

MarkAir Fairbanks Monitoring Well Report

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MarkAir Fairbanks Monitoring Well Report

Introduction

This report presents a summary of the monitoring well installations and the first round of water sample results. This environmental sampling work was performed on Block 1, Lot 6 and Block 10, Lots 6, 7, and 13 at the Fairbanks International Airport (FAI). These activities were carried out in accordance with EMI's approved Quality Assurance Program Plan (QAPP), ADEC document "Recommended Practices for Monitoring Well Design, Installation, and Decommissioning, dated January 1991", our understanding of the Airport Land Users Group objectives, and available budget .

This phase of work was performed as a further action to the site as discussed in Environmental Management, Inc. (EMI) Phase 2 - Site Assessment Report in Volume 1 under Section 6.0 Recommendations For Further Action, subsection 6.3 Evaluation and Remediation of Groundwater. The monitoring wells will be used to determine the hydraulic gradient at each site and to monitor the contaminant migration on and off the sites.

EMI was on-site to make observations of the monitoring well installation, survey of the monitoring wells, and to collect soil and water samples. Monitoring well installations were conducted by Ambler Exploration. Water sample analyses were conducted by Superior Precision Analytical, Analytica Alaska, and Commercial Testing and Engineering, Co. Geotechnical soil laboratory tests were conducted by EBA Engineering.

Background and Site History

In August of 1991, MarkAir contracted Tanknology Corporation International to perform tank tightness tests on twelve (12) of their existing seventeen (17) underground

storage tanks (UST). Of the twelve tanks tested, four tanks failed to pass the test. The tank tightness test failures, the existence of known contamination and the fact that fifteen of the seventeen tanks were fourteen years old or older, lead to MarkAir's decision to have all seventeen tanks removed from the ground.

In February of 1992, MarkAir solicited proposals for the following actions:

1. Removal of seventeen USTs;
2. Removal and assessment of associated soil;
3. The installation of three heating oil tanks and;
4. The installation of one dual tank for unleaded gasoline and diesel.

EMI submitted a proposal on March 23, 1992. EMI was awarded the contract on July 23, 1992 after arranging for two amendments to the original scope of work. Through contractual agreements between MarkAir and the Alaska Industrial Development and Export Authority (AIDEA) and through contractual agreement between MarkAir and EMI, work began on the site in mid August 1992.

EMI completed the Phase 1 Site Assessment on August 26, 1992 and subsequently, submitted the report to MarkAir. The UST removal and associated activities began on August 18, 1992 and continued through November 4, 1992.

On June 16, 1993, MarkAir contracted EMI to proceed with the Release Investigation/Monitoring Well Installation and Groundwater Sampling at the MarkAir facilities located in Fairbanks, Alaska. This report entails the tasks and findings from this phase of work.

Summary of Findings

The following is a summary of findings. Please consult the main body of the report and attachments for supporting information.

•From the elevation survey of the wells, the hydraulic gradient seems to be flowing in the southwestern direction. The stationing and elevation of each

monitoring well is listed in Table #1 in Attachment C. Figures A-2 and A-3, in Attachment A, show the placement, water level elevation, and groundwater flow direction.

•Geotechnical tests were performed to determine the soil's moisture content, relative density, classification, and hydraulic conductivity. The moisture contents were used to determine the saturation of the soils tested. The moisture content is required to determine the dry density in laboratory tests. The field density tests were conducted by the use of a free falling weight connected to the soil sampler. The number of "blows" to penetrate the soil were counted and used to determine the relative densities of the soil. The top 5 ft. seemed to be loosely compacted. Beneath the 5 ft. depth, the soil densities varied between a medium to dense compaction type. The densities were used to determine the hydraulic conductivity of the groundwater through the soil. The hydraulic conductivity of groundwater through the soil is approximately 0.62 ft./day.

•Petroleum hydrocarbons were detected in all wells. Monitoring Wells #4 and #5 at the hanger showed the least amounts of petroleum hydrocarbons present. Monitoring Well #2 at the hanger showed the most petroleum hydrocarbons present, with both diesel range petroleum hydrocarbons and solvents present. Monitoring Wells #3 at the hanger and #1 at Weaver Brother's Building had the highest levels of Benzene. Contaminant concentrations above the maximum contaminant levels (18 AAC 80, Drinking Water Standards, March 18, 1993) are depicted on figures A-2 and A-3 in Attachment A.

Well Installation and Development

On June 21 - 24, 1993, nine monitoring wells were installed by Ambler Exploration with the use of a Mobile B-61 truck mounted drilling rig using a 3.25 inch inside diameter hollow stem auger. An EMI geotechnical engineer was on-site to collect soil samples during drilling of the wells to assess the geotechnical characteristics of the site. These soils were also field screened with the use of a Flame Ionization Detector (FID), to segregate contaminated soils from non-contaminated soils. FID readings are

listed in the Soil & Well Logs in Attachment D.

A decontamination blank was collected from the drilling equipment during installation. Decontamination blanks are a sample of analyte-free media used to rinse the drilling equipment, to determine if cross contamination is occurring during the monitoring well installations.

Monitoring well locations were based on field observations during the underground storage tank (UST) abatement and subsequent hydrological data review. Monitoring wells were constructed as follows:

Quantity	9 monitoring wells
Depth	approximately 20 ft.
Well Diameter	2 inch diameter PVC
Screened Interval	approximately 5 ft. to 20 ft.
Filter Pack	Silica Sand at approximately 4 ft. to 20 ft.
Top of Filter Pack	approximately 2 ft. of a bentonite slurry
Ground Surface Seal	The surface seals were concreted at 2 ft. below the ground surface.
Protective Caps	2 monitoring wells were constructed with 3 ft. raised caps. The remaining 7 monitoring wells were constructed with flush mounted caps.

Detailed soil boring logs and well installation logs can be found in Attachment D. Photographs of the monitoring well installations are shown in Attachment B.

On June 25, 1993 monitoring well locations and casing elevations were surveyed. The water levels were measured with a reel mounted electronic transducer. The results of this survey are depicted in the Attachment C Table #1. Then the groundwater monitoring wells were developed by bailing 10 well casing volumes of water into 55 gallons drums. *The purge water was disposed of on the stockpiled soils, on site.* hotz good idea .

Subsurface Conditions

Monitoring well installations that occurred around the Weaver Brothers Building had approximately 2 inches of an asphalt cover. The monitoring wells installed around the MarkAir hangar did not have this asphalt cover. In general the soils at the drilled sites seemed to be an alluvium type material deposited by the Chena River flood plain. The alluvium material consists of fine gravelly sand with interdispersed sandy gravel and silty layers.

The Mobile B-61 drilling rig was equipped with a 300 pound hammer to determine the relative densities of the insitu soils. Soil samples were also collected and tested in the laboratory, by EBA Engineering, for moisture content, dry density, and wet denisty. The moisture contents ranged from 6.7% to 23.9%, verifying that moisture of the soils tested were saturated. The moisture contents is also required to determine the dry density.

From the field density tests and the laboratory tests, the soil densities varied. The top 5 ft. seemed to be loosely compacted. Beneath the 5 ft. depth, the soil densities varied between a medium to dense compaction type. The densities were used to determine the hydraulic conductivity of the groundwater through the soil. The hydraulic conductivity of groundwater through the soil is approximately 0.62 ft./day. These results are listed on the Soil & Well Logs in Attachment D.

Groundwater was encountered during the drilling program. The water levels varied between 7.5 ft. and 10.5 ft. below the ground surface. Soil and Well Logs can be referenced in Attachment D.

Water Sampling

On June 30, 1993 the water level in the monitoring wells were measured. Then the monitoring wells were purged by bailing approximately 3 well casing volumes. After purging, the water level returned to its initial elevation within 2 minutes, then water samples were collected. No free product was noticed during purging or sampling of

the monitoring wells. The water samples were also tested for temperature, pH, and conductivity.

These monitoring well samples were then sent to the selected laboratory's for analysis. Monitoring well water samples were tested for Diesel Range Petroleum Hydrocarbons (EPA Method 3540/8100 Modified), Gasoline Range Petroleum Hydrocarbons (EPA Method 5030/8015 Modified), Total BTEX (EPA Method 5030/602), PCB's (EPA Method 3550/8080), and Leachable Metals (Arsenic EPA Method 3020/7060), (Cadmium EPA Method 3010/6010), (Chromium EPA Method 3010,6010), (Lead EPA Method 3020/7421) by Superior Precision Analytical, Inc. Total Range Petroleum Hydrocarbons (EPA Method 3550/418.1), by Analytica Alaska, Inc. Volatile Chlorinated Solvents (EPA Method 5030/601), by Commercial Testing and Engineering, Co. Summary results may be found in Attachment C Tables 2-4. The chain of custody and complete analytical results can be found in Attachment E.

Discussion of Findings

Petroleum hydrocarbons were detected in all wells. Monitoring Wells #4 and #5 at the hanger showed the least amounts of petroleum hydrocarbons present. Monitoring Well #2 at the hanger showed the most petroleum hydrocarbons present, with both diesel range petroleum hydrocarbons and solvents present. Monitoring Wells #3 at the hanger and #1 at Weaver Brother's Building had the highest levels of Benzene. Contaminant concentrations above the maximum contaminant levels (18 AAC 80, Drinking Water Standards, March 18, 1993) are depicted on figures A-2 and A-3 in Attachment A..

Under the Alaska Administrative Code Chapter 70 Water Quality Standards, when used in combination with the water use designation, constitutes the water quality for a particular water body. Conductivity was measured in the field to determine the total suspended solids in the groundwater. The water results for temperature, pH, and total suspended solids, are all within the most stringent requirements for drinking water criteria. These results are listed in Attachment C Table #1.

The decontamination blank from the drilling operations had trace amounts of contaminants but they are considered insignificant since they were below the maximum contaminant levels.

Data Validation

This section and the referenced attachments represent our validation of the field and laboratory quality control procedures and data from the water samples collected from the monitoring wells. The field work was conducted by Stan Dolloff of EMI. Laboratory water sample analyses were conducted by Superior Precision Analytical, Analytica Alaska, and Commercial Testing and Engineering, Co. The use of three different laboratories was needed to receive the proper bottles with the proper preservatives as required by EMI's QAPP.

Related information is located as follows:

- A complete summary listing of laboratory results are included in Table #1 -#4.
- A complete summary listing of quality assurance and quality control (QA/QC) results are included in Attachment C.
- The complete laboratory data deliverables are included in Attachment E.

All QA/QC objectives were met, except for the precision in BTEX EPA Method 8020, which was 3% from the allowable limit. Otherwise, in all cases the results were within the allowable range. Sample collection techniques were used as described in EMI's QAPP.

Recommendations

EMI recommends continuing quarterly sampling of the monitoring wells for one year, so that, contamination can be monitored for one seasonal cycle of water table fluctuations. From this monitoring the determination of plume migration can be established. Also the increase or decrease in the hydrocarbon levels can be used to determine if biodegradation is occurring naturally. Once a one year history of quantitative contamination is established on the monitoring wells, a decision in

conjunction with the ADEC can be made regarding further action.

Closure

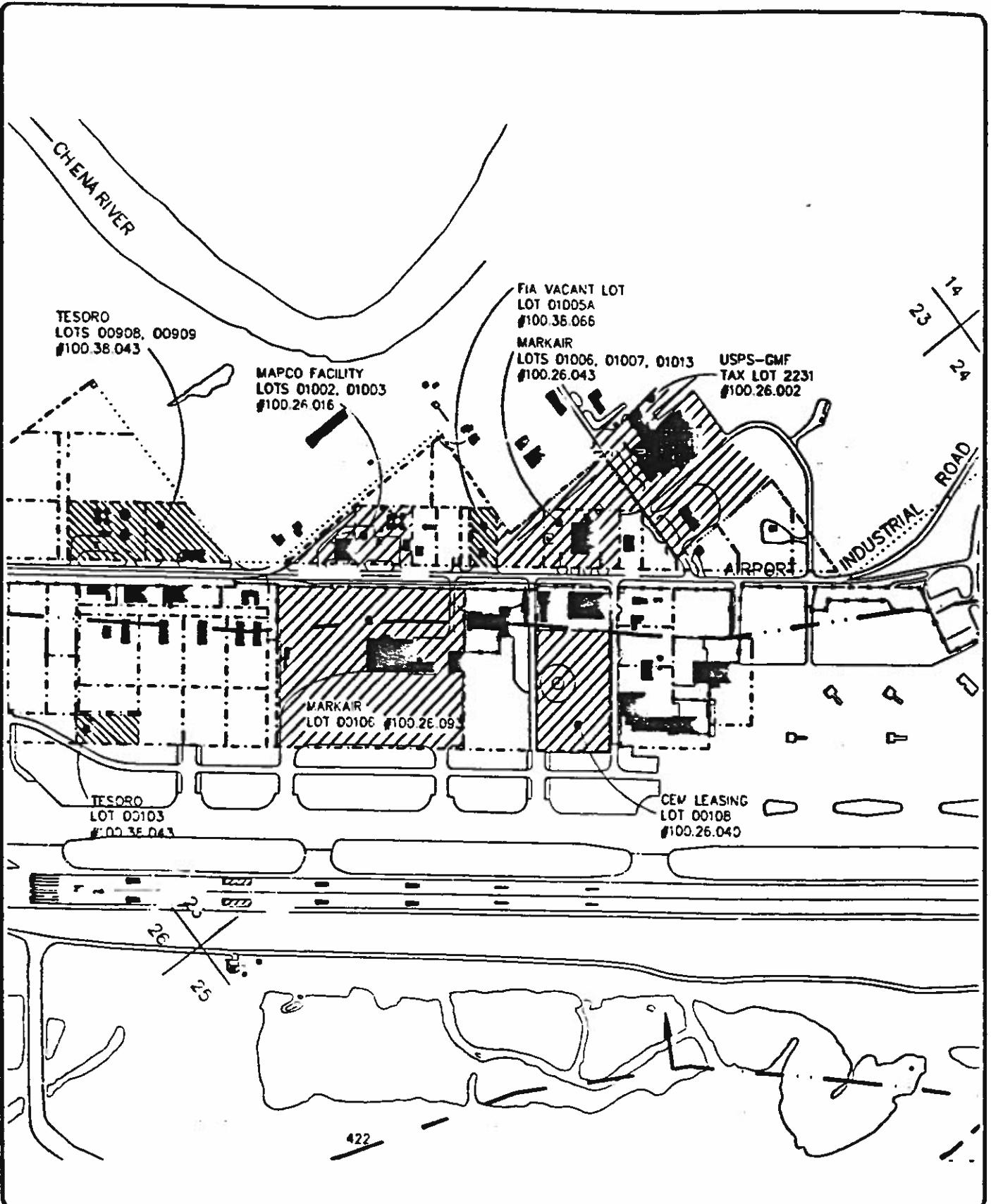
The discussion presented in this report is based on our understanding of ADEC guidelines, our investigations, our quality Assurance Program Plan, and other pertinent information referred to herein.

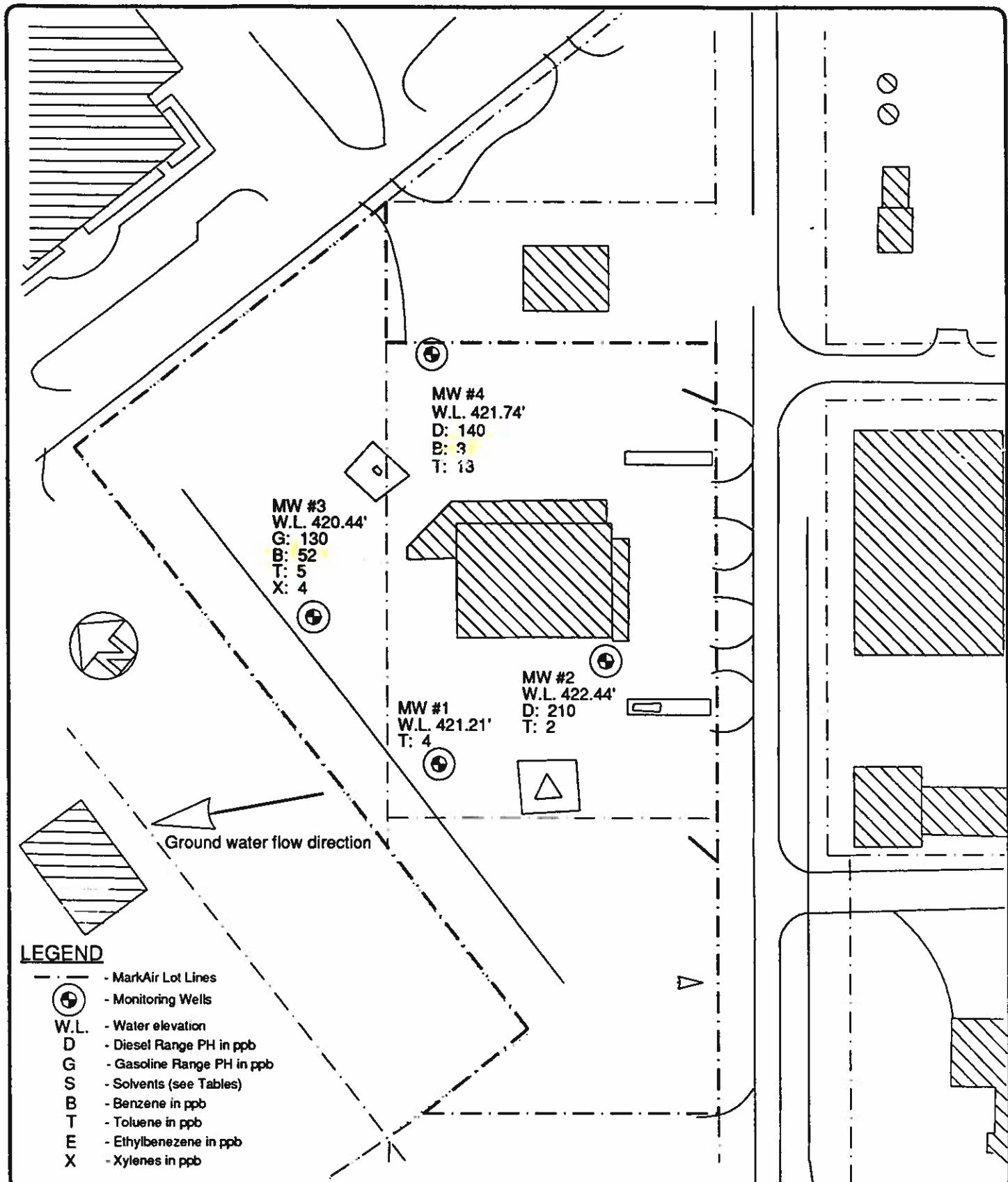
Findings representative of the site at any particular time are the result of services rendered within the scope authorized by the client. Changes due to natural processes and human activity will affect the conditions described herein.

