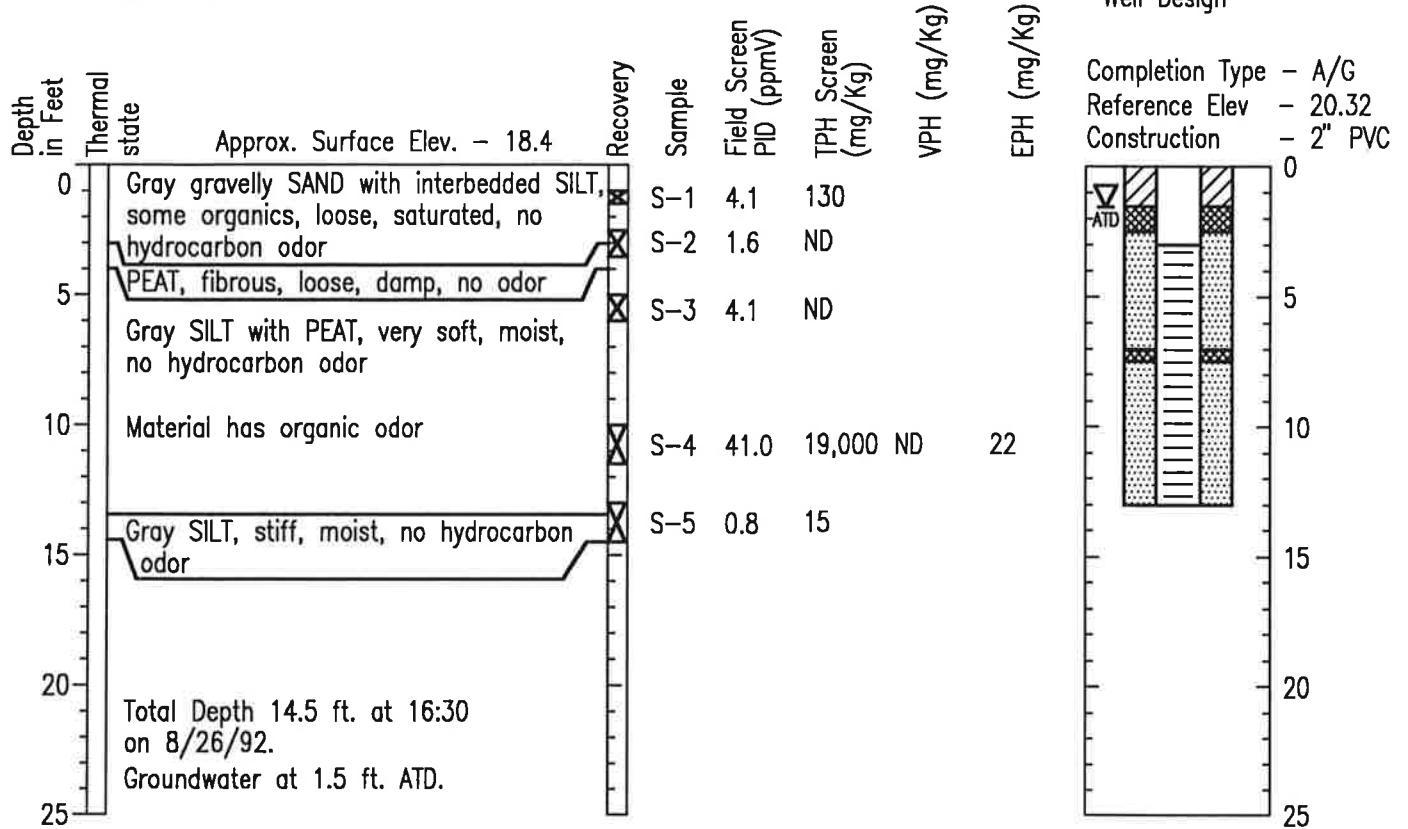


Boring Log and Well Construction Data for MW-8



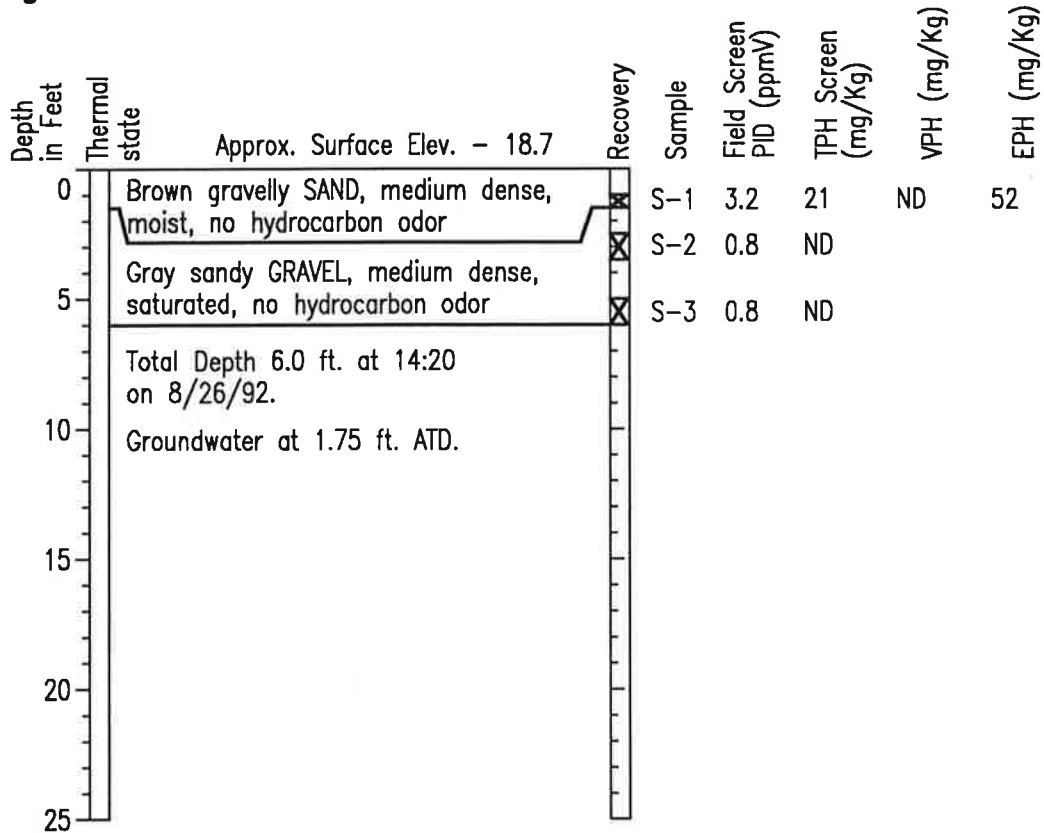
1. Soil descriptions are interpretative and actual changes may be gradual.
2. Water level is for date indicated and may vary with time of year. (ATD-At Time of Drilling)
3. Refer to Figure A-1 for key to exploration logs.