EMI prepared these tasks in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No warranty, express or implied, beyond exercise of reasonable care and professional diligence, is made.

ATTACHMENT A

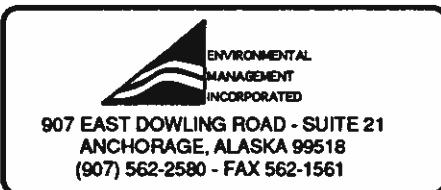
FIGURES





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REVISIONS		



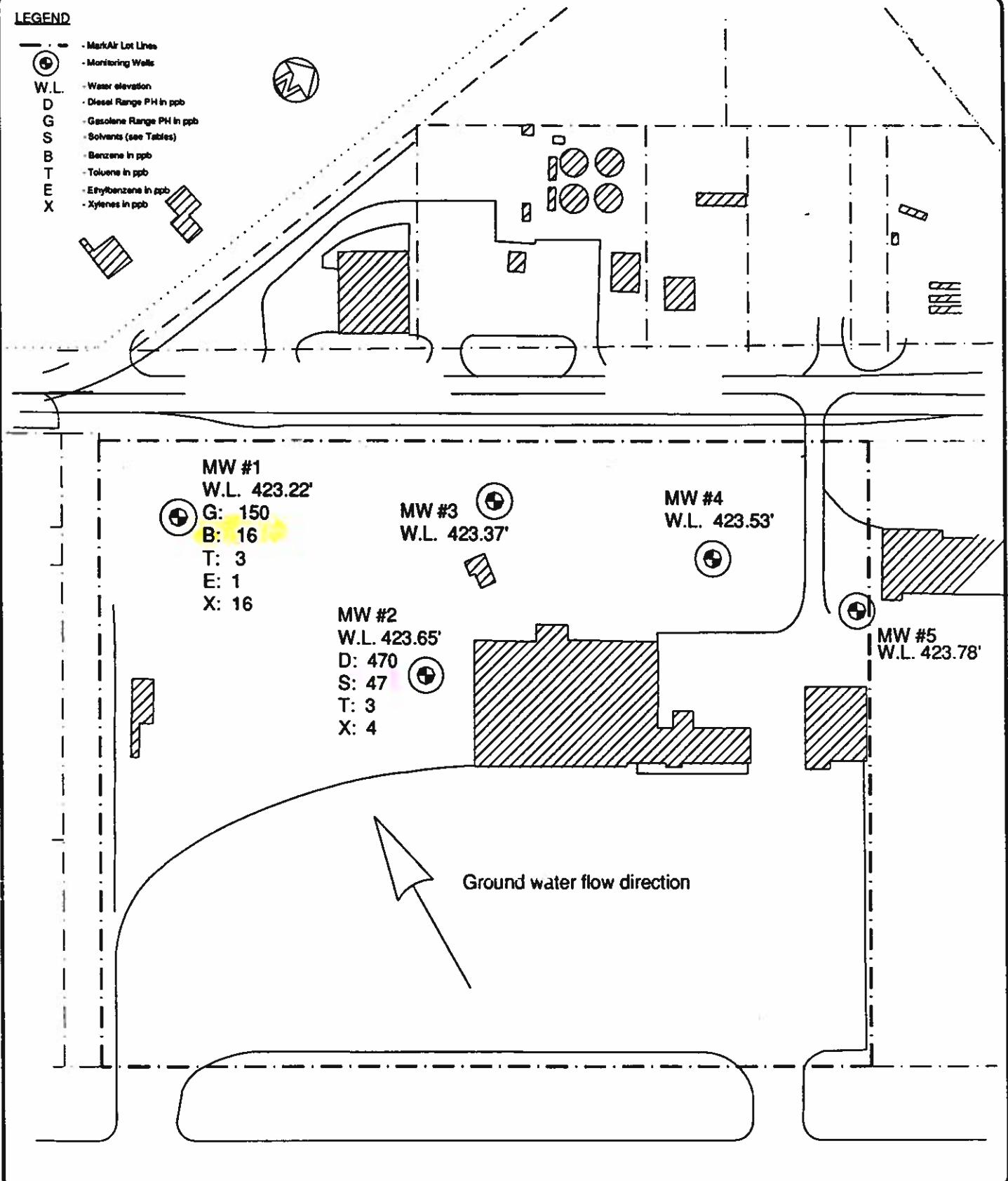
DATE SEP. 1993
EMI NO. 6179

A-2

SHEET
1 OF 1

LEGEND

- MarkAir Lot Lines
 - Monitoring Wells
 - Water elevation
 - Diesel Range PH in ppb
 - Solvents (see Tables)
 - Benzene in ppb
 - Toluene in ppb
 - Ethylbenzene in ppb
 - Xylenes in ppb
- W.L.
D
G
S
B
T
E
X



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MARKAIR FAIRBANKS FACILITY
MONITORING WELL RESULTS
JUNE 30, 1993
HANGAR/OFFICE BUILDING
Not to scale

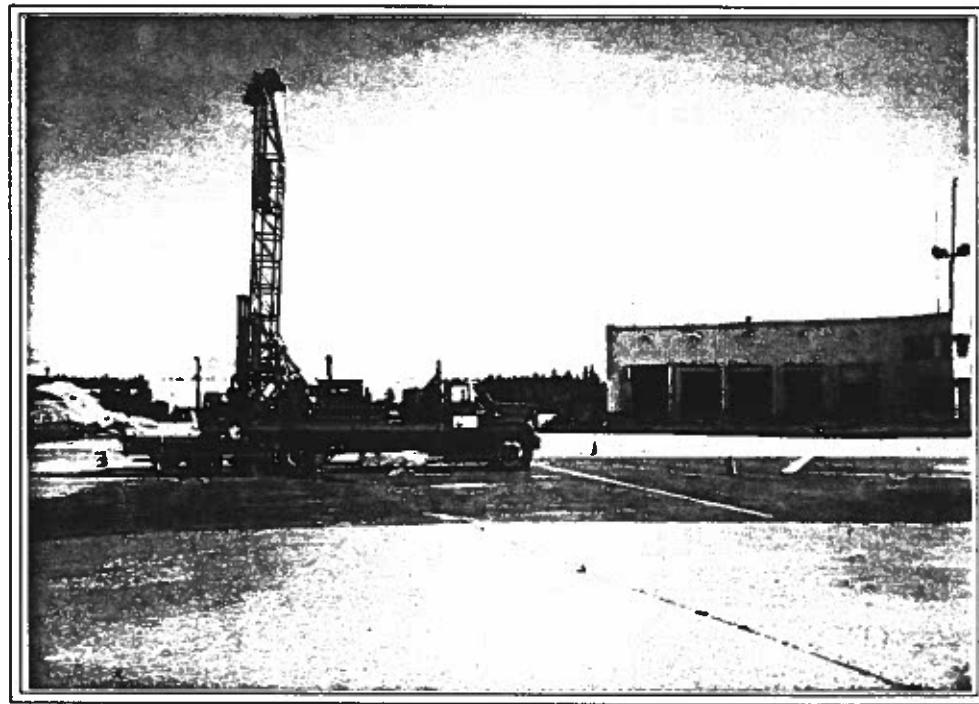
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A-3	
SHEET	1 OF 1

ATTACHMENT B

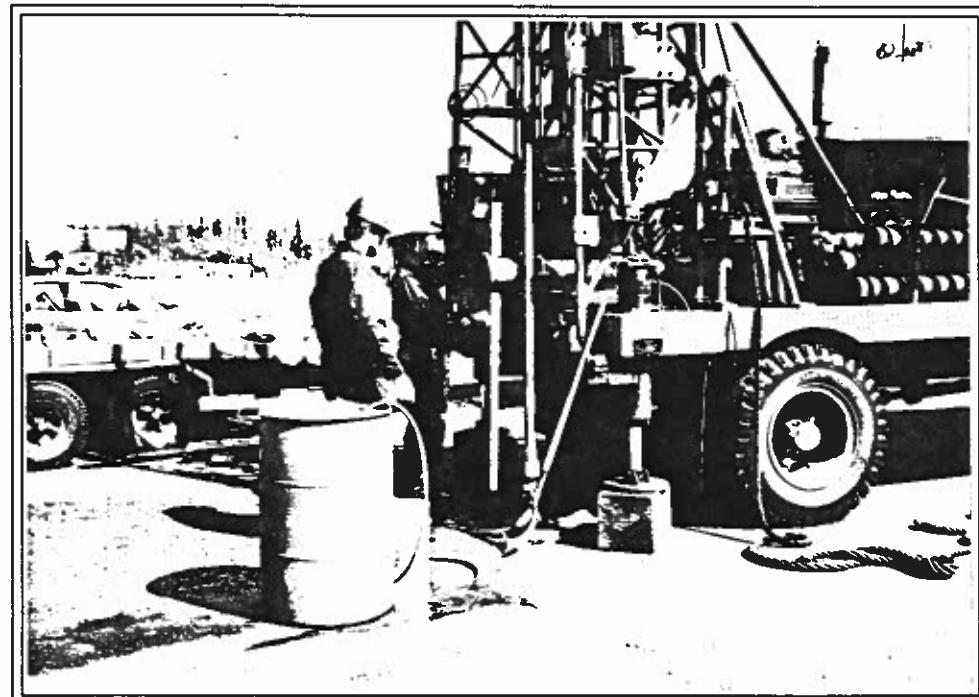
PHOTOGRAPHS



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JUNE 21 - 24, 1993



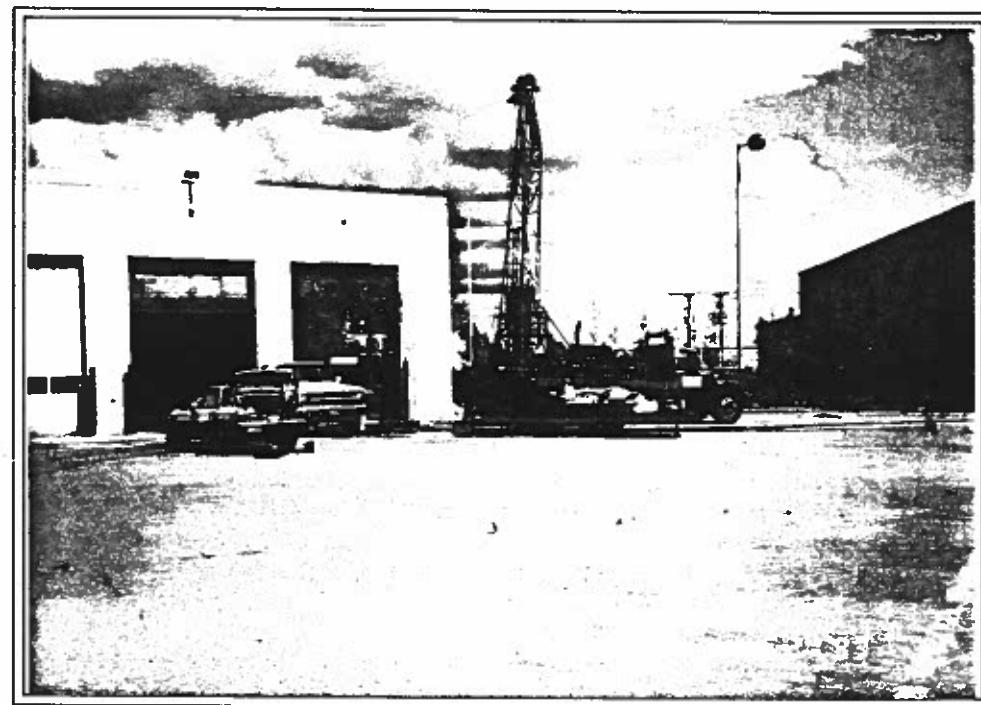
View of Monitoring Well #1 located at Weaver Brothers Bldg.



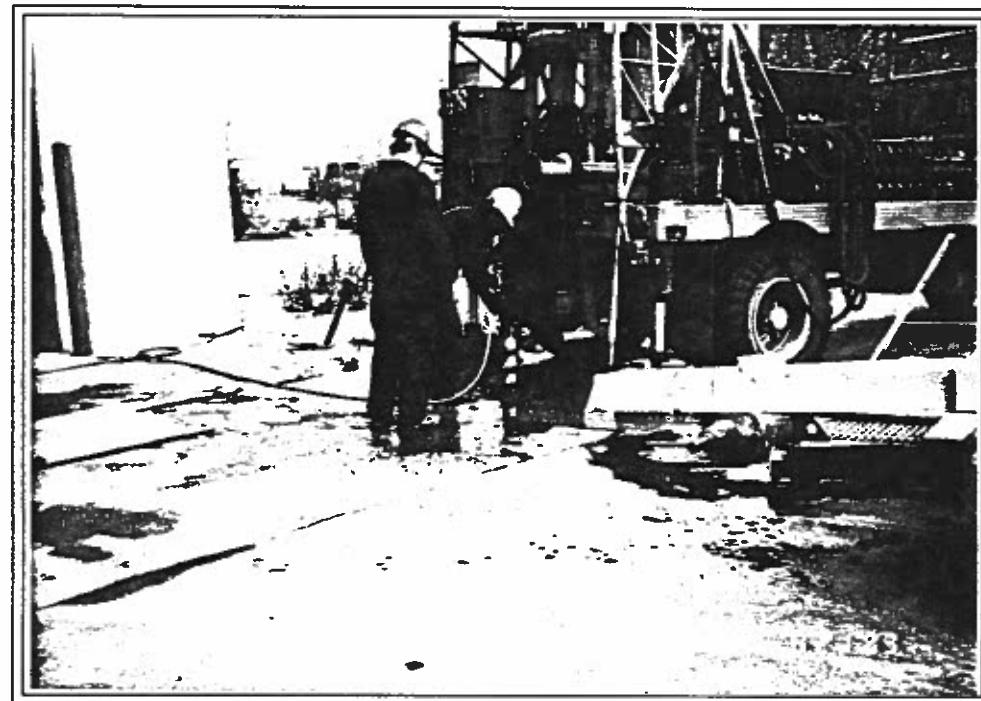
View of Monitoring Well #1 located at Weaver Brothers Bldg.



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JUNE 21 - 24, 1993



View of Monitoring Well #2 located at Weaver Brothers Bldg.

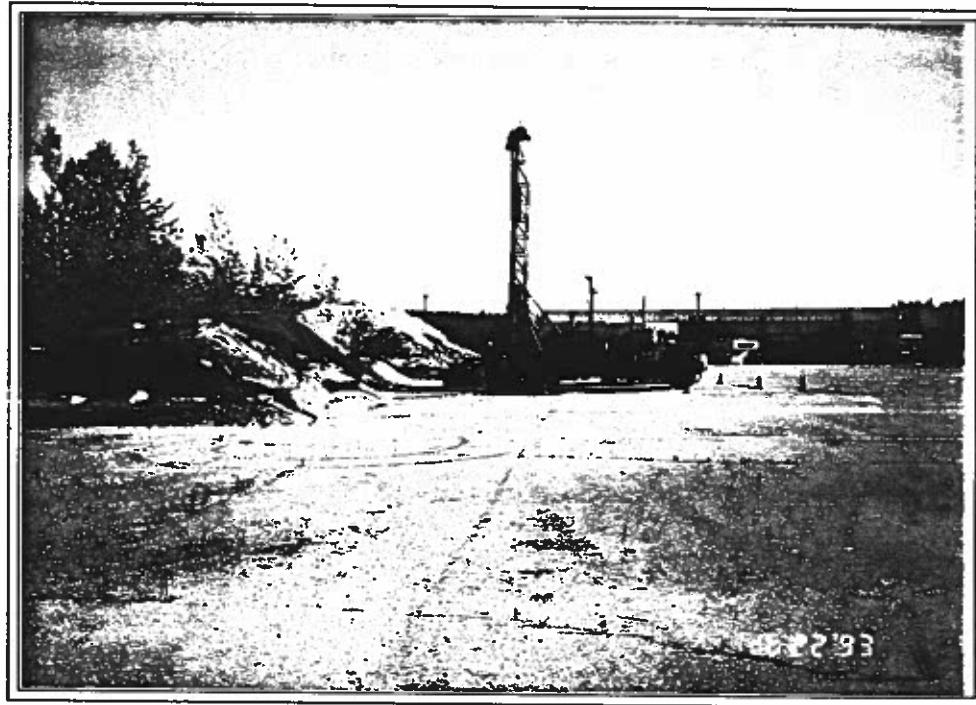


View of Monitoring Well #2 located at Weaver Brothers Bldg.