Boring Log and Well Construction Data for MW-9

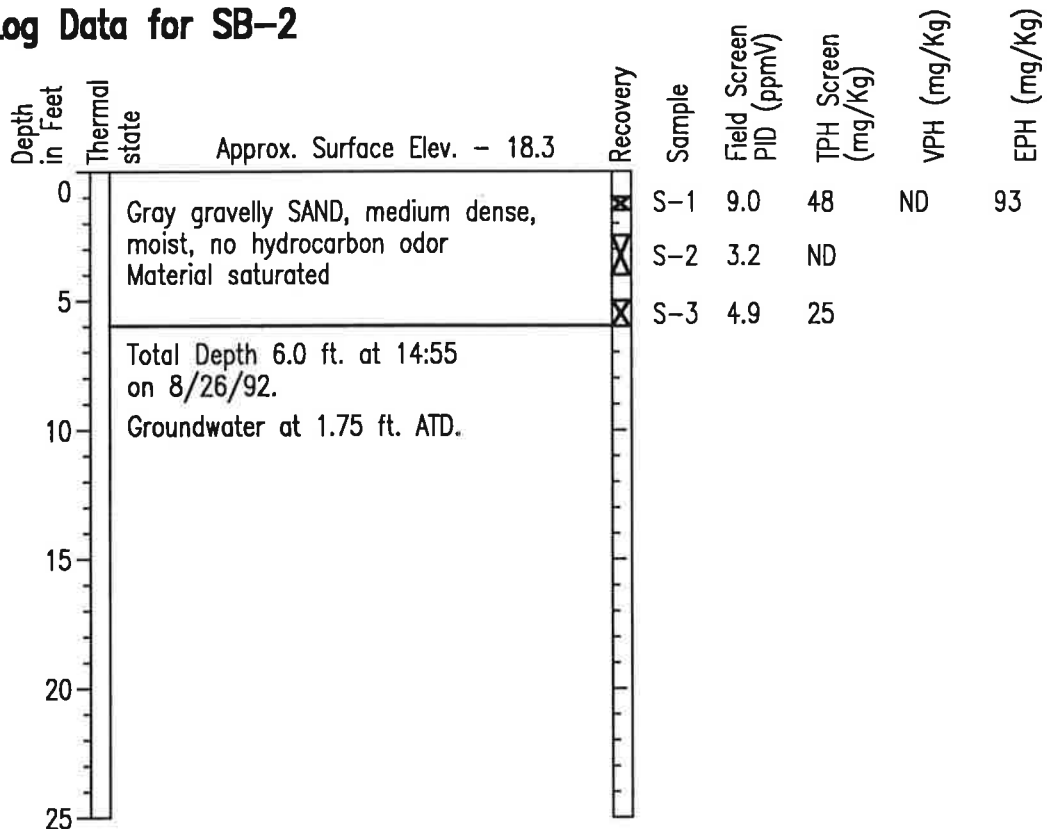


1. Soil descriptions are interpretative and actual changes may be gradual.
2. Water level is for date indicated and may vary with time of year. (ATD-At Time of Drilling)
3. Refer to Figure A-1 for key to exploration logs.

Boring Log Data for SB-1



Boring Log Data for SB-2



1. Soil descriptions are interpretative and actual changes may be gradual.
2. Water level is for date indicated and may vary with time of year. (ATD-At Time of Drilling)
3. Refer to Figure A-1 for key to exploration logs.

APPENDIX B DATA VALIDATION REPORT

This appendix presents our validation of the laboratory reports for chemical analysis of soil and water samples collected from AFSC Plant No. 1, as performed by North Creek Analytical, Inc. (North Creek), Bothell, Washington. The laboratory work reviewed herein was conducted for samples collected in August and September 1992.

This appendix is organized into three main sections. The first section is a summary of our data validation review. The second and third sections present detailed reviews of the soil and water quality data, respectively. Following the text are the laboratory data sheets.

SUMMARY OF FINDINGS

We have determined that the laboratory data generated from analysis of soil and groundwater samples collected during this work are valid and usable for the purposes of the AFSC Plant No. 1 subsurface investigation based on criteria set forth in the Quality Assurance Program Plan (QAPP). Summaries of the soil and groundwater quality data are presented in Tables 3A, 3B, and 4 in the main body of this report.

SOIL QUALITY DATA REVIEW

This section presents an evaluation of the soil quality data based on the criteria set forth in Hart Crowser's Quality Assurance Program Plan (QAPP) and the quality control data presented by the analytical laboratory.

Analytical Methods

Appropriateness of Testing

North Creek analyzed a total of 13 soil samples from the AFSC Plant No. 1 terminal. Nine samples were analyzed for petroleum hydrocarbons. These analyses included aromatic volatile organics (BTEX, EPA Method 5030/8020), volatile petroleum hydrocarbons (VPH, gasoline-range hydrocarbons) using EPA Method 5030/8015, and extractable petroleum hydrocarbons (EPH, diesel-range hydrocarbons) using EPA Method 3550/8100. Seven of the samples were analyzed for halogenated volatile organics (HVO, EPA Method 8010) and metals (arsenic, chromium, and lead) using EPA Method

6010. Lastly, three of the samples were analyzed for polychlorinated biphenyls (PCBs) using EPA Method 8080.

Because this work was performed for a baseline environmental assessment of a bulk fuel terminal, the analyses were targeted for petroleum hydrocarbons. HVO, PCB, and metal analyses were conducted to investigate possible releases and site contamination by these materials.

Reporting of Data

Laboratory data for petroleum hydrocarbons, metals, and PCB analyses were reported in milligrams per kilogram (mg/Kg). The HVO analytical data were reported in micrograms per kilogram ($\mu\text{g}/\text{Kg}$). For reporting purposes, these data were converted to mg/Kg. All analytical results were presented on a dry-weight basis.

Sample Handling

Sample Collection

Sample collection techniques are presented in Appendix A. Soil samples were collected in manufacturer-cleaned containers.

Sample Handling

Upon collection of each sample, the sample location, number, date and time of collection were recorded on the label of each container. Samples were stored in insulated containers with frozen "blue ice" and maintained in Hart Crowser's custody until shipment to North Creek Analytical.

Holding Times

All samples were extracted and/or analyzed within 14-days of sample collection, except for the metals analyses. All extractions and analyses were completed within the EPA recommended holding times.

Blanks

Laboratory Blanks

A laboratory reagent blank (method blank) was included with each group of samples for each of the analytical methods (VPH/BTEX,

EPH, HVO, PCB, and metals). No analytes of interest were detected in any of the method blanks.

Matrix Spike Recovery (Accuracy)

BTEX

The matrix spike recoveries were between 83 and 102 percent. The desired percent recovery is 60 to 140 percent, and the data are acceptable.

EPH

The percent recovery was 112 and 115 percent for the matrix spike and matrix spike duplicate and is acceptable.

HVO

The percent recoveries ranged between 52 and 76 percent. The desired percent recovery is 60 to 140 percent. All data are acceptable.

PCBs

The spike recoveries were 69 and 85 percent. North Creek's analytical control limits are 60 to 120 percent.

Metals

The percent recoveries ranged from 66 to 88 percent. The desired percent recovery is 70 to 130 percent, and the data are acceptable.

Surrogate Recovery

BTEX/VPH

Surrogate compound recoveries ranged from 86 percent to 126 percent.

EPH

Surrogate recoveries were between 83 and 124 percent for all EPH analyses.

HVO

The surrogate compound recoveries ranged between 75 and 90 percent.

PCBs

The surrogate compound recoveries ranged from 57 percent to 70 percent in the sample analyses.

All surrogate recoveries are considered valid for the purposes of this report.

Matrix Spike and Field Duplicates (Precision)

Matrix Spike Duplicates

The relative percent difference (RPD) for the spiked sample results for all analyses were all below a maximum value of 21 percent (PCB analysis) and are acceptable.

Field Duplicates

Field duplicate samples were collected for petroleum hydrocarbon and HVO (DUP #2), PCBs (PCB DUP), and metals (METALS DUP). The samples were collected at MW-3, S-4; MW-9, S-1; and MW-8, S-1, respectively.

The relative percent difference (RPD) between duplicate samples was 106 percent for VPH, 90 percent for EPH, and 47 percent for chromium. The RPD for all other field duplicate analyses could not be determined since one or both of the analytical results were below the detection limit. The large RPD between the field duplicate samples is likely due to variations within the soil materials.

Detection Limits

The detection limits for each of the analyses performed are as follows:

VPH	1.0 mg/Kg	EPH	4.0 mg/Kg
HVO	0.05 mg/Kg	PCB	0.05 mg/Kg
Arsenic	10 mg/Kg	Chromium	2.0 mg/Kg
Lead	5.0 mg/Kg	Benzene	0.05 mg/Kg
All other BTEX constituents			0.10 mg/Kg

All detection limits are within the practical quantitation limit stated in our QAPP and are acceptable.

WATER QUALITY DATA REVIEW

Analytical Methods

Appropriateness of Testing

North Creek analyzed a total of ten groundwater samples, one duplicate sample, one rinsate sample, and one trip blank. All groundwater samples were analyzed for VPH/BTEX using EPA Method 5030/8015/8020 and EPH using EPA Method 3510/8100. Because this work was performed for a baseline environmental assessment of a bulk fuel terminal, the analyses were targeted for petroleum hydrocarbons.

Reporting of Data

Laboratory data for VPH and BTEX were reported in micrograms per liter ($\mu\text{g/L}$), and EPH data were reported in milligrams per liter (mg/L), which is generally equivalent to ppm. For consistency, all data was presented in mg/L .

Sample Handling

Sample Collection

Sample collection techniques are described in Appendix A. Samples were collected in clean containers supplied by the analytical laboratory.

Sample Handling

Upon collection of each sample, the sample location, number, date and time of collection were recorded on the label of each container. Samples were stored in insulated coolers with "blue ice" and maintained in Hart Crowser's custody until samples were shipped to North Creek.

Holding Times

All samples were extracted and/or analyzed within the 14-day holding time recommended by the EPA.

Blanks

Laboratory Blanks

A laboratory reagent blank (method blank) was included with each group of samples for each of the analytical methods (VPH/BTEX and EPH). No analytes of interest were detected in any of the method blanks.

Field Blanks

One rinsate blank and one trip blank were collected and analyzed with the groundwater samples. The rinsate blank was collected after sampling MW-6. The rinsate blank was analyzed for VPH, BTEX, and EPH. The trip blank was analyzed for volatile compounds (VPH and BTEX) only. No analytes of interest were detected in the rinsate blank or the trip blank.

Matrix Spike Recovery (Accuracy)

Volatile Organics (VPH/BTEX)

Matrix spike and spike duplicate recoveries were reported for each of the BTEX constituents. The percent recoveries were between 96 and 108 percent and are within the laboratory control limits. As the laboratory control limits are within the data quality objectives of our QAPP, the data are valid and acceptable.

Extractable Petroleum Hydrocarbon (EPH)

The percent recoveries were 90 and 100 percent and are acceptable.

Surrogate Recovery

Surrogate compound recoveries for VPH/BTEX analyses ranged from 87 percent to 134 percent. Surrogate compound recoveries for EPH analyses ranged from 66 percent to 136 percent. All surrogate recoveries are considered valid for the purposes of this report.

Matrix Spike Duplicates (Precision)

Volatile Organics (VPH/BTEX)

The RPD for each analyte was within the maximum RPD allowed by the laboratory. As these values met the data quality objective for

precision of ± 30 percent, as stated in our QAPP, the data are valid and acceptable.

Extractable Petroleum Hydrocarbons (EPH)

The RPD for the matrix spike duplicate was 11 percent and is acceptable.

Field Duplicates

Volatile Organics (VPH/BTEX)

A duplicate groundwater sample was collected from MW-4. The individual BTEX constituents displayed a RPD no greater than 23 percent (toluene). The VPH results had a RPD of 42 percent.

Extractable Petroleum Hydrocarbons (EPH)

The sample from MW-4 and its duplicate had a RPD of 77 percent.

Detection Limits

The detection limit for each BTEX constituent, VPH, and EPH was 0.0005 mg/L, 0.05 mg/L, and 0.1 mg/L, respectively. All detection limits are within the data quality objectives (practical quantitation limits) listed in our QAPP and are acceptable.

Ref:J:\REP\829700SI.APB

Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Matrix: Soil Analysis for: Moisture Content First Sample #: 208-1483	Received: Aug 31, 1992 Reported: Sep 17, 1992
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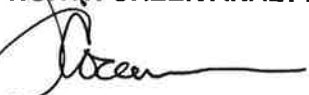
LABORATORY ANALYSIS FOR: Moisture Content

Sample Number	Sample Description	Total Solids %	Moisture Content %
208-1483	S-1, SB-1	95	5.0
208-1484	S-1, SB-2	95	5.0
208-1485	S-1, MW-8	93	7.0
208-1486	S-2, MW-8	93	7.0
208-1487	S-1, MW-3	92	8.0
208-1488	S-4, MW-3	93	7.0
208-1489	S-2, MW-4	91	9.0
208-1490	S-1, MW-5	82	18
208-1491	S-2, MW-5	95	5.0
208-1492	S-4, MW-3 DUP #2	95	5.0
208-1493	S-1, MW-9 PCB DUP	86	14

RECEIVED
SEP 23 1992
 HART CROWSER, INC.

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis. To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids. The results in this report apply only to the samples analyzed, as indicated on the custody document. This analytical report is to be reproduced only in its entirety.

NORTH CREEK ANALYTICAL Inc


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
2550 Denali Street, #705
Anchorage, AK 99503
Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
Matrix: Soil
Analysis for: Moisture Content
First Sample #: 208-1494

Received: Aug 31, 1992
Reported: Sep 17, 1992

LABORATORY ANALYSIS FOR: Moisture Content

Sample Number	Sample Description	Total Solids %	Moisture Content %
208-1494	S-1, MW-8 METALS DUP	91	9.0
208-1495	S-2, MW-6	94	6.0
208-1496	S-1, MW-7	91	9.0
208-1497	S-1, MW-9	87	13
208-1498	S-4, MW-9	65	35

RECEIVED
SEP 23 1992
HART CROWSER, INC.

The enclosed analytical results for soils, sediments and sludges have been converted to a DRY WEIGHT reporting basis.
To attain the wet weight "as received" equivalent, multiply the dry weight result by the decimal fraction of percent Total Solids.
The results in this report apply only to the samples analyzed, as indicated on the custody document.
This analytical report is to be reproduced only in its entirety.

NORTH CREEK ANALYTICAL inc


Scot Cocanour
Laboratory Director

Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Matrix Descript: Soil Analysis Method: EPA 5030/8015/8020 First Sample #: 208-1483	Sampled: Aug 26, 1992 Received: Aug 31, 1992 Analyzed: Sep 10, 1992 Reported: Sep 17, 1992
--	--	---

TOTAL PETROLEUM HYDROCARBONS with BTEX DISTINCTION (ALASKA TPH-G/BTEX)

Sample Number	Sample Description	Volatile Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
208-1483	S-1, SB-1	N.D. G-1	N.D.	N.D.	N.D.	N.D.	93
208-1484	S-1, SB-2	N.D. G-1	N.D.	N.D.	N.D.	N.D.	96
208-1486	S-2, MW-8	3.2 G-1	N.D.	N.D.	N.D.	N.D.	107
208-1495	S-2, MW-6	6.1 G-1	N.D.	N.D.	N.D.	N.D.	110
208-1496	S-1, MW-7	7.5 G-1	N.D.	N.D.	N.D.	N.D.	117
208-1498	S-4, MW-9	N.D.	N.D.	N.D.	N.D.	N.D.	97
BLK091092	Method Blank	N.D.	N.D.	N.D.	N.D.	N.D.	86

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HART CROWSER, INC.