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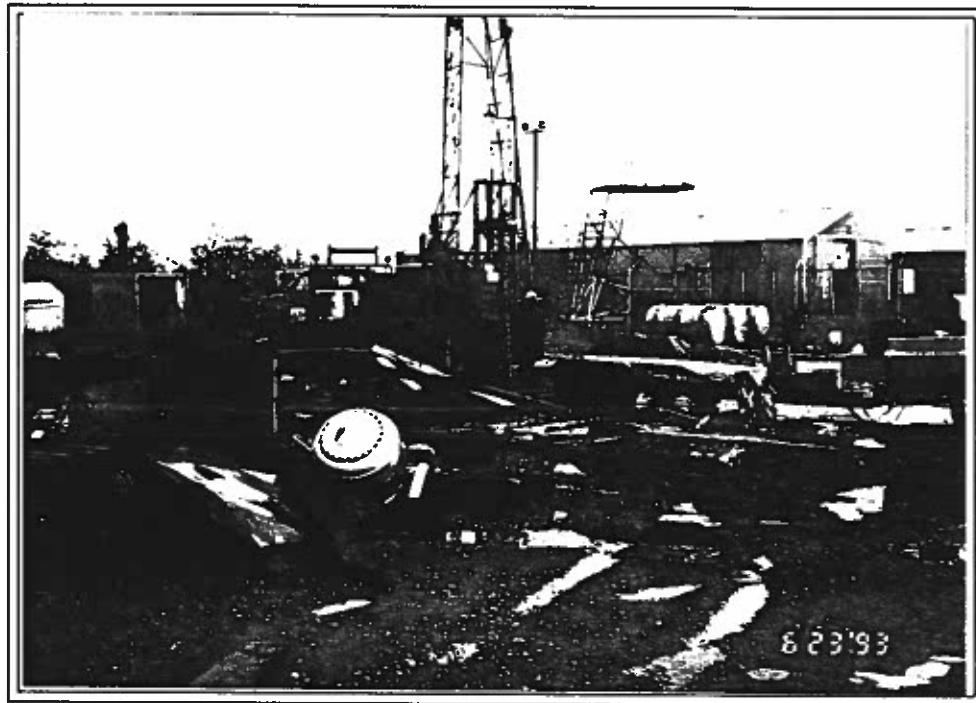
View of Monitoring Well #3 located at Weaver Brothers Bldg.



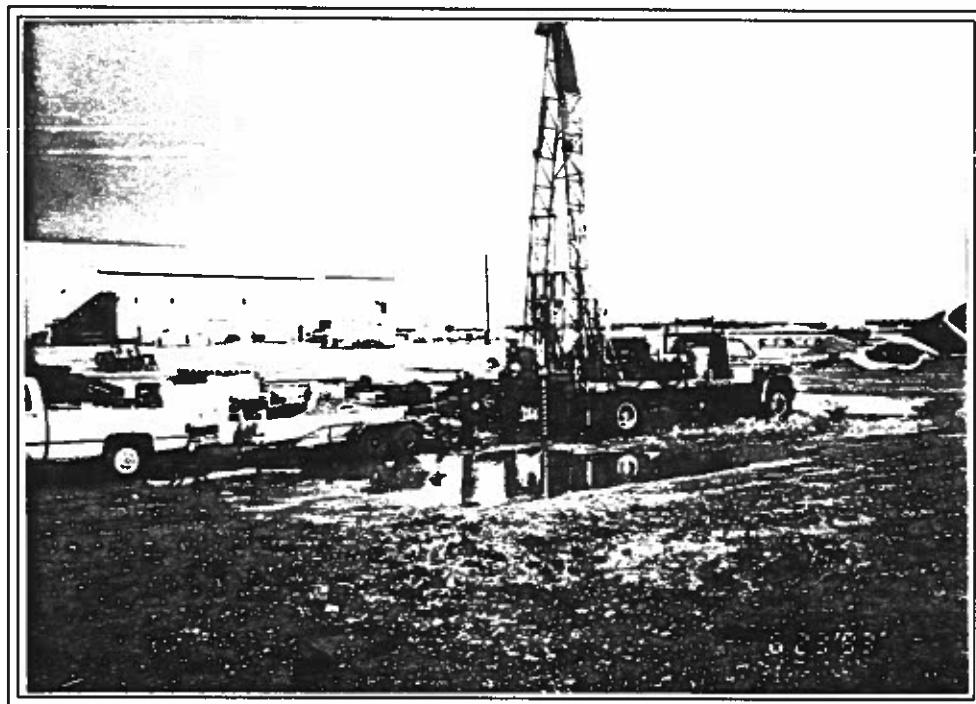
View of Monitoring Well #4 located at Weaver Brothers Bldg.



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View of Monitoring Well #1 located at the hanger



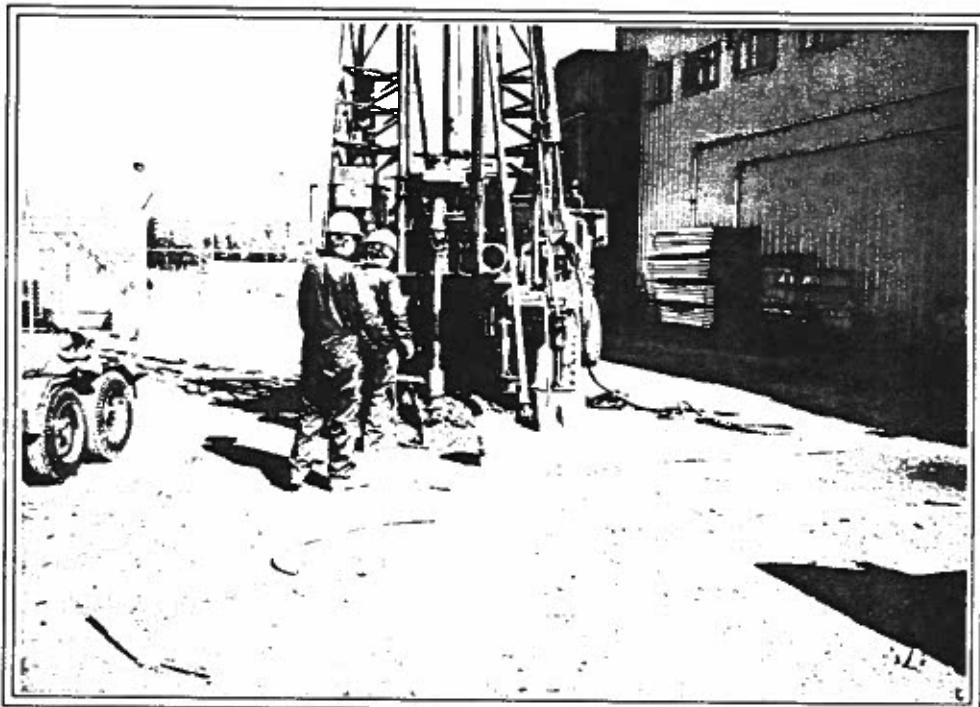
View of Monitoring Well #1 located at the hanger



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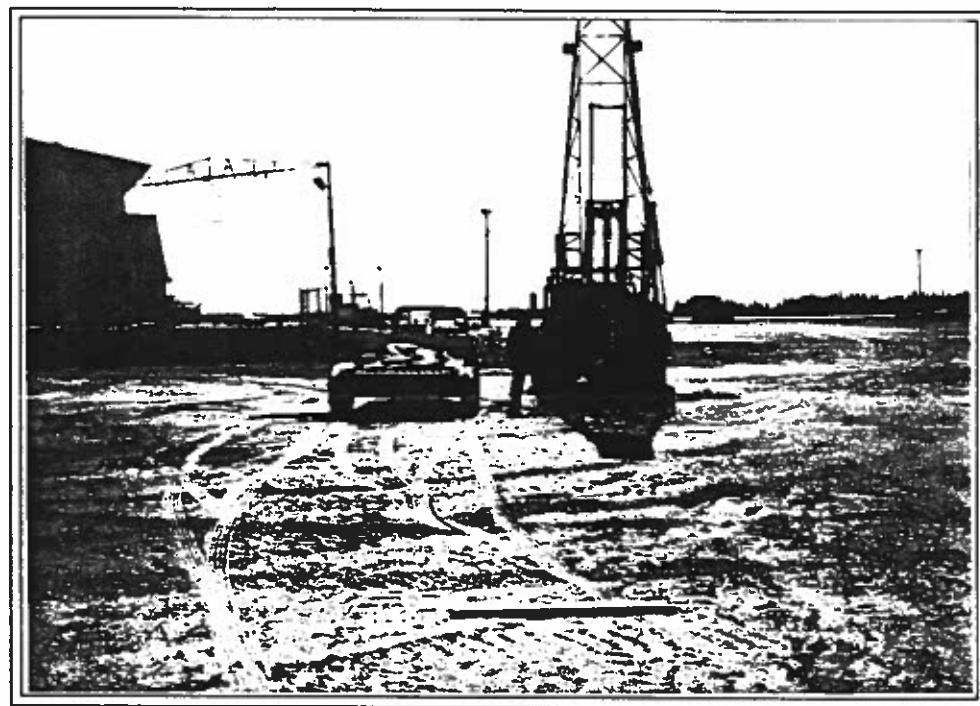
View of Monitoring Well #2 located at the hanger



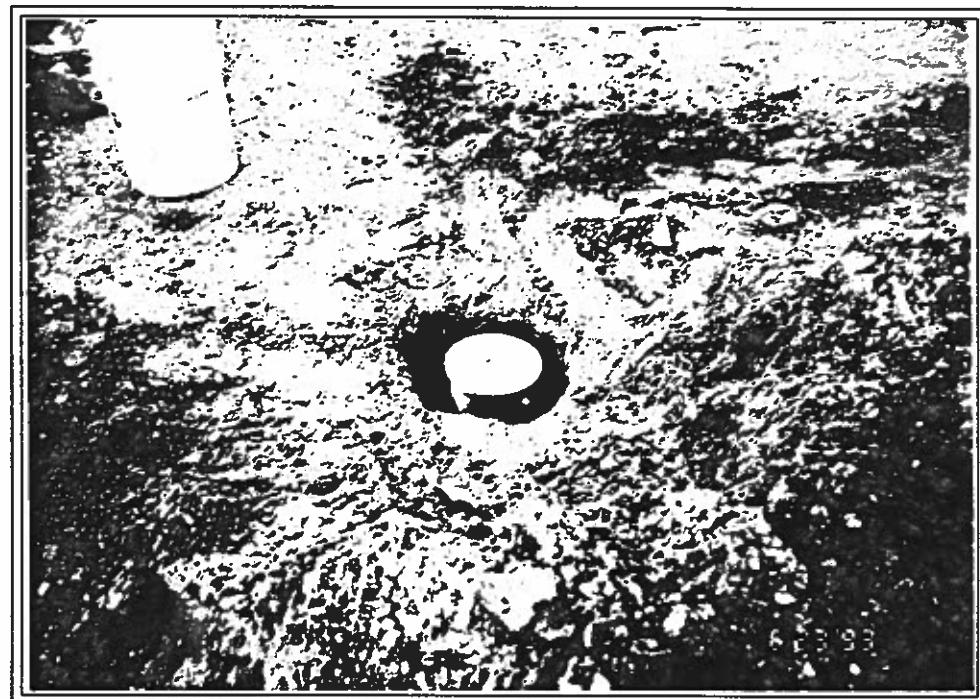
View of Monitoring Well #2 located at the hanger



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JUNE 21 - 24, 1993



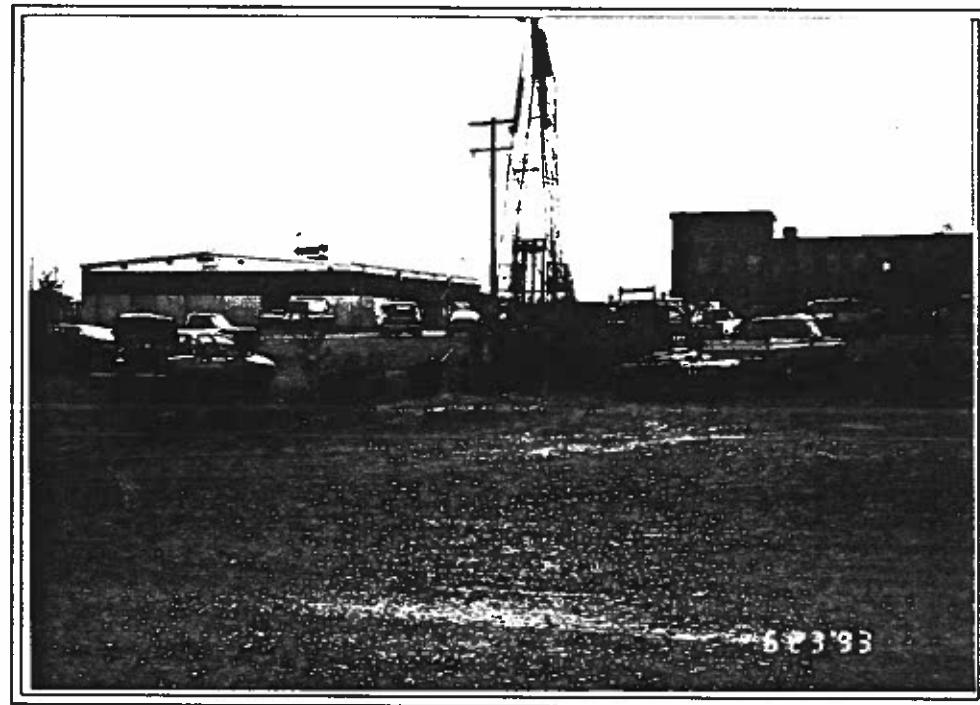
View of Monitoring Well #3 located at the hanger



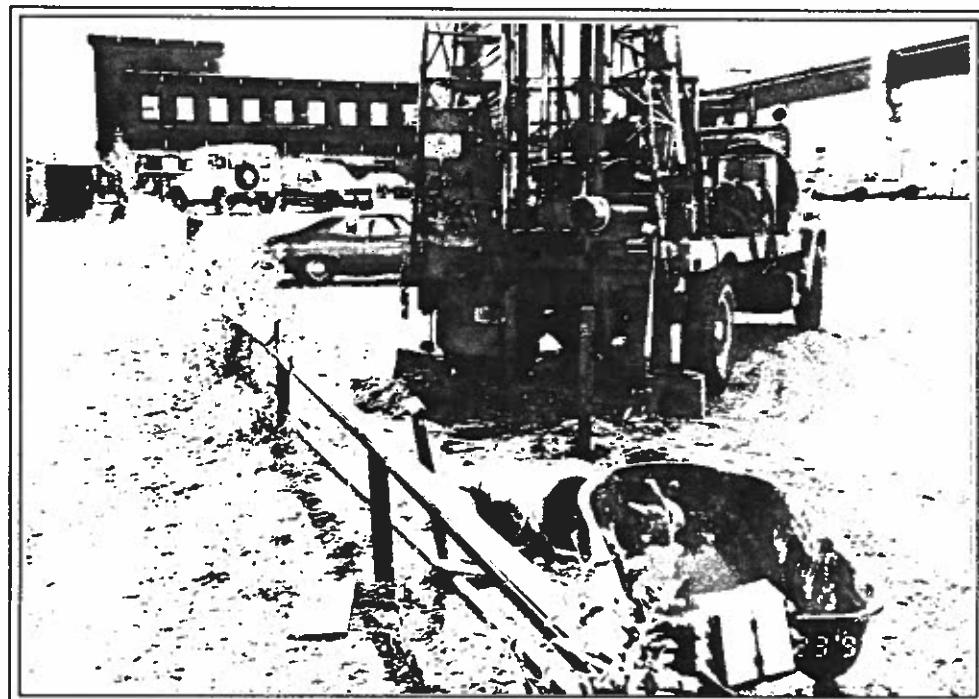
View of Monitoring Well #3 located View at the hanger