Detection Limits:

1.0

0.050

0.10

0.10

0.10

Volatile Hydrocarbons are quantitated as gasoline range organics (nC6 - nC10). Surrogate recovery reported is for Bromofluorobenzene. Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL inc


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Matrix Descript: Soil Analysis Method: EPA 5030/8015/8020 First Sample #: 208-1488	Sampled: Aug 27, 1992 Received: Aug 31, 1992 Analyzed: Sep 10, 1992 Reported: Sep 17, 1992
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TOTAL PETROLEUM HYDROCARBONS with BTEX DISTINCTION (ALASKA TPH-G/BTEX)

Sample Number	Sample Description	Volatile Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)	Surrogate Recovery %
208-1488	S-4, MW-3	400 G-1	N.D.	N.D.	N.D.	2.8	126
208-1489	S-2, MW-4	5,000 G-1	1.3	4.3	11	120	101
208-1491	S-2, MW-5	24 G-1	N.D.	N.D.	N.D.	N.D.	100
208-1495	DUP #2	1,300 G-1	N.D.	N.D.	2.4	13	110
BLK091092	Method Blank	N.D.	N.D.	N.D.	N.D.	N.D.	86

RECEIVED
 SEP 23 1992
 HART CROWSER, INC.

Detection Limits:	1.0	0.050	0.10	0.10	0.10
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Volatile Hydrocarbons are quantitated as gasoline range organics (nC6 - nC10). Surrogate recovery reported is for Bromofluorobenzene. Analytes reported as N.D. were not present above the stated limit of detection.

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Please Note:

The detection limit for Benzene in #208-1491 = 0.080 mg/kg.
 The detection limit for Benzene and Toluene in #208-1492 = 0.20 mg/kg.


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Sample Descript: Soil, S-2, MW-8 Analysis Method: EPA 5030/8010 Sample Number: 208-1486	Sampled: Aug 26, 1992 Received: Aug 31, 1992 Analyzed: Sep 9, 1992 Reported: Sep 17, 1992
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HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	300
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

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4-Bromofluorobenzene Surrogate Recovery, %: 82
 Analytes reported as N.D. were not present above the stated limit of detection.

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Please Note:
 Methylene Chloride is a suspected laboratory contaminant. Please refer to the method blank.

Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Sample Descript: Soil, S-4, MW-3 Analysis Method: EPA 5030/8010 Sample Number: 208-1488	Sampled: Aug 27, 1992 Received: Aug 31, 1992 Analyzed: Sep 9, 1992 Reported: Sep 17, 1992
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HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	250
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

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4-Bromofluorobenzene Surrogate Recovery, %: 80

Analytes reported as N.D. were not present above the stated limit of detection.

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Please Note:

Methylene Chloride is a suspected laboratory contaminant. Please refer to the method blank.


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Sample Descript: Soil, S-2, MW-4 Analysis Method: EPA 5030/8010 Sample Number: 208-1489	Sampled: Aug 27, 1992 Received: Aug 31, 1992 Analyzed: Sep 9, 1992 Reported: Sep 17, 1992
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HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	260
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

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4-Bromofluorobenzene Surrogate Recovery, %: 75
 Analytes reported as N.D. were not present above the stated limit of detection.

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Please Note:
 Methylene Chloride is a suspected laboratory contaminant. Please refer to the method blank.

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Soil, S-2, MW-5
 Analysis Method: EPA 5030/8010
 Sample Number: 208-1491

Sampled: Aug 27, 1992
 Received: Aug 31, 1992
 Analyzed: Sep 9, 1992
 Reported: Sep 17, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	100	N.D.
Vinyl chloride.....	50	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 85

Analytes reported as N.D. were not present above the stated limit of detection.

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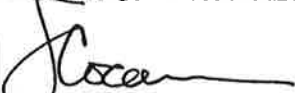
Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Sample Descript: Soil, DUP #2 Analysis Method: EPA 5030/8010 Sample Number: 208-1492	Sampled: Aug 27, 1992 Received: Aug 31, 1992 Analyzed: Sep 9, 1992 Reported: Sep 17, 1992
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HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 76
 Analytes reported as N.D. were not present above the stated limit of detection.

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Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Sample Descript: Soil, S-2, MW-6 Analysis Method: EPA 5030/8010 Sample Number: 208-1495	Sampled: Aug 26, 1992 Received: Aug 31, 1992 Analyzed: Sep 9, 1992 Reported: Sep 17, 1992
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HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 79
 Analytes reported as N.D. were not present above the stated limit of detection.

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Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Sample Descript: Soil, S-1, MW-7 Analysis Method: EPA 5030/8010 Sample Number: 208-1496	Sampled: Aug 26, 1992 Received: Aug 31, 1992 Analyzed: Sep 9, 1992 Reported: Sep 17, 1992
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HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 76
 Analytes reported as N.D. were not present above the stated limit of detection.

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Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Soll, S-4, MW-9
 Analysis Method: EPA 5030/8010
 Sample Number: 208-1498

Sampled: Aug 26, 1992
 Received: Aug 31, 1992
 Analyzed: Sep 9, 1992
 Reported: Sep 17, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	370
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

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4-Bromofluorobenzene Surrogate Recovery, %: 90

Analytes reported as N.D. were not present above the stated limit of detection.

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Please Note:

Methylene Chloride is a suspected laboratory contaminant. Please refer to the method blank.


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Method Blank
 Analysis Method: EPA 5030/8010
 Sample Number: BLK090992

Analyzed: Sep 9, 1992
 Reported: Sep 17, 1992

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg (ppb)	Sample Results µg/kg (ppb)
Bromodichloromethane.....	50	N.D.
Bromoform.....	50	N.D.
Bromomethane.....	50	N.D.
Carbon tetrachloride.....	50	N.D.
Chlorobenzene.....	50	N.D.
Chloroethane.....	50	N.D.
2-Chloroethylvinyl ether.....	50	N.D.
Chloroform.....	50	N.D.
Chloromethane.....	50	N.D.
Dibromochloromethane.....	50	N.D.
1,2-Dichlorobenzene.....	50	N.D.
1,3-Dichlorobenzene.....	50	N.D.
1,4-Dichlorobenzene.....	50	N.D.
1,1-Dichloroethane.....	50	N.D.
1,2-Dichloroethane.....	50	N.D.
1,1-Dichloroethene.....	50	N.D.
Total 1,2-Dichloroethene.....	50	N.D.
1,2-Dichloropropane.....	50	N.D.
cis-1,3-Dichloropropene.....	50	N.D.
trans-1,3-Dichloropropene.....	50	N.D.
Methylene chloride.....	250	N.D.
1,1,2,2-Tetrachloroethane.....	50	N.D.
Tetrachloroethene.....	50	N.D.
1,1,1-Trichloroethane.....	50	N.D.
1,1,2-Trichloroethane.....	50	N.D.
Trichloroethene.....	50	N.D.
Trichlorofluoromethane.....	50	N.D.
Vinyl chloride.....	50	N.D.

4-Bromofluorobenzene Surrogate Recovery, %: 81
 Analytes reported as N.D. were not present above the stated limit of detection.

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Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Analysis Method: EPA 6010 Analysis for: Lead First Sample #: 208-1485 Matrix: Soil	Sampled: Aug 27, 1992 Received: Aug 31, 1992 Digested: Sep 14, 1992 Analyzed: Sep 15, 1992 Reported: Sep 17, 1992
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METALS ANALYSIS FOR: Lead

Sample Number	Sample Description	Detection Limit mg/kg (ppm)	Sample Result mg/kg (ppm)
208-1485	S-1, MW-8 8/26/92	5.0	N.D.
208-1487	S-1, MW-3	5.0	11
208-1489	S-2, MW-4	5.0	N.D.
208-1490	S-1, MW-5	5.0	N.D.
208-1494	METALS DUP	5.0	N.D.
208-1495	S-2, MW-6 8/26/92	5.0	N.D.
208-1496	S-1, MW-7 8/26/92	5.0	63
208-1497	S-1, MW-9 8/26/92	5.0	8.4
BLK091492	Method Blank	0.10 mg/L	N.D.

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Analytes reported as N.D. were not present above the stated limit of detection.

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Hart Crowser, Anchorage
2550 Denali Street, #705
Anchorage, AK 99503
Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
Analysis Method: EPA 6010
Analysis for: Arsenic
First Sample #: 208-1485
Matrix: Soil

Sampled: Aug 27, 1992
Received: Aug 31, 1992
Digested: Sep 14, 1992
Analyzed: Sep 15, 1992
Reported: Sep 17, 1992

METALS ANALYSIS FOR: Arsenic

Sample Number	Sample Description	Detection Limit mg/kg (ppm)	Sample Result mg/kg (ppm)
208-1485	S-1, MW-8 8/26/92	10	N.D.
208-1487	S-1, MW-3	10	N.D.
208-1489	S-2, MW-4	10	N.D.
208-1490	S-1, MW-5	10	N.D.
208-1494	METALS DUP	10	N.D.
208-1495	S-2, MW-6 8/26/92	10	N.D.
208-1496	S-1, MW-7 8/26/92	10	N.D.
208-1497	S-1, MW-9 8/26/92	10	N.D.
BLK091492	Method Blank	0.020 mg/L	N.D.

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Analytes reported as N.D. were not present above the stated limit of detection.

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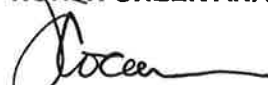
Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC #1, A-8297 Analysis Method: EPA 6010 Analysis for: Chromium First Sample #: 208-1485 Matrix: Soil	Sampled: Aug 27, 1992 Received: Aug 31, 1992 Digested: Sep 14, 1992 Analyzed: Sep 15, 1992 Reported: Sep 17, 1992
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METALS ANALYSIS FOR: Chromium

Sample Number	Sample Description	Detection Limit mg/kg (ppm)	Sample Result mg/kg (ppm)
208-1485	S-1, MW-8 8/26/92	2.0	13
208-1487	S-1, MW-3	2.0	23
208-1489	S-2, MW-4	2.0	19
208-1490	S-1, MW-5	2.0	17
208-1494	METALS DUP	2.0	21
208-1495	S-2, MW-6 8/26/92	2.0	17
208-1496	S-1, MW-7 8/26/92	2.0	23
208-1497	S-1, MW-9 8/26/92	2.0	20
BLK091492	Method Blank	0.025 mg/L	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

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Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Soil, S-2, MW-4
 Analysis Method: EPA 8080
 Sample Number: 208-1489

Sampled: Aug 27, 1992
 Received: Aug 31, 1992
 Extracted: Sep 3, 1992
 Analyzed: Sep 7, 1992
 Reported: Sep 17, 1992

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
PCB 1016.....	0.05	N.D.
PCB 1221.....	0.05	N.D.
PCB 1232.....	0.05	N.D.
PCB 1242.....	0.05	N.D.
PCB 1248.....	0.05	N.D.
PCB 1254.....	0.05	N.D.
PCB 1260.....	0.05	N.D.

Tetrachloro-m-xylene Surrogate Recovery, %: 57
 Analytes reported as N.D. were not present above the stated limit of detection.

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 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Soil, PCB DUP
 Analysis Method: EPA 8080
 Sample Number: 208-1493

Sampled: Aug 27, 1992
 Received: Aug 31, 1992
 Extracted: Sep 3, 1992
 Analyzed: Sep 8, 1992
 Reported: Sep 17, 1992

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
PCB 1016.....	0.05	N.D.
PCB 1221.....	0.05	N.D.
PCB 1232.....	0.05	N.D.
PCB 1242.....	0.05	N.D.
PCB 1248.....	0.05	N.D.
PCB 1254.....	0.05	N.D.
PCB 1260.....	0.05	N.D.

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Tetrachloro-m-xylene Surrogate Recovery, %: 62

Analytes reported as N.D. were not present above the stated limit of detection.

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 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Soil, S-1, MW-7
 Analysis Method: EPA 8080
 Sample Number: 208-1496

Sampled: Aug 27, 1992
 Received: Aug 31, 1992
 Extracted: Sep 3, 1992
 Analyzed: Sep 8, 1992
 Reported: Sep 17, 1992

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
PCB 1016.....	0.05	N.D.
PCB 1221.....	0.05	N.D.
PCB 1232.....	0.05	N.D.
PCB 1242.....	0.05	N.D.
PCB 1248.....	0.05	N.D.
PCB 1254.....	0.05	N.D.
PCB 1260.....	0.05	N.D.

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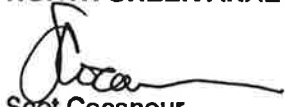
SEP 30 1992

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Tetrachloro-m-xylene Surrogate Recovery, %: 67

Analytes reported as N.D. were not present above the stated limit of detection.

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 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Soil, S-1, MW-9
 Analysis Method: EPA 8080
 Sample Number: 208-1497

Sampled: Aug 27, 1992
 Received: Aug 31, 1992
 Extracted: Sep 3, 1992
 Analyzed: Sep 8, 1992
 Reported: Sep 17, 1992

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
PCB 1016.....	0.05	N.D.
PCB 1221.....	0.05	N.D.
PCB 1232.....	0.05	N.D.
PCB 1242.....	0.05	N.D.
PCB 1248.....	0.05	N.D.
PCB 1254.....	0.05	N.D.
PCB 1260.....	0.05	N.D.

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Tetrachloro-m-xylene Surrogate Recovery, %: 70
 Analytes reported as N.D. were not present above the stated limit of detection.

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 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Sample Descript: Method Blank
 Analysis Method: EPA 8080
 Sample Number: BLK090392

Extracted: Sep 3, 1992
 Analyzed: Sep 7, 1992
 Reported: Sep 17, 1992

POLYCHLORINATED BIPHENYLS (EPA 8080)

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
PCB 1016.....	0.05	N.D.
PCB 1221.....	0.05	N.D.
PCB 1232.....	0.05	N.D.
PCB 1242.....	0.05	N.D.
PCB 1248.....	0.05	N.D.
PCB 1254.....	0.05	N.D.
PCB 1260.....	0.05	N.D.

Tetrachloro-m-xylene Surrogate Recovery, %: 129
 Analytes reported as N.D. were not present above the stated limit of detection.

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 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Matrix Descript: Soil
 Analysis Method: EPA 3550/8100
 First Sample #: 208-1483

Sampled: Aug 26, 1992
 Received: Aug 31, 1992
 Extracted: Sep 3, 1992
 Analyzed: Sep 8-13, 1992
 Reported: Sep 17, 1992

TOTAL PETROLEUM HYDROCARBONS (ALASKA TPH-D)

Sample Number	Sample Description	Extractable Hydrocarbons mg/kg (ppm)	Surrogate Recovery %
208-1483	S-1, SB-1	52	89
208-1484	S-1, SB-2	93 D-3	93
208-1486	S-2, MW-8	100	124
208-1495	S-2, MW-6	13 D-3	94
208-1496	S-1, MW-7	550 D-3	108
208-1498	S-4, MW-9	22 D-3	87
BLK090392	Method Blank	N.D.	83

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Detection Limits:

4.0

Extractable Hydrocarbons are quantitated as diesel range organics (nC10 - nC28). Surrogate recovery reported is for 2-Fluorobiphenyl. Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL inc


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Matrix Descript: Soil
 Analysis Method: EPA 3550/8100
 First Sample #: 208-1488

Sampled: Aug 27, 1992
 Received: Aug 31, 1992
 Extracted: Sep 3, 1992
 Analyzed: Sep 8-13, 1992
 Reported: Sep 17, 1992

TOTAL PETROLEUM HYDROCARBONS (ALASKA TPH-D)

Sample Number	Sample Description	Extractable Hydrocarbons mg/kg (ppm)	Surrogate Recovery %
208-1488	S-4, MW-3	330	114
208-1489	S-2, MW-4	6,900	83
208-1491	S-2, MWj-5	380	115
208-1492	DUP #2	870	123
BLK090392	Method Blank	N.D.	83

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Detection Limits:

4.0

Extractable Hydrocarbons are quantitated as diesel range organics (nC10 - nC28). Surrogate recovery reported is for 2-Fluorobiphenyl. Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL inc