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JUNE 21 - 24, 1993



View of Monitoring Well #4 located at the hanger

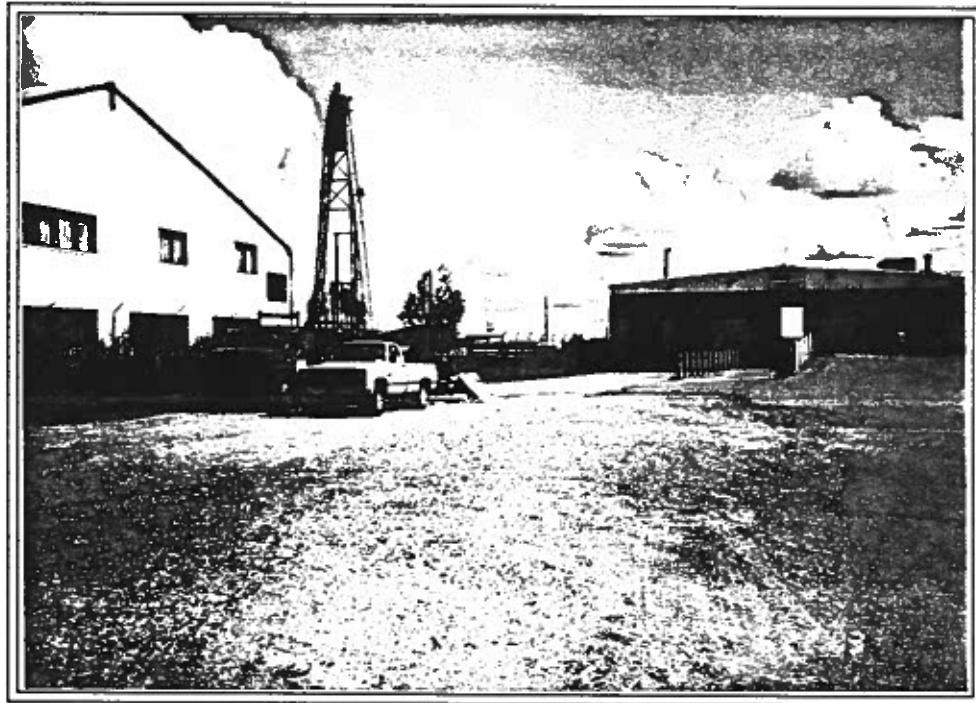


View of Monitoring Well #4 located at the hanger

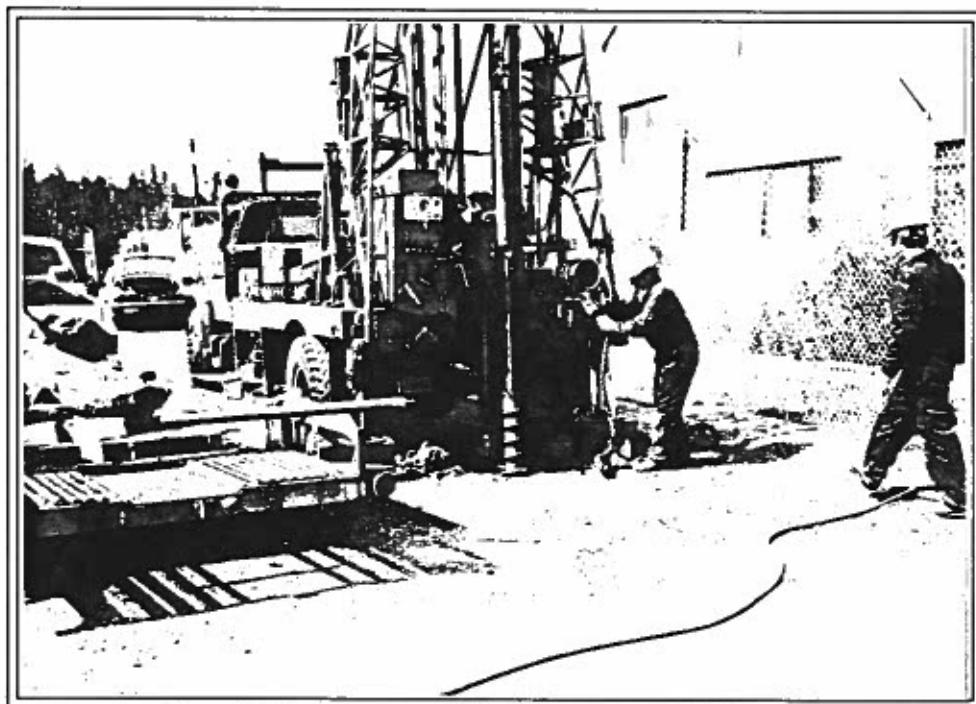


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JUNE 21 - 24, 1993



View of Monitoring Well #5 located at the hanger



View of Monitoring Well #5 located at the hanger

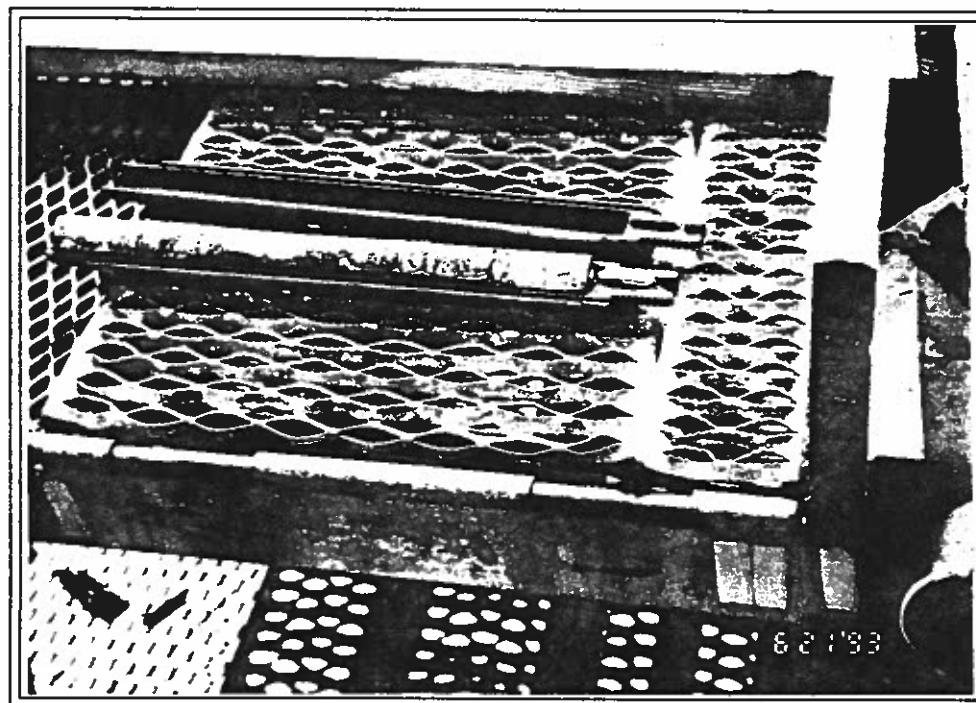


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JUNE 21 - 24, 1993



Development of Monitoring Well #5 located at the hanger



Split-spoon sampler with brass liners

ATTACHMENT C

TABLES

Table #1

Table #2

Summary of Analytical Monitoring Well Water Samples						
Samples Collected on June 30, 1993						
Well ID	Sample ID#	DRPH	GRPH	TPH	VCS	PCB's
	3510/8100M (ppb)	5030/8015M (ppb)	418.1 (ppm)	5030/601 (ppb)	3550/8080 (ppb)	
MW#1 @ WB	6179-03	ND (100 ppb)	ND (100 ppb)	ND (1 ppm)	ND (1 ppb)	ND (0.1 ppb)
Duplicate	6179-04	ND (100 ppb)	ND (100 ppb)	ND (1 ppm)	ND (1 ppb)	ND (0.1 ppb)
MW#2 @ WB	6179-05	210	ND (100 ppb)	ND (1 ppm)	ND (1 ppb)	ND (0.1 ppb)
MW#3 @ WB	6179-02	ND (100 ppb)		130	NA	NA
MW#4 @ WB	6179-01	140	ND (100 ppb)	NA	NA	NA
MW#1 @ H	6179-09	ND (100 ppb)		150	ND (1 ppm)	ND (0.1 ppb)
MW#2 @ H	6179-10	470	ND (100 ppb)	ND (1 ppm)	*	ND (0.1 ppb)
MW#3 @ H	6179-08	ND (100 ppb)	ND (100 ppb)	NA	NA	NA
MW#4 @ H	6179-07	ND (100 ppb)	ND (100 ppb)	NA	NA	NA
MW#5 @ H	6179-06	ND (100 ppb)	ND (100 ppb)	NA	NA	NA
Decon Blank	DB#1-DB#5	ND (100 ppb)	ND (100 ppb)	ND (1 ppm)	**	ND (0.1 ppb)

LEGEND: WB = Weaver Brothers Bldg.
 Duplicate = Duplicate of MW#1
 H = Hanger
 DRPH = Diesel Range Petroleum Hydrocarbons
 GRPH = Gasoline Range Petroleum Hydrocarbons
 BTEX = Benzene, Toluene, Ethylbenzene, and Xylene
 TPH = Total Range Petroleum Hydrocarbons
 VCS = Volatile Chlorinated Solvents
 PCB's = Polychlorinated Biphenyls
 ND () = Not Detected (Detection Limit)

ppb = parts per billion
 ppm = parts per million

Note: Decontamination Blank samples were collected June 24, 1993

Table #3

Summary of Analytical Monitoring Well Water Samples (BTEX)						
Samples Collected on June 30, 1993						
Well ID	Sample ID#	Total BTEX 5030/602 (ppb)	Benzene 5030/602 (ppb)	Toluene 5030/602 (ppb)	Ethylbenzene 5030/602 (ppb)	Xylenes 5030/602 (ppb)
MW#1 @ WB	6179-03	2	ND (1 ppb)	2	ND (1 ppb)	ND (3 ppb)
Duplicate	6179-04	4	ND (1 ppb)	4	ND (1 ppb)	ND (3 ppb)
MW#2 @ WB	6179-05	2	ND (1 ppb)	2	ND (1 ppb)	ND (3 ppb)
MW#3 @ WB	6179-02	61	52	5	ND (1 ppb)	4
MW#4 @ WB	6179-01	16	3	13	ND (1 ppb)	ND (3 ppb)
MW#1 @ H	6179-09	36	16	3	1	16
MW#2 @ H	6179-10	7	ND (1 ppb)	3	ND (1 ppb)	4
MW#3 @ H	6179-08	1	1	ND (1 ppb)	ND (1 ppb)	ND (3 ppb)
MW#4 @ H	6179-07	ND (6 ppb)	ND (1 ppb)	ND (1 ppb)	ND (1 ppb)	ND (3 ppb)
MW#5 @ H	6179-06	1	ND (1 ppb)	1	ND (1 ppb)	ND (3 ppb)
Decon Blank	DB#2		ND (1 ppb)	1	ND (1 ppb)	ND (3 ppb)

LEGEND: WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

BTEX = Benzene, Toluene, Ethylbenzene, and Xylene

ND () = Not Detected (Detection limit)

ppb = parts per billion

Table #4

Summary of Analytical Monitoring Well Water Samples (Heavy Metals)					
Samples Collected on June 30, 1993					
Well ID	Sample ID#	Arsenic 3020/7060 (ppm)	Cadmium 3010/6010 (ppm)	Chromium 3010/6010 (ppm)	Lead 3020/7421 (ppm)
MW#1 @ WB	6179-03	ND (0.01 ppm)	ND (0.01 ppm)	ND (0.05 ppm)	0.011
Duplicate	6179-04	ND (0.01 ppm)	ND (0.01 ppm)	ND (0.05 ppm)	0.01
MW#2 @ WB	6179-05	0.01	ND (0.01 ppm)	ND (0.05 ppm)	0.012
MW#3 @ WB	6179-02	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#4 @ WB	6179-01	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#1 @ H	6179-09	0.01	ND (0.01 ppm)	ND (0.05 ppm)	0.01
MW#2 @ H	6179-10	0.02	ND (0.01 ppm)	ND (0.05 ppm)	0.01
MW#3 @ H	6179-08	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#4 @ H	6179-07	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#5 @ H	6179-06	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
Decon Blank	DB #6	ND (0.01 ppm)	ND (0.01 ppm)	ND (0.05 ppm)	ND (0.01 ppm)

LEGEND: WB = Weaver Brothers Bldg.

Duplicate = Duplicate of WB #1

H = Hanger

ND () = Not Detected (Detection Limit)

ppm = parts per million

Holding Times and Surrogate Recovery

QC Designation	Tolerance		Results for this Project
<u>Holding Times</u>			
8100M,DRPH,water	extraction analysis	14 days max. 40 days max.	< 14 days < 14 days
8015M,GRPH,water	analysis	14 days max.	< 14 days
418.1,TPH,water	extraction analysis	14 days max. 40 days max.	< 14 days ~ 14 days
8020,BTEX,water	analysis	14 days max.	< 14 days
8010,HVO,water	analysis	14 days max.	< 14 days
8080,PCBs,water	extraction analysis	14 days max. 40 days max.	< 14 days < 14 days
7060,Arsenic,water	analysis	6 months max.	< 14 days
6010,Cadmium,water	analysis	6 months max.	< 14 days
6010,Chromium,water	analysis	6 months max.	< 14 days
7421,Lead,water	analysis	6 months max.	< 14 days
<u>Surrogate Recovery</u>		(+/-%)	
8100M,DRPH,water		40%	51% - 121%
8015M,GRPH,water		40%	78% - 108%

Laboratory and Field Precision

QC Designation	Tolerance +/-	Results for this Project +/-
<u>Laboratory Precision</u>		
8100M,DRPH,water	30%	1%
8015M,GRPH,water	30%	7%
418.1,TPH,water	30%	<5%
8020,BTEX,water	30%	<7%
8010,HVO,water	30%	<6%
8080,PCBs,water	30%	25%
7060,Arsenic,water	20%	1%
6010,Cadmium,water	20%	2%
6010,Chromium,water	20%	1%
7421,Lead,water	20%	3%
<u>Field Precision</u>		
8100M,DRPH,water	30%	0%
8015M,GRPH,water	30%	0%
418.1,TPH,water	30%	0%
8020,BTEX,water	30%	33%
8010,HVO,water	30%	0%
8080,PCBs,water	30%	0%
7060,Arsenic,water	20%	0%
6010,Cadmium,water	20%	0%
6010,Chromium,water	20%	0%
7421,Lead,water	20%	10%

Laboratory Accuracy and Completeness

QC Designation	Tolerance	Results for this Project
<u>Laboratory Accuracy</u>		
8100M, DRPH, water	60% - 130%	66%
8015M, GRPH, water	60% - 130%	81%
418.1, TPH, water	60% - 130%	90%
8020, BTEX, water	60% - 130%	98% - 106%
8010, HVO, water	40% - 130%	82% - 118%
8080, PCBs, water	60% - 140%	84%
7060, Arsenic, water	80% - 120%	84%
6010, Cadmium, water	80% - 120%	99%
6010, Chromium, water	80% - 120%	93%
7421, Lead, water	80% - 120%	98%
<u>Completeness</u>		
8100M, DRPH, water	85% min.	100%
8015M, GRPH, water	85% min.	100%
418.1, TPH, water	85% min.	100%
8020, BTEX, water	85% min.	100%
8010, HVO, water	85% min.	100%
8080, PCBs, water	85% min.	100%
7060, Arsenic, water	85% min.	100%
6010, Cadmium, water	85% min.	100%
6010, Chromium, water	85% min.	100%
7421, Lead, water	85% min.	100%

ATTACHMENT D

SOIL & WELL LOGS

ENVIRONMENTAL MANAGEMENT, INC.

SOIL LOG & MONITORING WELL CONSTRUCTION

LEGEND

SOIL PATTERNS	Soil Type	SYMBOLS	Labels	Well Const. Patterns	Description
	Sand Silt Sand and Silt Gravel and Sand Gravel Sand, Silt and Gravel Fine sand	 	<p>(USCS) - Unified Soil Classification System</p> <p>Hyd. C. - hydraulic conductivity</p> <p>cps - centimeters per second</p> <p>SPT - Standard penetration test</p> <p>"N" - Blow count for 12" penetration</p> <p>SN - Sample number</p> <p>M - Moisture level</p> <p>DD - Dry density</p> <p>WD - Wet density</p> <p>pcf - Pounds per cubic foot</p> <p>FID - Flame Ionization Detection level</p> <p>ppm - parts per million</p>	 	Concrete Bentonite Well screen Silica sand Native soil

ENVIRONMENTAL MANAGEMENT

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/21/93

BORING NO. MW#1 @ Weaver Brothers

ELEVATION: 428.00 ft.