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 EPA Method: 8080
 Sample Matrix : Soil
 Units: $\mu\text{g}/\text{kg}$ (ppb)
 QC Sample #: 209-0120

Analyst: S. Kouri
 Extracted: Sep 3, 1992
 Analyzed: Sep 7, 1992
 Reported: Sep 17, 1992

QUALITY CONTROL DATA REPORT

ANALYTE

Aroclor 1260

Sample Conc.: N.D.
 Spike Conc. Added: 67
 Conc. Matrix Spike: 46
 Matrix Spike % Recovery: 69
 Conc. Matrix Spike Dup.: 57
 Matrix Spike Duplicate % Recovery: 85
 Upper Control Limit %: 120
 Lower Control Limit %: 60
 Relative % Difference: 21
 Maximum RPD: 50

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% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 EPA Method: 5030/8020
 Sample Matrix: Soil
 Units: mg/kg (ppm)
 QC Sample #: 209-0445

Analyst: R. Lister
 K. Wilke
 Analyzed: Sep 10, 1992
 Reported: Sep 17, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Conc.:	N.D.	0.013	N.D.	N.D.
Spike Conc. Added:	0.50	0.50	0.50	0.50
Conc. Matrix Spike:	0.42	0.43	0.48	0.44
Matrix Spike % Recovery:	84	83	96	88
Conc. Matrix Spike Dup.:	0.43	0.45	0.51	0.48
Matrix Spike Duplicate % Recovery:	86	87	102	96
Upper Control Limit %:	93	96	117	109
Lower Control Limit %:	57	58	69	63
Relative % Difference:	2.4	4.6	6.1	8.7
Maximum RPD:	8.6	9.6	8.8	9.5

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 Laboratory Director

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 EPA Method: 8010
 Sample Matrix : Soil
 Units: $\mu\text{g}/\text{kg}$ (ppb)
 QC Sample #: 208-1496

Analyst: R. Lister
 Analyzed: Sep 9, 1992
 Reported: Sep 17, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	1,1-DCE	TCE	Chloro-Benzene
Sample Conc.:	N.D.	N.D.	N.D.
Spike Conc. Added:	2,000	2,000	2,000
Conc. Matrix Spike:	1,090	1,290	1,510
Matrix Spike % Recovery:	55	65	76
Conc. Matrix Spike Dup.:	1,030	1,220	1,450
Matrix Spike Duplicate % Recovery:	52	61	73
Upper Control Limit %:	94	106	111
Lower Control Limit %:	34	50	60
Relative % Difference:	5.6	6.3	4.0
Maximum RPD:	23	17	16

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 Laboratory Director

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 Lab Control Sample: Water
 Units: mg/L (ppm)
 Sample Matrix: Soil
 Units: mg/kg (ppm)

Analyst: D. Vandel
 Digested: Sep 15, 1992
 Reported: Sep 17, 1992

INORGANIC QUALITY CONTROL DATA REPORT

ANALYTE	As	Cr	Pb
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EPA Method:	6010	6010	6010
Date Analyzed:	Sep 15, 1992	Sep 15, 1992	Sep 15, 1992

ACCURACY ASSESSMENT

LCS Spike Conc. Added:	0.50	0.50	0.50
LCS Spike Result:	0.41	0.44	0.40
LCS Spike % Recovery:	82	88	80
Upper Control Limit:	105	102	109
Lower Control Limit:	58	75	68
Matrix Spike Sample #:	209-0187	209-0187	209-0187
Matrix Spike % Recovery:	68	72	66

PRECISION ASSESSMENT

Sample #:	209-0187	209-0187	209-0187
Original:	N.D.	7.1	5.6
Duplicate:	N.D.	7.3	6.8
Relative % Difference:	0	2.8	

Relative Percent Difference values are not reported at sample concentration levels less than ten (10) times the Detection Limit.

NORTH CREEK ANALYTICAL inc

Tod Becherer

Tod Becherer
 Project Manager

Lab Control Sample	Conc. of L.C.S.	x 100
% Recovery:	L.C.S. Spike Conc. Added	
Relative % Difference:	$\frac{\text{Original Result} - \text{Duplicate Result}}{(\text{Original Result} + \text{Duplicate Result}) / 2}$	x 100

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC #1, A-8297
 EPA Method: 3550/8100
 Sample Matrix : Soil
 Units: mg/kg (ppm)
 QC Sample #: BLK090392

Analyst: L. Dutton
 Extracted: Sep 3, 1992
 Analyzed: Sep 8, 1992
 Reported: Sep 17, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Diesel Fuel
----------------	-------------

Sample Conc.: N.D.

Spike Conc. Added: 67

Conc. Matrix Spike: 75

Matrix Spike % Recovery: 112

Conc. Matrix Spike Dup.: 77

Matrix Spike Duplicate % Recovery: 115

Upper Control Limit %: 115

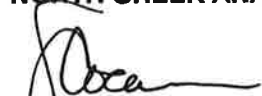
Lower Control Limit %: 78

Relative % Difference: 2.6

Maximum RPD: 17

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 Scot Cocanour
 Laboratory Director

% Recovery:	$\frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$



Hart Crowser, Inc.
2550 Denali Street
Suite 705
Anchorage, Alaska 99503
907.276.7475

HARTCROWSER

PAGE 1 OF 2

DATE Aug 28

Sample Custody Record

JOB NUMBER <u>A-8297</u> LAB NUMBER _____		PROJECT MANAGER <u>Tim McDougall</u>		PROJECT NAME <u>AFSC Plant No. 1</u>		SAMPLED BY: <u>DEBI GEYER</u>	
LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING		OBSERVATIONS / COMMENTS / COMPOSITING INSTRUCTIONS
	S-1	1400	SB-1	Soil	VPH/BTEX 8020	PCB 8060	
	S-1	1440	SB-2	↓	EDL 8100	PCB 8060	2 2-4oz 8/26
	S-1	1105	MW-8		X		1-8oz 8/26
	S-2	1120	MW-B		X		2 2-4oz 8/26
	S-1	1140	MW-3		X		1-8oz 8/27
	S-4	1210	MW-3		X		2 2-4oz 8/27
	S-2	1320	MW-4		X		3 2-4oz 1-8oz 8/27
	S-1	900	MW-5		X		1-8oz 8/27
	S-2	910	MW-5		X		2 2-4oz 8/27
	--	--	DUP #2				2 2-4oz VPH/BTEX EPA & HVO Duplicate
	--	--	PCB Dup				1-8oz PCB Duplicate
	--	--	Metals Dup			1-8oz Duplicate Metals	
RELINQUISHED BY					DATE	RECEIVED BY	DATE
SIGNATURE <u>Tim McDougall</u>					DATE <u>8/28</u>		
PRINTED NAME <u>Tim McDougall</u>					TIME		
COMPANY <u>Hart Crowser</u>					10:00		
RELINQUISHED BY					DATE	RECEIVED BY	DATE
SIGNATURE							
PRINTED NAME					TIME		
COMPANY							
TOTAL NUMBER OF CONTAINERS					20		
METHOD OF SHIPMENT					AIRBORNE		
SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS					Use ALASKA ADEC Methods for VPH & EPH		
Analyze Metals for Arsenic, Chromium, and Lead							
DISTRIBUTION:					1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY		
					2. RETURN PINK COPY TO PROJECT MANAGER		
					3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT		
					4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER		

SEP 25 1992

18939 120th Avenue N.E., Suite 101 • Bothell, WA 98011-2569

Phone (206) 481-9200 • FAX (206) 485-2992

HART CROWSER, INC.