BORING LOCATION RW Stn 101+47 Offset 2081 Left

NOTES:

METHOD OF DRILLING: 6" Hollow Stem Auger

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none

ELEVATION DEPTH	SOIL SYMBOLS/ FIELD TEST DATA	Soil Description (USCS)	Hyd.C cps	SPT "N"	SN	M %	WD pcf	DD pcf	FID ppm	D
0		Gravel and Sand: with some fines, grey, moist (SP) - 2" ASPHALT COVER								Flush
-5		Sand: grey, moist (SP)								Cover 2'
-10		Sand: with gravel, grey, saturated, (SP)								Bento
-15		Sand: grey, saturated, medium - dense (SP)								Screen
-20										Silica
				12 40	S1	15.7	134	116	8	N

ENVIRONMENTAL MANAGEMENT

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/21/93

BORING NO. MW#2 @ Weaver Brothers

ELEVATION: 431.00 ft

BORING LOCATION RW Stn 102+50 Offset 1941 Left

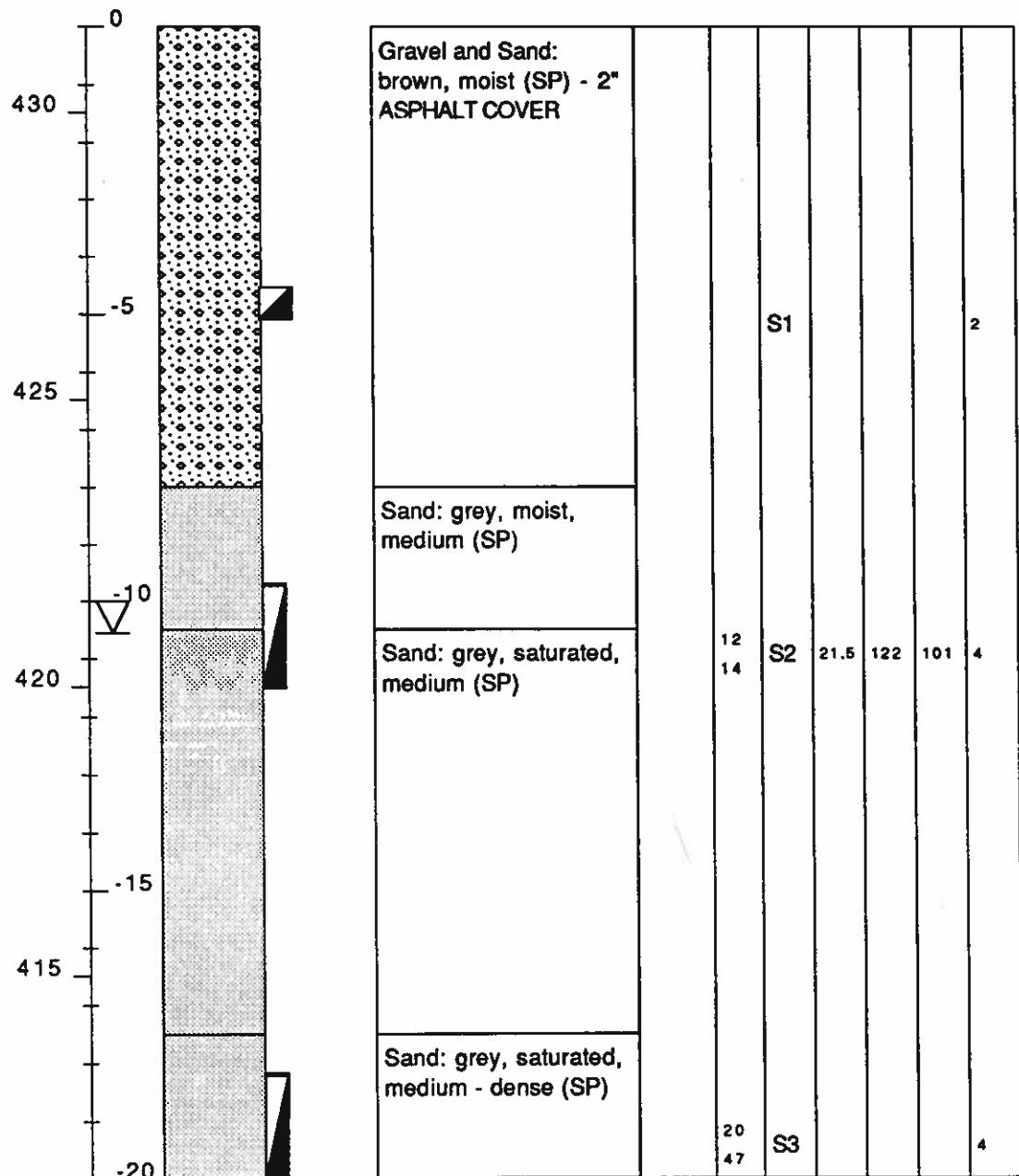
METHOD OF DRILLING: 6" Hollow Stem Auger

NOTES:

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none

ELEVATION	SOIL SYMBOLS/ FIELD TEST DATA	Soil Description (USCS)	Hyd.C cps	SPT "N"	SN	M %	WD pcf	DD pcf	FID ppm
DEPTH									



C.

ON

De

Flush

Cover

2'

Bento

Screen

Silica

No

ENVIRONMENTAL MANAGEMENT, INC.

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/22/93

BORING NO. MW#3 @ Weaver Brothers

ELEVATION: 427

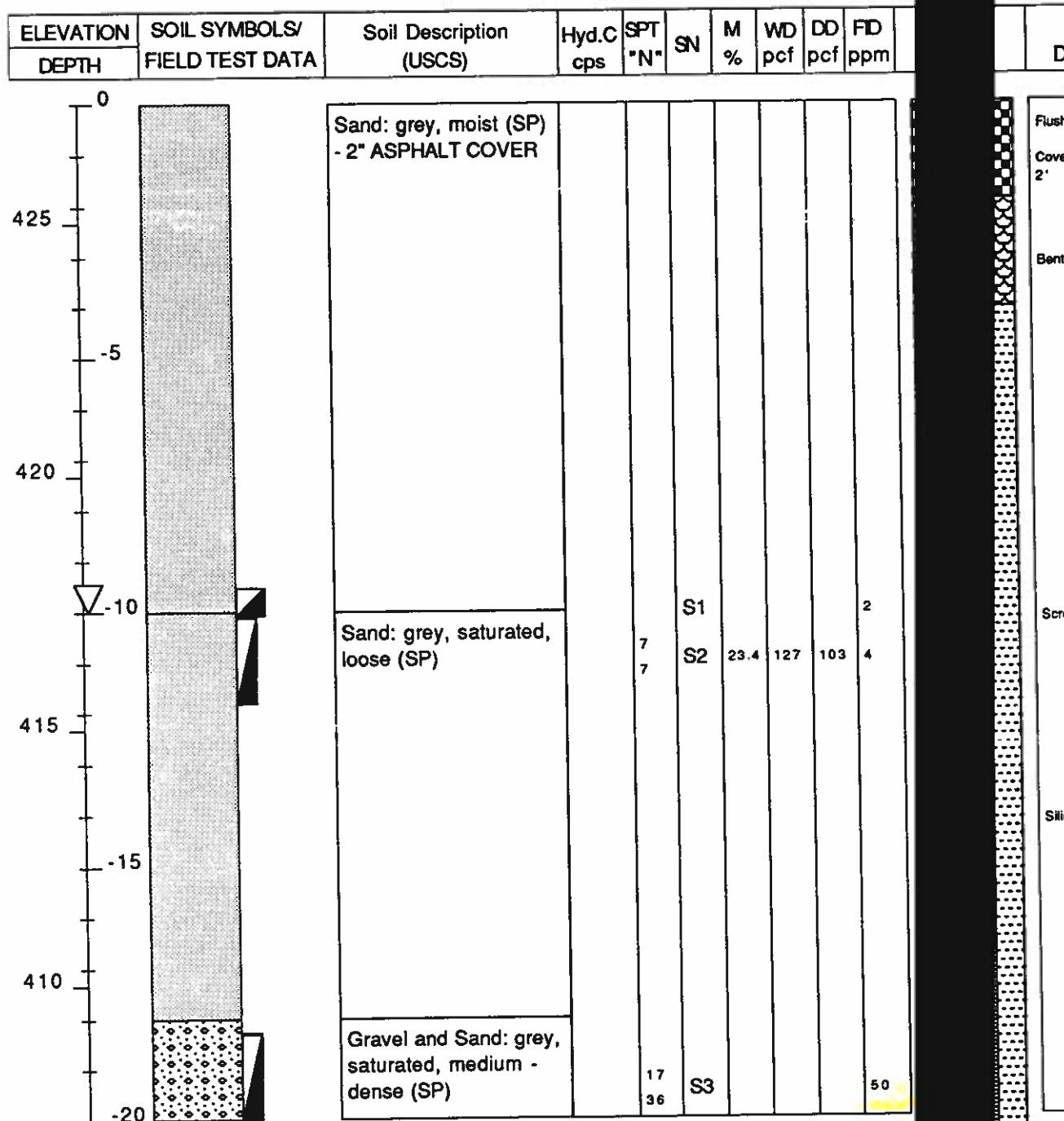
BORING LOCATION RW Stn 102+62 Offset 2191 Left

NOTES:

METHOD OF DRILLING: 6" Hollow Stem Auger

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none



ENVIRONMENTAL MANAGEMENT

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

BORING NO. MW#4 @ Weaver Brothers

BORING LOCATION RW Stn 104+86 Offset 2142 Left

METHOD OF DRILLING: 6" Hollow Stem Auger

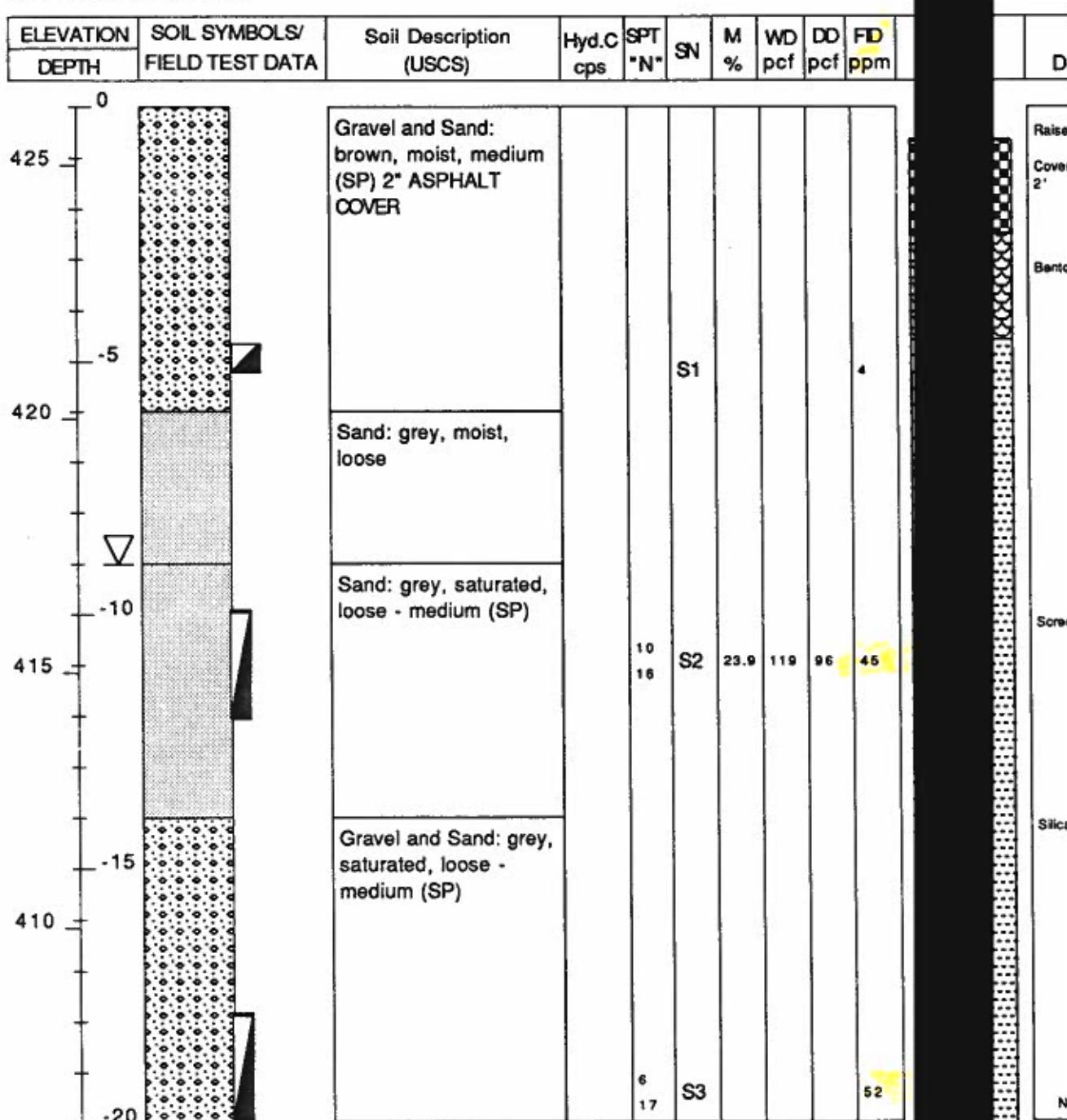
DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none

DATE: 6/22/93

ELEVATION: 426

NOTES:



ENVIRONMENTAL MANAGEMENT

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/23/93

BORING NO. MW#1 @ Hanger

ELEVATION: 429

BORING LOCATION RW Stn 87+26 Offset 1603 Left

NOTES: Well is low due

METHOD OF DRILLING: 6" Hollow Stem Auger

getting into

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none

ELEVATION	SOIL SYMBOLS/ FIELD TEST DATA	Soil Description (USCS)	Hyd.C cps	SPT "N"	SN	M %	WD pcf	DD pcf	FID ppm	D
DEPTH										
0		Sand: with gravel, grey, moist (SP)								Flush
425	-5	Silt: brown, moist, dense (ML)								Cover 2'
420	-10	Sand and Silt: brown, moist, dense (SP-SM)								Bento
415	-15	Sand: grey, saturated, dense (SP)	13 24	S1 S2	22.7	125	102	2		Screen 18.5
410	-20	Sand: grey, saturated, loose (SP)								Silica
			7 4	S3					285	N

The diagram illustrates the soil profile from the surface down to -20 feet. It shows five distinct soil horizons, each with a unique hatching pattern. From top to bottom, the layers are: 0 to -5 feet (topsoil), -5 to -10 feet (intermediate layer), -10 to -15 feet (subsoil), -15 to -20 feet (bottom layer), and a thin layer at the very bottom. Test results are plotted against depth: SPT values (N) of 22.7 and 125 are shown for the -10 to -15 ft range; Hydrometer (H) values of 13 and 24 are shown for the -10 to -15 ft range; and SPT values (N) of 7 and 4 are shown for the -15 to -20 ft range. A vertical line at approximately -18.5 feet indicates the location of a screen. A horizontal line at the bottom marks the water level (N). A legend on the right side identifies the symbols: a solid gray box for 'Flush', a diagonal-hatched box for 'Cover 2'' (labeled 'Bento' in the original), a dotted box for 'Bento', a wavy box for 'Screen 18.5' (labeled 'Silica' in the original), and a horizontal line for 'N'.

ENVIRONMENTAL MANAGEMENT

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/24/93

BORING NO. MW#2 @ Hanger

ELEVATION: 434

BORING LOCATION RW Stn 90+83 Offset 1391 Left

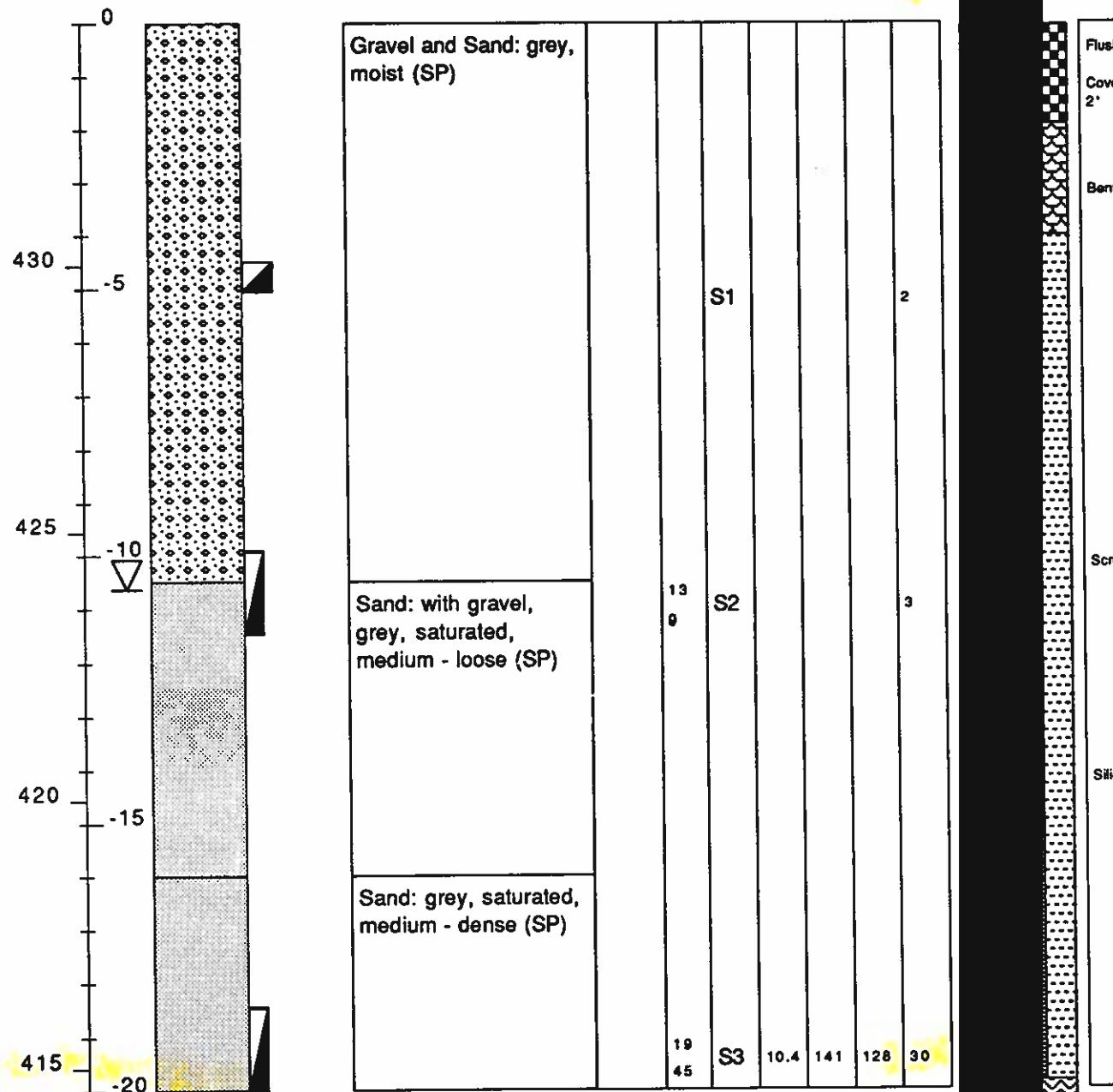
NOTES:

METHOD OF DRILLING: 6" Hollow Stem Auger

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none

ELEVATION DEPTH	SOIL SYMBOLS/ FIELD TEST DATA	Soil Description (USCS)	Hyd.C cps	SPT "N"	SN	M %	WD pcf	DD pcf	FID ppm	De
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ENVIRONMENTAL MANAGEMENT SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/23/93

BORING NO. MW#3 @ Hanger

ELEVATION: 430

BORING LOCATION RW Stn 91+32 Offset 1653 Left

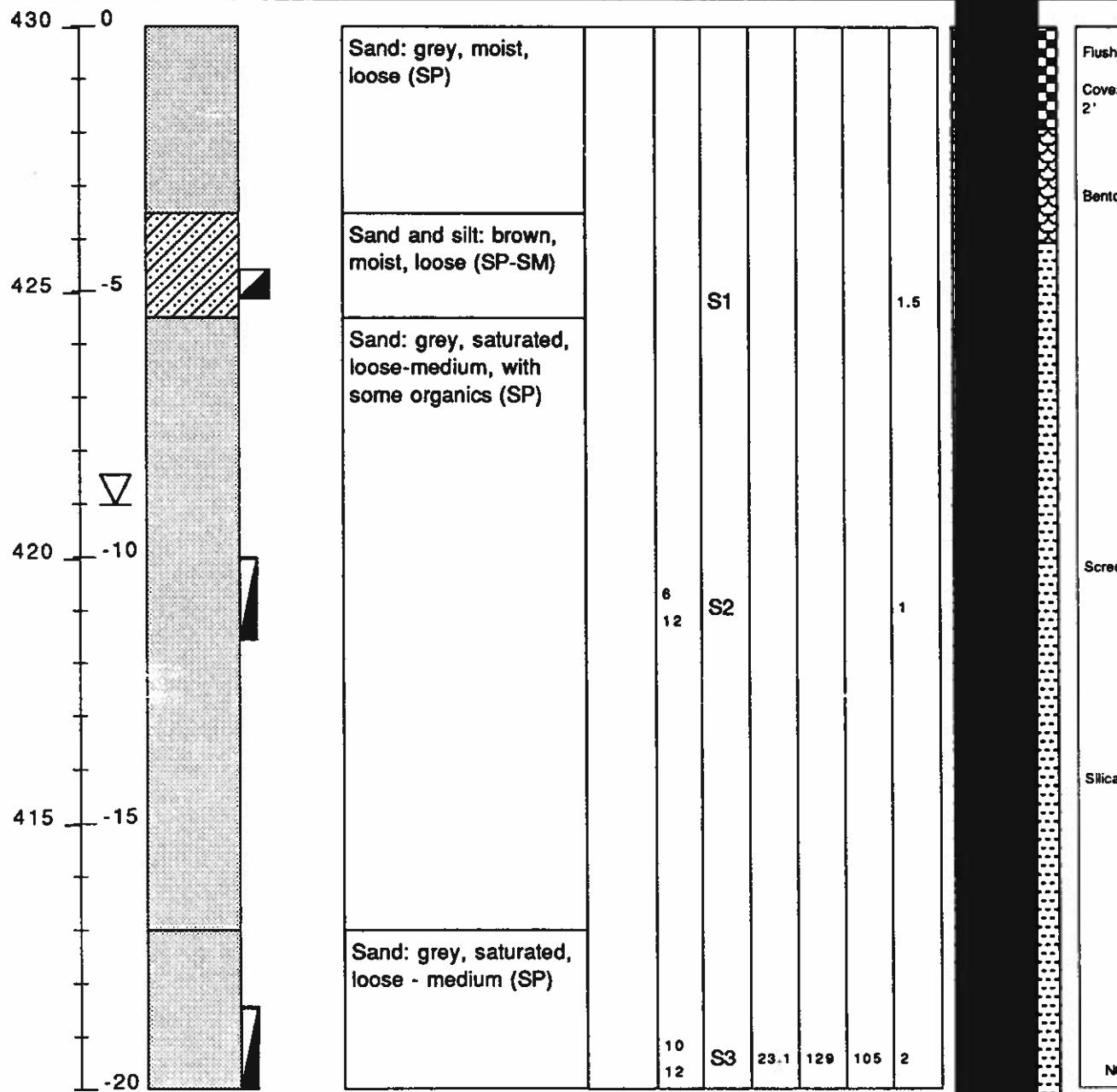
METHOD OF DRILLING: 6" Hollow Stem Auger

NOTES:

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none

ELEVATION DEPTH	SOIL SYMBOLS/ FIELD TEST DATA	Soil Description (USCS)	Hyd.C cps	SPT "N"	SN	M %	WD pcf	DD pcf	FID ppm
--------------------	----------------------------------	----------------------------	--------------	------------	----	--------	-----------	-----------	------------



ENVIRONMENTAL MANAGEMENT

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/23/93

BORING NO. MW#4 @ Hanger

ELEVATION: 430

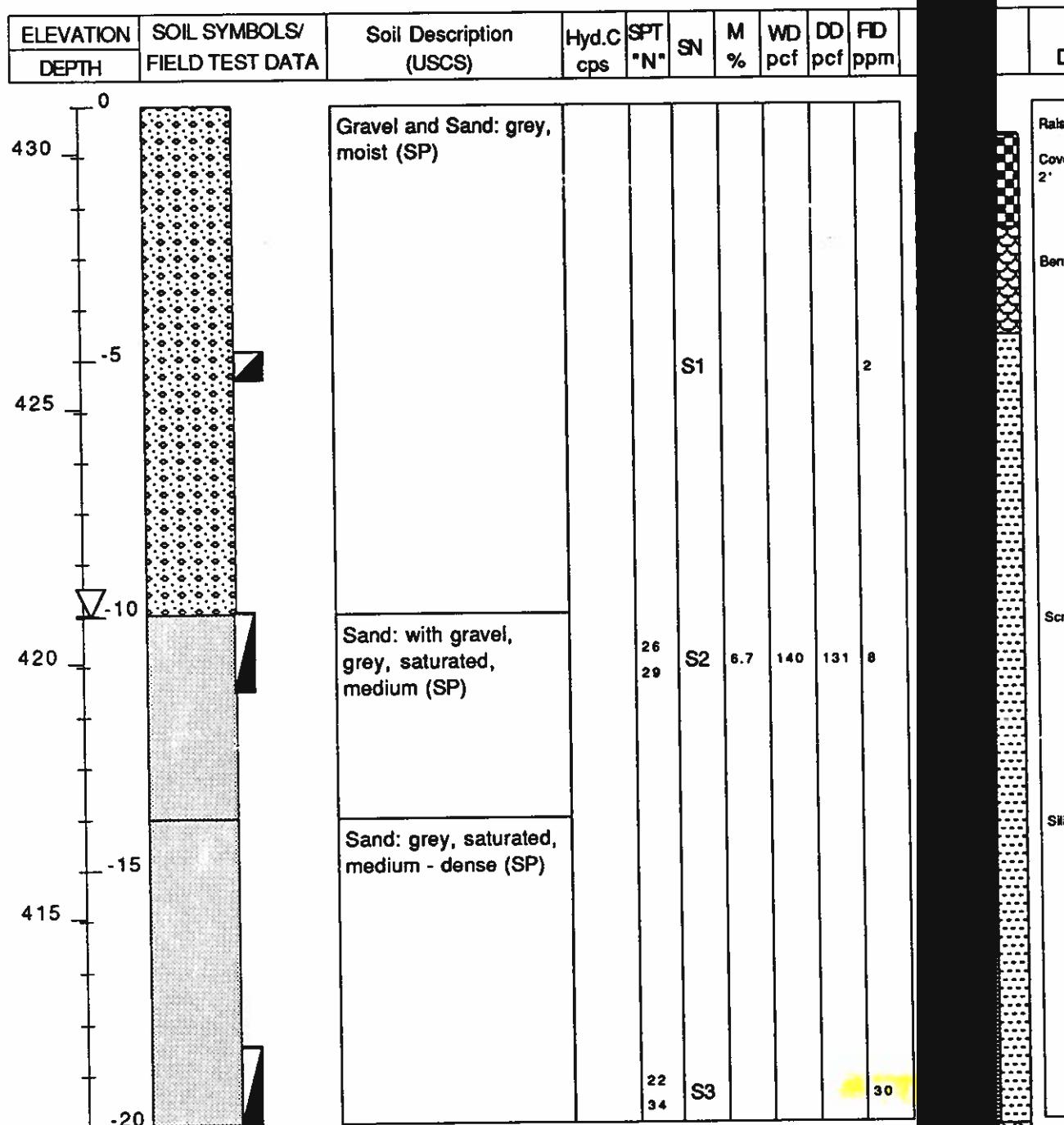
BORING LOCATION RW Stn 93+86 Offset 1582 Left

NOTES:

METHOD OF DRILLING: 6" Hollow Stem Auger

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none



ENVIRONMENTAL MANAGEMENT

SOIL LOG & MONITORING WELL CONSTRUCTION

PROJECT: MarkAir, Fairbanks Int. Apt., AK

DATE: 6/22/93

BORING NO. MW#5 @ Hanger

ELEVATION: 430 ft

BORING LOCATION RW Stn 96+16 Offset 1571 Left

NOTES:

METHOD OF DRILLING: 6" Hollow Stem Auger

DRILLING COMPANY: Ambler Exploration, Inc., Anchorage

CAVING DEPTH: none

ELEVATION DEPTH	SOIL SYMBOLS/ FIELD TEST DATA	Soil Description (USCS)	Hyd.C cps	SPT "N"	SN	M %	WD pcf	DD pcf	FID ppm	De
0										
430		Gravel and Sand: grey, moist, loose (SP)								
-5		Gravel and Sand: grey, moist, medium (SP)			S1				0	
425		Gravel and Sand: grey, saturated, medium (SP)	17 24	S2	12.6	141	125	3.5		
-10										
420										
-15										
415										
-20										

The diagram illustrates the soil profile and construction details. The vertical axis represents depth from 0 to -20 feet. The top 5 feet is described as 'Gravel and Sand: grey, moist, loose (SP)'. Below 5 feet, it is 'Gravel and Sand: grey, moist, medium (SP)' until 10 feet, then 'saturated, medium (SP)' until 15 feet. A 'Screen' is indicated between 420 and 425 feet. At 15 feet, a 'Silicate' liner is shown, and at 20 feet, a 'Neoprene' liner is shown.

ATTACHMENT E

LABORATORY RESULTS

89180

CP
P...
S...
A...
V...
OK

49C

MarkAir Fairbanks Facilities
Release Investigation ADEC#100.26.043
Monitoring Well Installation EMI#6179
Weaver Brothers Facility I.D. 0-002751
Hanger Facility I.D. 0-001110

Environmental Management, Inc.
907 E. Dowling Road, Suite 21
Anchorage, AK 99518
(907)562-2580 (907)562-1561
Manager Bill Patterson/Sampler Stan Dolloff

Environmental Analysis									Containers / Present
Site	Sample	DRPH	GRPH/BTEX	TPH	HVO	PCB's	Arsenic	Cadmium, Chromium	
Well I.D.	I.D.	3510/8100	5030/8015/602	1418 1	5030/601	3550/8080	3020/7060	3010/6010	
Weaver Bros.									
002751-1	6179-03	X					X		
			X						
				N.A.					
					N.A.				
002751-2	6179-05	X					X		
			X						
				N.A.					
					N.A.				
002751-3	6179-02	X					X		
			X						
				N.A.					
002751-4	6179-01	X					N.A.		
			X						
				N.A.					
002751-5	6179-04	X					X		
			X						
				N.A.					
					N.A.				
Hanger									
001110-1	6179-09	X					X		
			X						
				N.A.					
					N.A.				
001110-2	6179-10	X					X		
			X						
				N.A.					
					N.A.				
001110-3	6179-08	X					X		
			X						
				N.A.					
001110-4	6179-07	X					N.A.		
			X						
				N.A.					
001110-5	6179-06	X					X		
			X						
				N.A.					
					N.A.				
					N.A.				

Released By:	Date/Time:	Received By:
<i>Stan Dalll</i>	<i>7-6-93/1pm</i>	
Released By:	Date/Time:	Received By:
		<i>Tracy B... 7-93</i>



Superior Precision Analytical, Inc.

1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 647-2082

7123

ENVIRONMENTAL MANAGEMENT INC.
Attn: BILL PATTERSON

Report E93
-July

TOTAL PETROLEUM HYDROCARBONS AS DIESEL BY EPA METHOD 100

Identification	Chronology				Laboratory Number	Sampled	Received	Extracted	Analyzed
6179-03	06/30/93	07/07/93	07/09/93	07/09/93					
6179-05	06/30/93	07/07/93	07/09/93	07/09/93					
6179-02	06/30/93	07/07/93	07/09/93	07/09/93					
6179-01	06/30/93	07/07/93	07/09/93	07/09/93					
6179-04	06/30/93	07/07/93	07/09/93	07/09/93					
6179-09	06/30/93	07/07/93	07/09/93	07/09/93					
6179-10	06/30/93	07/07/93	07/09/93	07/09/93					
6179-08	06/30/93	07/07/93	07/09/93	07/09/93					
6179-07	06/30/93	07/07/93	07/09/93	07/09/93					
6179-06	06/30/93	07/07/93	07/09/93	07/09/93					



Superior Precision Analytical, Inc.

1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax (415) 647-7123

ENVIRONMENTAL MANAGEMENT INC.
Attn: BILL PATTERSON

Report E9
5-Jul

TOTAL PETROLEUM HYDROCARBONS AS DIESEL BY EPA METHOD 3100

Laboratory Number	Sample Identification	Matrix
56751- 1	6179-03	Water
56751- 2	6179-05	Water
56751- 3	6179-02	Water
56751- 4	6179-01	Water
56751- 5	6179-04	Water
56751- 6	6179-09	Water
56751- 7	6179-10	Water
56751- 8	6179-08	Water
56751- 9	6179-07	Water
56751-10	6179-06	Water

RESULTS OF ANALYSIS

Laboratory Number:	56751- 1	56751- 2	56751- 3	56751- 4	56751- 5	56751- 6	56751- 7	56751- 8	56751- 9	56751-10
Diesel:	ND<100	210	ND<100	14	ND	ND<100	470	ND<100	ND	ND<100
Concentration:	ug/L	ug/L	ug/L	ug	ug	ug/L	ug/L	ug/L	ug	ug/L
Surrogate Recovery:	81%	76%	51%	87%	51%	81%	104%	81%	99%	96%



Quality Assurance and Control Data - Water

Laboratory Number 56751

Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 56751

RPD = Relative Patient Diff.

Cecilia G Senior A



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1520

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No.
Revised 2/20/94

Project E9
4-Jul-94
Revised 2/20/94

VOLATILE PETROLEUM HYDROCARBONS

Sample preparation by Purge and Trap (EPA SW-846 method 8015 modified). Gasoline range analysis by SW-846 method 8015 modified. Gasoline range compounds between C6 and C10. Benzene, Toluene, Ethyl Benzene and m,p-xylene analyses by EPA method 602.