Hart Crowser, Anchorage
2550 Denali Street, #705
Anchorage, AK 99503
Attention: Tim McDougall

Client Project ID: AFSC Plant #1, A-8297
Matrix Descript: Water
Analysis Method: EPA 5030/8015/8020
First Sample #: 209-0354

Sampled: Sep 2, 1992
Received: Sep 4, 1992
Analyzed: Sep 15, 1992
Reported: Sep 18, 1992

TOTAL PETROLEUM HYDROCARBONS with BTEX DISTINCTION (ALASKA TPH-G/BTEX)

Sample Number	Sample Description	Volatile Hydrocarbons	Benzene	Toluene	Ethyl Benzene	Xylenes	Surrogate Recovery
		µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	%
209-0354	MW-1	180	1.2	N.D.	2.5	2.3	114
209-0355	MW-2	2,100	4.1	4.6	50	320	126
209-0356	MW-3	8,400	20	11	240	1,800	134
209-0357	MW-4	13,000	140	78	350	2,300	127
209-0358	MW-5	220 G-2	N.D.	N.D.	N.D.	N.D.	118
209-0359	MW-6	150	0.89	0.68	5.6	1.6	98
209-0360	MW-7	N.D.	N.D.	N.D.	N.D.	N.D.	102
209-0361	MW-8	N.D.	N.D.	N.D.	N.D.	N.D.	87
209-0362	MW-9	N.D.	1.3	1.0	N.D.	2.4	102
209-0363	WP-5	N.D.	N.D.	N.D.	N.D.	N.D.	87

Detection Limits:

50.0 0.5 0.5 0.5 0.5

Volatile Hydrocarbons are quantitated as gasoline range organics (nC6 - nC10). Surrogate recovery reported is for Bromofluorobenzene. Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL inc


Scot Cocanour
Laboratory Director

Please Note:

The detection limit for Toluene in #209-0354 = 0.80 µg/L.
The detection limit for Benzene, Toluene, Ethyl Benzene & Xylenes in #209-0358 = 2.0 µg/L.
The detection limit for Benzene, Toluene, Ethyl Benzene & Xylenes in #209-0360 = 0.80 µg/L.

Hart Crowser, Anchorage 2550 Denali Street, #705 Anchorage, AK 99503 Attention: Tim McDougall	Client Project ID: AFSC Plant #1, A-8297 Matrix Descript: Water Analysis Method: EPA 5030/8015/8020 First Sample #: 209-0364	Sampled: Sep 2, 1992 Received: Sep 4, 1992 Analyzed: Sep 15, 1992 Reported: Sep 18, 1992
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TOTAL PETROLEUM HYDROCARBONS with BTEX DISTINCTION (ALASKA TPH-G/BTEX)

Sample Number	Sample Description	Volatile Hydrocarbons	Benzene	Toluene	Ethyl Benzene	Xylenes	Surrogate Recovery
		$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	$\mu\text{g/L}$ (ppb)	%
209-0364	Trip Blank	N.D.	N.D.	N.D.	N.D.	N.D.	96
209-0365	Rinsate	N.D.	N.D.	N.D.	N.D.	N.D.	94
209-0366	Duplicate	20,000	130	62	350	2,100	100
BLK091592	Method Blank	N.D.	N.D.	N.D.	N.D.	N.D.	87

Detection Limits:	50	0.50	0.50	0.50	0.50
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Volatile Hydrocarbons are quantitated as gasoline range organics (nC6 - nC10). Surrogate recovery reported is for Bromofluorobenzene. Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL inc


 Scot Cocanour
 Laboratory Director

Please Note:

The detection limit for Toluene in #209-0354 = 0.80 $\mu\text{g/L}$.
 The detection limit for Benzene, Toluene, Ethyl Benzene & Xylenes in #209-0358 = 2.0 $\mu\text{g/L}$.
 The detection limit for Benzene, Toluene, Ethyl Benzene & Xylenes in #209-0360 = 0.80 $\mu\text{g/L}$.

HYDROCARBON ANALYSES FOOTNOTES

(8/92)

Code Description

VOLATILE HYDROCARBONS - Gasoline Range Organics

- G 1 This sample appears to contain extractable diesel range organics.
- G 2 The chromatogram for this sample is not a typical gasoline fingerprint.
- G 3 The total hydrocarbon result in this sample is primarily due to a peak(s) eluting in the volatile hydrocarbon range. Identification and quantitation by EPA 8010, 8021 or 8240 is recommended.

EXTRACTABLE HYDROCARBONS - Diesel Range Organics

- D 1 This sample appears to contain volatile gasoline range organics.
- D 2 The hydrocarbons present in this sample are primarily due to very heavy, non-resolvable oil range organics. Quantitation by EPA 418.1 is recommended.
- D 3 The hydrocarbons present in this sample are a complex mixture of extractable diesel range and non-resolvable motor oil or other heavy oil range organics.
- D 4 The hydrocarbon result shown is an estimated (greater than) value due to high concentration. Reanalysis is being performed to yield a quantitative result.

Oils & Lubricants

[-----]
T.R.P.H. (418.1)

Diesel & Fuel Oils

[-----]
Extractables (3550/8015)

Gasoline

[-----]
Volatiles (5030/8015)

HYDROCARBON BOILING POINT RANGE

LOW LOW TO MEDIUM MEDIUM MEDIUM TO HIGH VERY HIGH

CARBON RANGE:

5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 +

Hart Crowser, Anchorage
2550 Denali Street, #705
Anchorage, AK 99503
Attention: Tim McDougall

Client Project ID: AFSC Plant #1, A-8297
Matrix Descript: Water
Analysis Method: EPA 3510/8100
First Sample #: 209-0355

Sampled: Sep 2, 1992
Received: Sep 4, 1992
Extracted: Sep 9, 1992
Analyzed: Sep 12, 1992
Reported: Sep 18, 1992

TOTAL PETROLEUM HYDROCARBONS (ALASKA TPH-D)

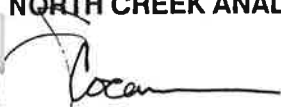
Sample Number	Sample Description	Extractable Hydrocarbons mg/L (ppm)	Surrogate Recovery %
209-0355	MW-2	66	86
209-0356	MW-3	27	86
209-0358	MW-5	35	136
209-0363	WP-5	2.5	98
BLK090992	Method Blank	N.D.	72

Detection Limits:

0.10

Extractable Hydrocarbons are quantitated as diesel range organics (nC10 - nC28). Surrogate recovery reported is for 2-Fluorobiphenyl. Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL inc


Scot Cocanour
Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC Plant #1, A-8297
 Matrix Descript: Water
 Analysis Method: EPA 3510/8100
 First Sample #: 209-0354

Sampled: Sep 2, 1992
 Received: Sep 4, 1992
 Extracted: Sep 9, 1992
 Analyzed: Sep 12, 1992
 Reported: Sep 18, 1992

TOTAL PETROLEUM HYDROCARBONS (ALASKA TPH-D)

Sample Number	Sample Description	Extractable Hydrocarbons mg/L (ppm)	Surrogate Recovery %
209-0354	MW-1	0.86	80
209-0357	MW-4	110	66
209-0359	MW-6	8.6 D-1	107
209-0360	MW-7	1.4 D-3	118
209-0361	MW-8	1.5	109
209-0362	MW-9	1.0	81
209-0365	Rinsate	N.D.	95
209-0366	Duplicate	49	85
BLK090992	Method Blank	N.D.	72

Detection Limits:

0.10

Extractable Hydrocarbons are quantitated as diesel range organics (nC10 - nC28). Surrogate recovery reported is for 2-Fluorobiphenyl. Analytes reported as N.D. were not present above the stated limit of detection.

NORTH CREEK ANALYTICAL inc


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC Plant #1, A-8297
 EPA Method: 5030/8020
 Sample Matrix: Water
 Units: $\mu\text{g/L}$ (ppb)
 QC Sample #: 209-0364

Analyst: R. Lister
 S. Stowell
 Analyzed: Sep 15, 1992
 Reported: Sep 18, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Ethyl			
	Benzene	Toluene	Benzene	Xylenes
Sample Conc.:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	5.0	5.0	5.0	15.0
Conc. Matrix Spike:	5.2	5.0	5.2	16.2
Matrix Spike % Recovery:	104%	100%	104%	108%
Conc. Matrix Spike Dup.:	4.8	5.0	5.0	15.4
Matrix Spike Duplicate % Recovery:	96%	100%	100%	103%
Upper Control Limit %:	112	105	109	108
Lower Control Limit %:	85	74	87	79
Relative % Difference:	8%	0%	4%	5%
Maximum RPD:	9.9	17	13	17

NORTH CREEK ANALYTICAL inc

$$\% \text{ Recovery} = \frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference} = \frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$$


 Scot Cocanour
 Laboratory Director

Hart Crowser, Anchorage
 2550 Denali Street, #705
 Anchorage, AK 99503
 Attention: Tim McDougall

Client Project ID: AFSC Plant #1, A-8297
 EPA Method: 3510 /8100
 Sample Matrix : Water
 Units: mg/L (ppm)
 QC Sample #: BLK090992

Analyst: L. Dutton
 Extracted: Sep 9, 1992
 Analyzed: Sep 12, 1992
 Reported: Sep 18, 1992

QUALITY CONTROL DATA REPORT

ANALYTE	Diesel Fuel
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Sample Conc.: N.D.

Spike Conc. Added: 2.0

Conc. Matrix Spike: 1.8

Matrix Spike % Recovery: 90%

Conc. Matrix Spike Dup.: 2.0

Matrix Spike Duplicate % Recovery: 100%

Upper Control Limit %: 119

Lower Control Limit %: 49

Relative % Difference: 11%

Maximum RPD: 22

NORTH CREEK ANALYTICAL inc

$$\% \text{ Recovery: } \frac{\text{Conc. of M.S.} - \text{Conc. of Sample}}{\text{Spike Conc. Added}} \times 100$$

$$\text{Relative \% Difference: } \frac{\text{Conc. of M.S.} - \text{Conc. of M.S.D.}}{(\text{Conc. of M.S.} + \text{Conc. of M.S.D.}) / 2} \times 100$$

Tom Becherer
 Scot Cocanour (fa)
 Laboratory Director



Hart Crowser, Inc.
2550 Denali Street
Suite 705
Anchorage, Alaska 99503
907.276.7475

HART CROWSER

PAGE 1 OF 1

DATE 9/3/92

Sample Custody Record

JOB NUMBER <u>A-8297</u> LAB NUMBER _____		OBSERVATIONS / COMMENTS / COMPOSING INSTRUCTIONS	
PROJECT MANAGER <u>Tim McDougall</u>		NO. OF CONTAINERS 2 3 3 2 3 2 2 2 2 3 2 2	
PROJECT NAME <u>AFSC Plant No. 1</u>			
<u>Butler Aviation</u>			
SAMPLED BY: <u>Debi Geyer</u>			
SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS <u>This cooler is one of 2 coolers for this job number (water samples).</u>			
DISTRIBUTION: 1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY 2. RETURN PINK COPY TO PROJECT MANAGER 3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT 4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER			
METHOD OF SHIPMENT <u>ARRBORNE</u>			
TOTAL NUMBER OF CONTAINERS <u>30</u>			
SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS			
DISTRIBUTION			

LAB NO.	SAMPLE	TIME	STATION	MATRIX	DATE	RECEIVED BY
2090354		1440	MW-1	Water	9/3/92	<u>Debi Geyer</u>
2090355		1520	MW-2		9/3/92 TIME 9:00	<u>Debi Geyer</u> PRINTED NAME DEBI J. GEYER COMPANY HART CROWSER
2090356		1340	MW-3			
2090357		1310	MW-4			
2090358		1230	MW-5			
2090359		1100	MW-6			
2090360		8:25	MW-7			
2090361		9:25	MW-8			
2090362		1200	MW-9			
2090363		11:30	WP-5			
2090364		---	TRIP BLANK			
2090365		---	Rinsed			
2090366		---	Duplicate		---	---

RELINQUISHED BY	DATE	RECEIVED BY	DATE
<u>Debi Geyer</u>	9/3/92	<u>Debi Geyer</u>	9/3/92
SIGNATURE	TIME	SIGNATURE	TIME
<u>Debi Geyer</u>	9:00	<u>Debi Geyer</u>	9:05
PRINTED NAME	DATE	PRINTED NAME	DATE
<u>HART CROWSER</u>		<u>Debi Geyer</u>	
COMPANY		COMPANY	
SIGNATURE	TIME	SIGNATURE	TIME
PRINTED NAME	DATE	PRINTED NAME	DATE
COMPANY		COMPANY	

Hart Crowser
A-8297-00

APPENDIX C
SURVEY INFORMATION

DOWL
ENGINEERS
A Division of DOWL, Incorporated

September 16, 1992
W.O. D54457

Mr. Tim McDougal
Hart Crowser, Inc.
2550 Denali Street, Suite 705
Anchorage, Alaska 99503

Subject: Anchorage Fueling Services, Plant #1

Dear Mr. McDougal:

Attached are coordinates and elevations for the points you requested at Butler Aviation Tank Farm. We were unable to locate the two well points shown on the sketch you supplied. Let me know if this is a problem.

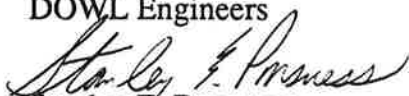
Coordinates are Alaska State Plane, Zone 4 based on monumentation on the dock at the Port of Anchorage. The monuments used are named "N. End" and "S. End."

Elevations are based on bench mark "Tidal 16" also located at the Port. This bench mark is published in the Municipality of Anchorage Vertical Control Manual. The datum is NGS 1972 adjust, (MSL = 0.00 feet).

Fence corners are listed in a clockwise direction beginning at the northwest corner of the site.

Thank you for the opportunity to assist you on this project, Tim. I trust this provides you with the information you need. Please call if you have any questions.

Sincerely,
DOWL Engineers


Stanley E. Ponsness
Chief of Surveys

SEP:np

Attachment: Coordinates/elevation chart

RECEIVED
SEP 18 1992
HART CROWSER, INC.

ANCHORAGE FUELING SERVICE, PLANT #1

Point	North	East	Elevation
N. End	2,646,896.47	520,554.84	-
S. End	2,644,542.44	519,698.00	-
BM Tidal 16	-	-	23.23
Fence Corner	2,643,558.36	520,356.57	-
Fence Corner	2,643,559.66	521,169.14	-
Fence Corner	2,643,306.84	521,166.00	-
Fence Corner	2,643,304.93	520,950.34	-
Fence Corner	2,643,059.03	520,949.83	-
Fence Corner	2,643,018.88	520,220.88	-
			* **
MW # 1	2,643,362.53	520,371.48	18.77 & 21.21
MW # 2	2,643,525.59	520,413.73	18.90 & 21.35
MW # 3	2,643,541.63	520,359.95	18.41 & 20.11
MW # 4	2,643,191.36	520,318.06	19.99 & 19.59
MW # 5	2,643,299.51	520,545.30	19.42 & 21.27
MW # 6	2,643,484.36	520,731.77	18.77 & 20.51
MW # 7	2,643,307.26	520,926.96	18.50 & 20.33
MW # 8	2,643,404.04	521,134.05	18.56 & 20.42
MW # 9	2,643,031.12	520,730.16	18.41 & 20.32
SB # 1	2,643,268.36	520,875.08	18.68
SB # 2	2,643,225.86	520,876.27	18.28
			* **
WP#1	2,643,020.62	520,278.79	19.28 & 20.13
WP#5	2,643,069.34	520,783.08	20.18

* Ground Surface Elevation

** Measure Point Elevations