Identification	Sampled	Received	Extracted	Analyzed	Laboratory	Run #
					Number	
6179-03	07/06/93	07/07/93	/	/	07/13/	
6179-05	07/06/93	07/07/93	/	/	07/14/	
6179-02	07/06/93	07/07/93	/	/	07/14/	
6179-01	07/06/93	07/07/93	/	/	07/13/	
6179-04	07/06/93	07/07/93	/	/	07/13/	
6179-09	07/06/93	07/07/93	/	/	07/14/	
6179-10	07/06/93	07/07/93	/	/	07/13/	
6179-08	07/06/93	07/07/93	/	/	07/14/	
6179-07	07/06/93	07/07/93	/	/	07/14/	
6179-06	07/06/93	07/07/93	/	/	07/14/	



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1520

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No. E9-14-JUL
Revised 2000

VOLATILE PETROLEUM HYDROCARBONS

Laboratory Number	Sample Identification	Matrix
89180- 1	6179-03	Water
89180- 2	6179-05	Water
89180- 3	6179-02	Water
89180- 4	6179-01	Water
89180- 5	6179-04	Water
89180- 6	6179-09	Water
89180- 7	6179-10	Water
89180- 8	6179-08	Water
89180- 9	6179-07	Water
89180-10	6179-06	Water

RESULTS OF ANALYSIS

Laboratory Number: 89180- 1 89180- 2 89180- 3 89180- 4 89180- 5 89180- 6 89180- 7 89180- 8 89180- 9 89180- 10

Gasoline:	ND<100	ND<100	130	N	N	N	N	N	N
Benzene:	ND<1	ND<1	52	S	S	S	S	S	S
Toluene:	2	2	5	I	I	I	I	I	I
Ethyl Benzene:	ND<1	ND<1	ND<1	N	N	N	N	N	N
Xylenes:	ND<3	ND<3	4	N	N	N	N	N	N
Surrogate Recovery:	85%	86%	90%	7	7	7	7	7	8
Concentration:	ug/L	ug/L	ug/L	u	u	u	u	u	u

Laboratory Number: 89180- 6 89180- 7 89180- 8 89180- 9 89180- 10 89180- 11 89180- 12 89180- 13 89180- 14 89180- 15

Gasoline:	150	ND<100	ND<100	N	N	N	N	N	N
Benzene:	16	ND<1	1	N	N	N	N	N	N
Toluene:	3	3	ND<1	N	N	N	N	N	1
Ethyl Benzene:	1	ND<1	ND<1	N	N	N	N	N	N
Xylenes:	16	4	ND<3	N	N	N	N	N	N
Surrogate Recovery:	90%	83%	94%	8	8	8	8	8	1
Concentration:	ug/L	ug/L	ug/L	u	u	u	u	u	u



Superior Precision Analytical, Inc.

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VOLATILE PETROLEUM HYDROCARBONS Quality Assurance and Control Data - Water

Laboratory Number 89180

Compound	Method	Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limit (%)	RPD (%)
Gasoline:	ND<100	100	81%	70-	-	7%
Benzene:	ND<1	1	106%	70-	-	6%
Toluene:	ND<1	1	97%	70-	-	4%
Ethyl Benzene:	ND<1	1	98%	70-	-	3%
Xylenes:	ND<3	3	99%	70-	-	5%

Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 89180

RPD = Relative Percent Di

 9/29/98

Senior Analyst



Superior Precision Analytical, Inc.

1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax

1-7123

ENVIRONMENTAL MANAGEMENT INC.
Attn: DHRUBA NEOGI

Report

ct E9:
4-Jul

Polychlorinated Biphenyls Method 8080

Chronology

Laborat

umber

Identification	Sampled	Received	Extracted	Analyz
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6179-03	06/30/93	07/07/93	07/13/93	07/14/
6179-05	06/30/93	07/07/93	07/13/93	07/14/
6179-04	06/30/93	07/07/93	07/13/93	07/14/
6179-09	06/30/93	07/07/93	07/13/93	07/14/
6179-10	06/30/93	07/07/93	07/13/93	07/14/



Superior Precision Analytical, Inc.

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1-7123

ENVIRONMENTAL MANAGEMENT INC.
Attn: DHRUBA NEOGI

Report

ct E9:
4-July

Polychlorinated Biphenyls Method 8080

Laboratory Number	Sample Identification	Matrix
56749- 1	6179-03	Water
56749- 2	6179-05	Water
56749- 3	6179-04	Water
56749- 4	6179-09	Water
56749- 5	6179-10	Water

RESULTS OF ANALYSIS

Laboratory Number: 56749- 1 56749- 2 56749- 3 56749- 4 56749- 5

AROCLOR 1016:	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
AROCLOR 1221:	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
AROCLOR 1232:	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
AROCLOR 1242:	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
AROCLOR 1248:	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
AROCLOR 1254:	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
AROCLOR 1260:	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1

Concentration: ug/L ug/L ug/L ug/L ug/L ug/L

SURROGATE RECOVERY: 90% 94% 71% 100% 95%



Superior Precision Analytical, Inc.

1555 Burke, Unit I • San Francisco, California 94124 • (415) 647-2081 / fax

1-7123

Polychlorinated Biphenyls Method 8080 Quality Assurance and Control Data - Water

Laboratory Number 56749

Compound	Method	Average			RPD (%)
		Blank (ug/L)	PQL (ug/L)	Spike Recovery (%)	
AROCLOR 1016:		ND<0.1	0.1		
AROCLOR 1221:		ND<0.1	0.1		
AROCLOR 1232:		ND<0.1	0.1		
AROCLOR 1242:		ND<0.1	0.1		
AROCLOR 1248:		ND<0.1	0.1		
AROCLOR 1254:		ND<0.1	0.1	84%	50-100%
AROCLOR 1260:		ND<0.1	0.1		25%

Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

RPD = Relative

QC File No. 56749

nt Di

Senior



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

29-1526

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report E93
-July

ANALYSIS FOR ARSENIC, CADMIUM, CHROMIUM, & LEAD

by EPA Method SW-846 6010, 7060 & 7471

Identification	Sampled	Received	Extracted	Analyzed	Laboratory Number
6179-03	07/06/93	07/07/93	07/08/93	07/09/93	
6179-05	07/06/93	07/07/93	07/08/93	07/09/93	
6179-04	07/06/93	07/07/93	07/08/93	07/09/93	
6179-09	07/06/93	07/07/93	07/08/93	07/09/93	
6179-10	07/06/93	07/07/93	07/08/93	07/09/93	



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

229-1526

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No. E93
Date: 4-July

ANALYSIS FOR ARSENIC, CADMIUM, CROMIUM, & LEAD

Laboratory Number	Sample Identification	Matrix
89180- 1	6179-03	Water
89180- 2	6179-05	Water
89180- 5	6179-04	Water
89180- 6	6179-09	Water
89180- 7	6179-10	Water

RESULTS OF ANALYSIS

Laboratory Number: 89180- 1 89180- 2 89180- 5 89180- 7 89180- 6

ARSENIC	(As) :	ND<0.01	0.01	ND<0.01	0.01	ND<0.01	0.01
CADMIUM	(Cd) :	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01	ND<0.01
CHROMIUM	(Cr) :	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05	ND<0.05
LEAD	(Pb) :	0.011	0.012	0.010	0.010	0.010	0.010

Concentration: mg/L mg/L mg/L mg/L mg/L mg/L



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

ANALYSIS FOR ARSENIC, CADMIUM, CHROMIUM & Quality Assurance and Control Data - Water

Laboratory Number 89180

Compound	Method	Average			Limit	RPD (%)
		Blank (mg/L)	PQL (mg/L)	Spike Recovery (%)		
ARSENIC (As) :	ND<0.01	0.01	84%	75-125	1%	
CADMIUM (Cd) :	ND<0.01	0.01	99%	75-125	2%	
CHROMIUM (Cr) :	ND<0.05	0.05	93%	75-125	1%	
LEAD (Pb) :	ND<.005	.005	98%	75-125	3%	

Definitions:

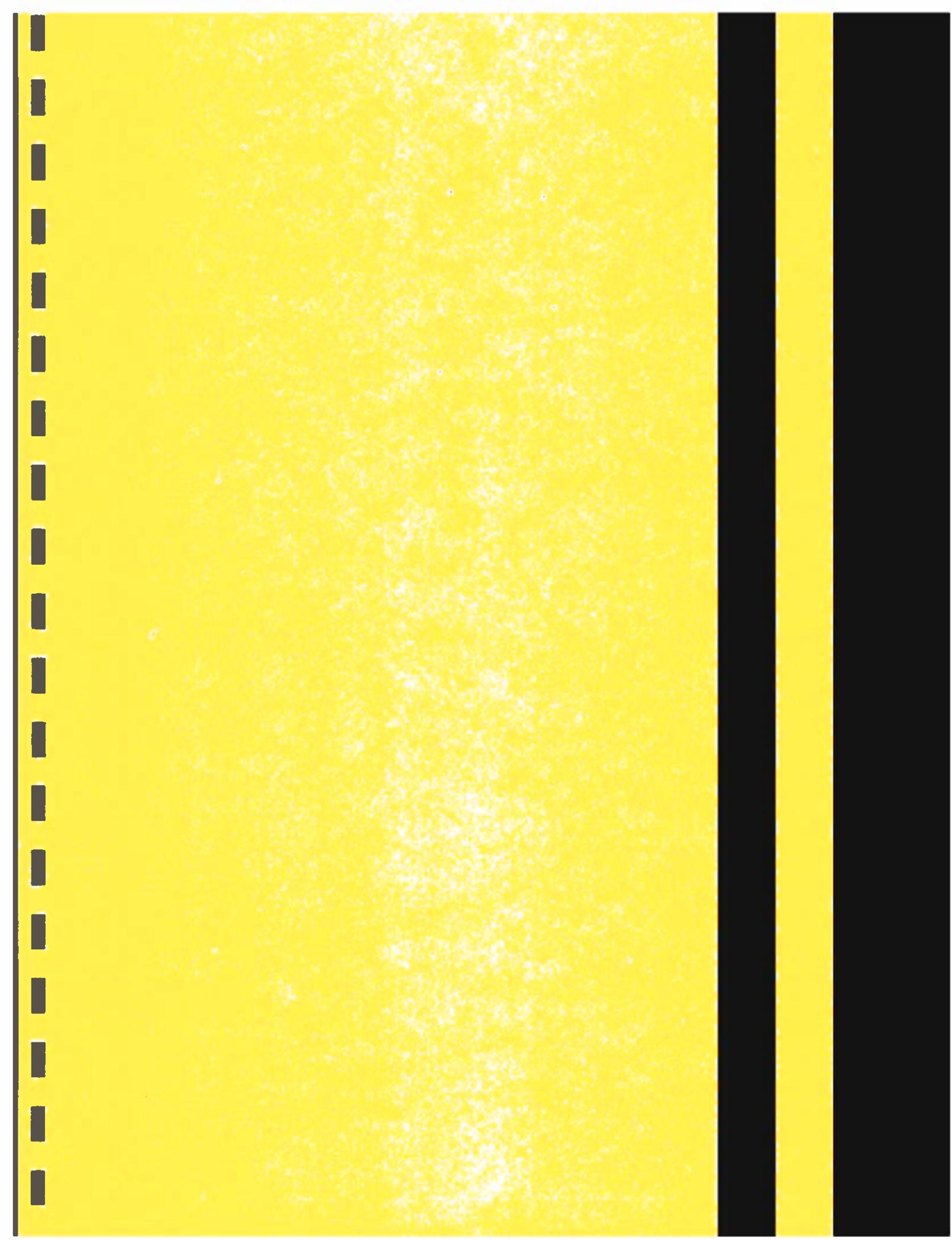
ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 89180

RPD = Relative Percent Difference

Senior Analyst



Environmental Management Inc. Stan Dolfelt
CLIENT ADDRESS 267 E Devil's Rd., Suite #21

PROJECT ID/DESCRIPTION USE ONLY
CSN 431316

FAX 562-1561	P.O. NO. 1B4B	TESTS REQUESTED	LOC					
Sample Matrix (circle one) <input checked="" type="radio"/> WATER SOIL OIL SLUDGE		SPECIAL (X) CONSIDERATION	OC					
OTHER (specify)		NO. OF BOTTLES	PM					
(NOTE: use one Chain of Custody per matrix)		DUE						
DATE	TIME	CLIENT ID	SAMPLE REMARK					
6-30	3:09pm	6179-03	H ₂ SO ₄					
6-30	5:09pm	6179-03	H ₂ SO ₄					
6-30	5:16pm	6179-04	H ₂ SO ₄					
6-30	6:37pm	6179-09	H ₂ SO ₄					
6-30	7:10pm	6179-10	H ₂ SO ₄					
6-30	6:37pm	6179-09 (Extra Sample)	H ₂ SO ₄ (only use if needed)					
COMMENTS 15 wt% TAN Level II QC per Quate. 7/1/93								
RELINQUISHED BY	DATETIME	RECEIVED BY	DATETIME	RELINQUISHED BY	DATETIME	RECEIVED BY	DATETIME	MEANS OF DELIVERY
Stan Dolfelt	6-30-93 2:45pm.	Shanle Wieg	6-30-93	Shanle Wieg	7-2-93	Carl Hopp	7/2/93 3:40pm	

Order # A3-07-003
Analytica, Inc.

ENVIRONMENTAL MANAGEMENT INC.
CASE NARRATIVE

2

RESULTS AND DISCUSSION
FOR
ENVIRONMENTAL MANAGEMENT INC.

LGN:A3-07-003

ORGANIC NARRATIVE

Method 418.1 from Method for Chemical Analysis of Water and Wastes, USEPA-60C/4-79-020, March 1983, is used for the analysis of total petroleum hydrocarbons (TPH).

The samples are non-detect for the required analysis.

The EPA recommended analytical and extraction holding times are met for all the samples. The quality control (QC) data is indicative of acceptable method and instrument performance. The method blank is within acceptable limits. Samples were received properly packed at preserving temperature.



811 W. 8th Avenue, Anchorage, AK 99501 • (907) 258-2155 • FA

258-663

ENVIRONMENTAL MANAGEMENT INC.
907 E. DOWLING RD. STE. #21
ANCHORAGE, ALASKA 99518

Attn: STAN DOLLOFF

Order #: A3-07-003
Date: 07/09/93 16:02
Work ID: #6179
Date Received: 07/06/93
Date Completed: 07/09/93

SAMPLE IDENTIFICATION

Sample Number	<u>Client Description</u>
01	6179-05
02	6179-03
03	6179-04

Sample Number	<u>Client Description</u>
04	6179-09
05	6179-10
06	6179-09 EXTRA SAMPL

Enclosed are the analytical results for the submitted samples. All analyses met quality assurance objectives, except where noted in the case narratives. If you have any questions regarding the analyses, please feel free to call.

Earl L. Crapps

Earl L. Crapps
Laboratory Supervisor

Order # A3-07-003
Analytica, Inc.

ENVIRONMENTAL MANAGEMENT INC.
TEST RESULTS by SAMPLE

3

Sample: 01A 6179-05 Collected: 06/30/93 Matrix:

<u>Test Description</u>	<u>Method</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>Specified</u>
TPH In Water By 418.1	EPA 418.1	ND	1	mg/L	793

Sample: 02A 6179-03 Collected: 06/30/93 Matrix:

<u>Test Description</u>	<u>Method</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>Specified</u>
TPH In Water By 418.1	EPA 418.1	ND	1	mg/L	793

Sample: 03A 6179-04 Collected: 06/30/93 Matrix:

<u>Test Description</u>	<u>Method</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>Specified</u>
TPH In Water By 418.1	EPA 418.1	ND	1	mg/L	793

Sample: 04A 6179-09 Collected: 06/30/93 Matrix:

<u>Test Description</u>	<u>Method</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>Specified</u>
TPH In Water By 418.1	EPA 418.1	ND	1	mg/L	793

Sample: 05A 6179-10 Collected: 06/30/93 Matrix:

<u>Test Description</u>	<u>Method</u>	<u>Result</u>	<u>Limit</u>	<u>Units</u>	<u>Specified</u>
TPH In Water By 418.1	EPA 418.1	ND	1	mg/L	793

The Science of Analysis, The Art of Service

Analytica Alaska Inc. 811 W 8th Avenue, Anchorage, AK 99501 • (907) 258-2155 • FAX (90)

534

07/09/93 16:21:24

QA/QC Summary Report
Work Order: A307003 Client: EMI

SPIKE

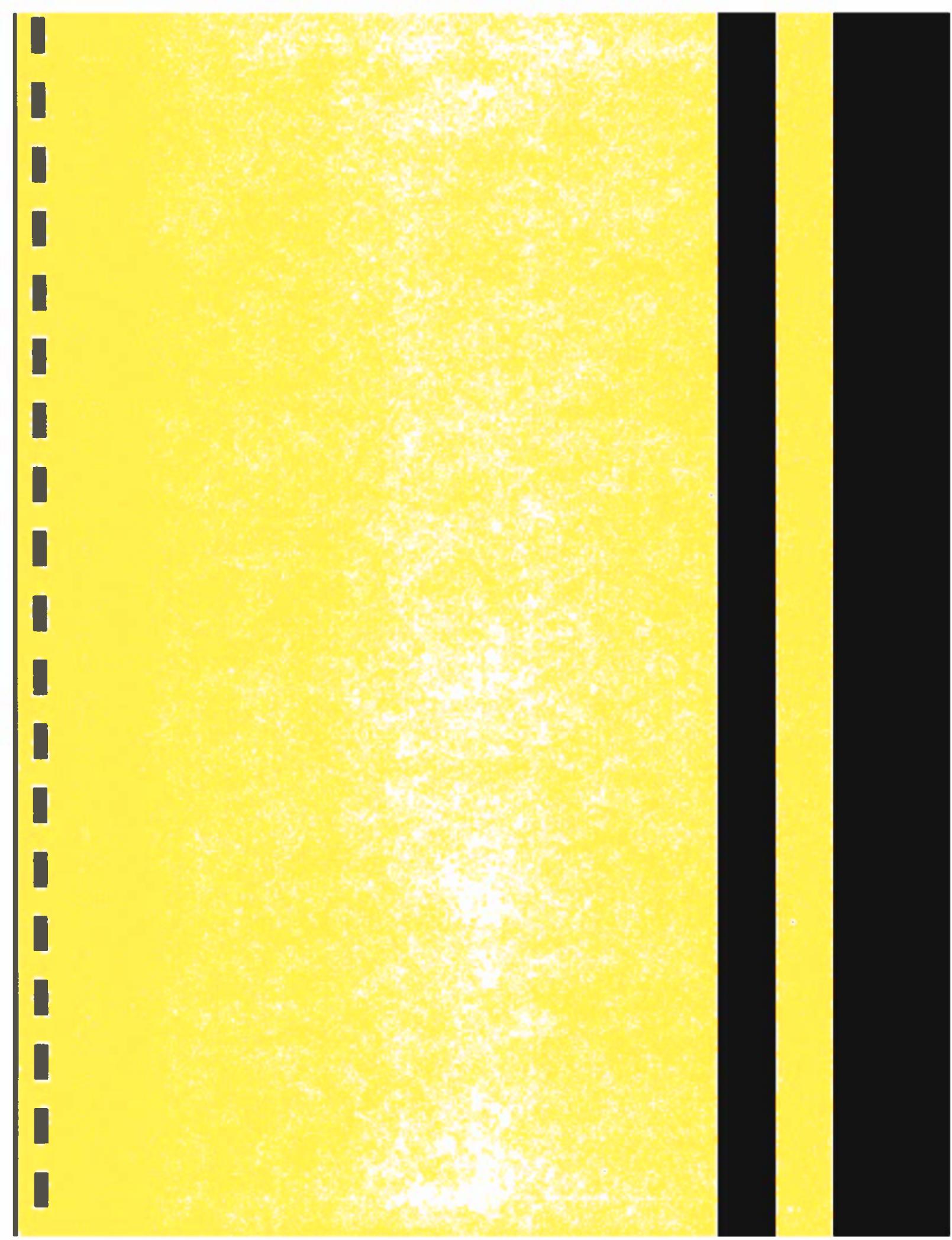
Seq.	Sample ID	Test Code	Class/ Sub/Dup	Matrix/ Sub	Ref Seq	Spk Seq	Dilution	Weight	Volume	Ag	Ver
2	LCS	TPH_W	K	S	W	1	100	1.0	1000	LW	

Analytes	Unspiked		Detection		Spike		Rec-		Specs	
	Result	Result	Limit	Value	Over	Over	Low	High	Specs	Ref
TPH	4.3	ND	1.0	5.0	86.0	70	120	20	86	

SPIKE DUPLICATE

Seq.	Sample ID	Test Code	Class/ Sub/Dup	Matrix/ Sub	Ref Seq	Spk Seq	Dilution	Weight	Volume	Ag	Ver
3	LCS-DUP	TPH_W	K	S	D	W	1	2	100	1.0	1000

Analytes	Unspiked		Detection		Spike		Rec-		Specs	
	Result	Result	Limit	Value	Over	Over	Low	High	Specs	Ref
TPH	4.5	ND	1.0	5.0	90.0	70	120	20	86	



EBA Engineering Inc.

907 E. Dowling Rd., Suite 27, Anchorage, Alaska 99503

427

Laboratory Test Charges

Bill To: Environmental Management Inc.
907 E. Dowling, Suite #21
Anchorage, AK 99518

EBA Jd

M11

Attn: Accounts Payable

Invoi

827-

Project: Materials Testing

Date	Qty.	Description	ASTM #	U Ra
1993				
07/22	9	Densities (In tube)		\$27
	1	Hydraulic Conductivity	D5084	\$210
	1	Prep charge for above		\$30
	5	Gradations (Sieve Analysis)	D422	\$85



TERMS: Net 30 days. 1.5% service charges added to all outstanding balances.

NOTE: 1. MOISTURE CONTENT REPORTED HEREIN WAS DETERMINED FROM BRASS
2. OVERBURDEN PRESSURE ON HYDRAULIC CONDUCTIVITY TESTS WAS 15 I

GRAIN SIZE ANALYSIS (ASTM D422)

PROJECT NAME: EMI-6179
 PROJECT NO.: 5064
 CLIENT: EMI
 BOREHOLE/LOCATION: 87 + 00
 SAMPLE NO.: MW1
 DEPTH: NA

DATE TESTED: 7/21/93
 TESTED BY: RDL
 REVIEWED BY:
 DESCRIPTION: Poorly graded sand

EBA Engineering Inc.

Phone: (907) 561-4085

907 East Dowling Road, Suite 27, Anchorage, Alaska 99518

(907) 561-

SIEVE ANALYSIS TEST

SIEVE SIZE	DIAMETER (mm)	TOTAL % PASSING
6"	152.4	
4"	100	
3"	76.2	
2"	50.8	
1"	25.4	
3/4"	19	
1/2"	12.7	
3/8"	9.5	100
# 4	4.75	100
# 10	2	99
# 20	0.85	99
# 40	0.425	94
# 60	0.25	43
# 100	0.15	21
#200	0.075	4.7

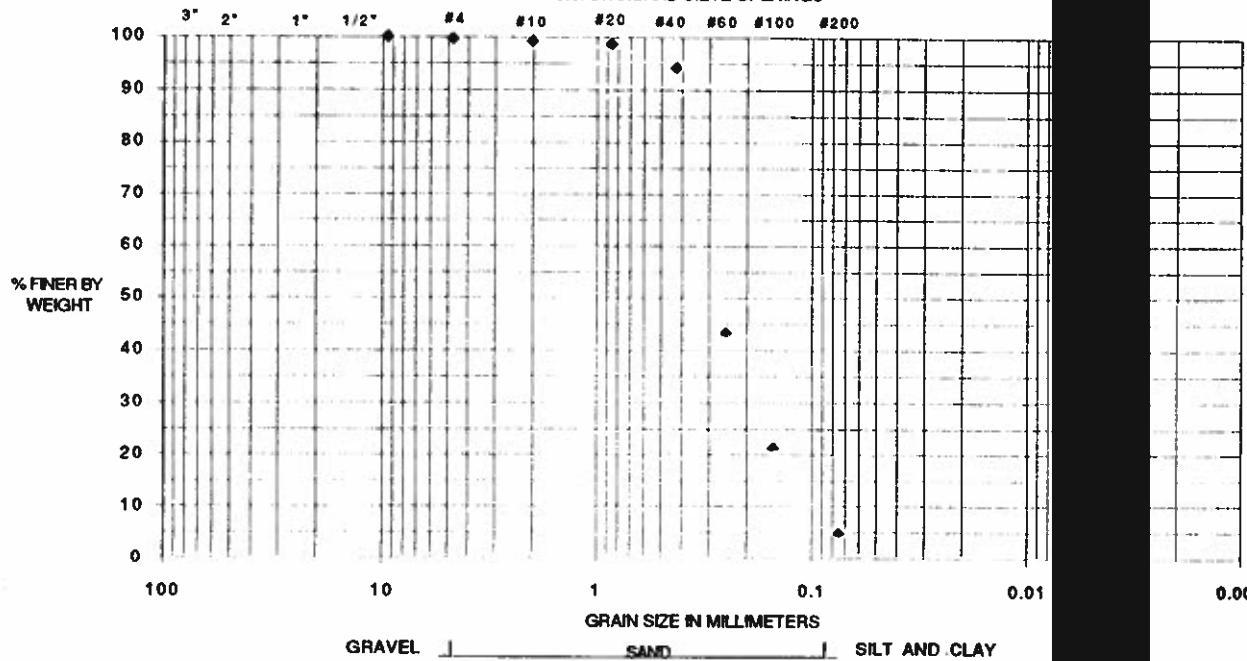
HYDROMETER TEST

ELAPSED TIME	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

% GRAVEL	0.4
% SAND	94.9
% SILT	4.7
	0.31
	0.19
	0.10
MATERIAL	3.1
	1.2
SP	0.0%
	.02

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE OPENINGS



GRAIN SIZE ANALYSIS (ASTM D422)

PROJECT NAME: EMI-6179
 PROJECT NO.: 5064
 CLIENT: EMI
 BOREHOLE/LOCATION: 102 + 50
 SAMPLE NO.: MW2
 DEPTH: NA

DATE TESTED: 7/21/93
 TESTED BY: RDL
 REVIEWED BY:
 DESCRIPTION: Poorly sorted sand w/ silt

EBA Engineering Inc.

Phone: (907) 561-4085

907 East Dowling Road, Suite 27, Anchorage, Alaska 99518

(907) 561-4085

SIEVE ANALYSIS TEST

SIEVE SIZE	DIAMETER (mm)	TOTAL % PASSING
6"	152.4	
4"	100	
3"	76.2	
2"	50.8	
1"	25.4	
3/4"	19	100
1/2"	12.7	97
3/8"	9.5	96
# 4	4.75	95
# 10	2	94
# 20	0.85	94
# 40	0.425	93
# 60	0.25	62
# 100	0.15	35
# 200	0.075	8.7

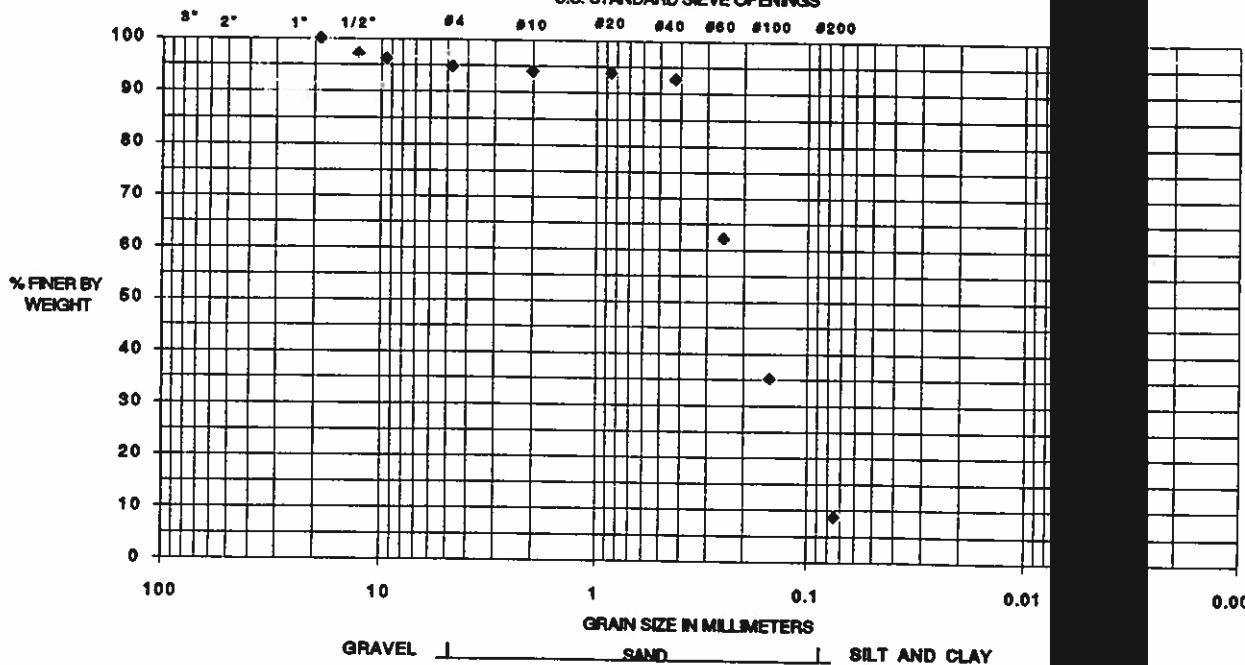
HYDROMETER TEST

ELAPSED TIME	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

% GRANULES	5.1
% COARSE	86.2
% SILTAZETTE	8.7
	0.24
	0.14
	0.08
	3.1
	1.0
MATERIAL	0.0%
SP-SP	0.0%
SP-SM	0.0%
	.02%

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE OPENINGS



GRAIN SIZE ANALYSIS (ASTM D422)

PROJECT NAME: EMI-6179
 PROJECT NO.: 5064
 CLIENT: EMI
 BOREHOLE/LOCATION: 91 + 50
 SAMPLE NO.: MW3
 DEPTH: NA

DATE TESTED: 7/21/93
 TESTED BY: RDL
 REVIEWED BY:
 DESCRIPTION: Poorly

EBA Engineering Inc.

Phone: (907) 561-4085 907 East Dowling Road, Suite 27, Anchorage, Alaska 99518

: (907) 5

SIEVE ANALYSIS TEST

SIEVE SIZE	DIAMETER (mm)	TOTAL % PASSING
6"	152.4	
4"	100	
3"	76.2	
2"	50.8	
1"	25.4	
3/4"	19	
1/2"	12.7	100
3/8"	9.5	100
# 4	4.75	98
# 10	2	97
# 20	0.85	96
# 40	0.425	90
# 60	0.25	47
# 100	0.15	10
# 200	0.075	2.0

HYDROMETER TEST

ELAPSED TIME	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

% GF
%

% SILT

2.1

95.9

2.0

0.30

0.20

0.15

2.0

0.9

0.0%

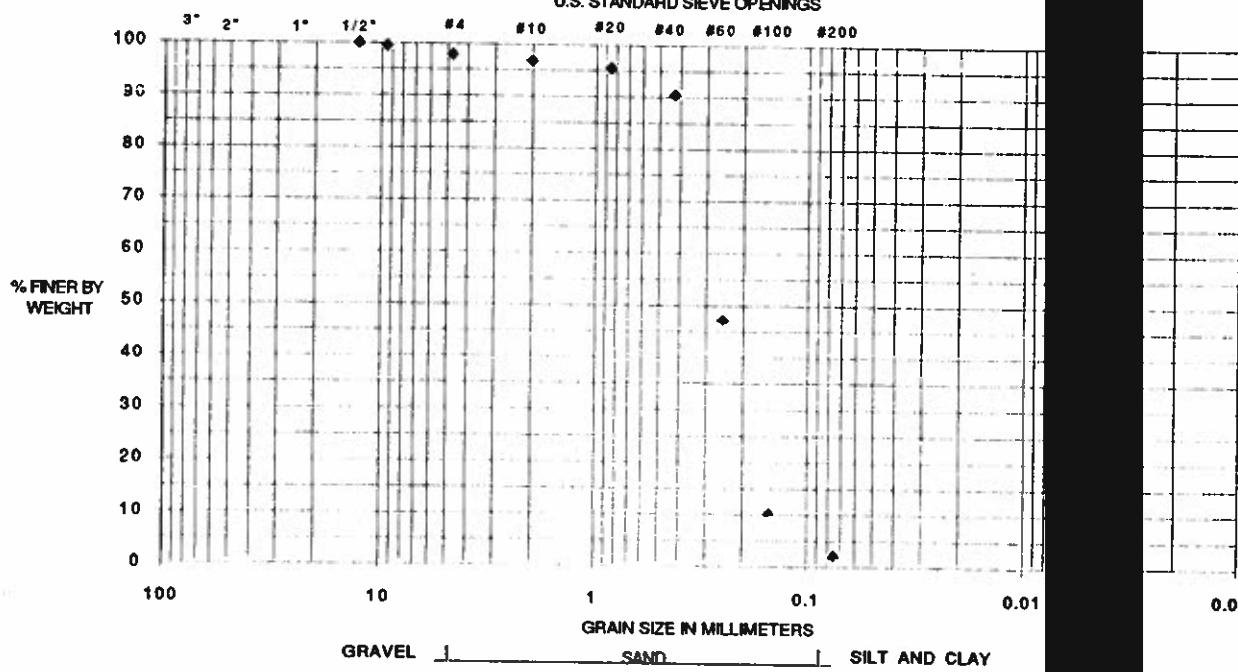
SP

N
%

0.0

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE OPENINGS



GRAIN SIZE ANALYSIS (ASTM D422)

PROJECT NAME:	EMI-6179
PROJECT NO.:	5064
CLIENT:	EMI
BOREHOLE/LOCATION:	102 + 75
SAMPLE NO.:	MW3
DEPTH:	NA

DATE TESTED: 7/21/93
TESTED BY: RDL
REVIEWED BY: _____
DESCRIPTION: Poorly
and w/ sili

EBA Engineering Inc.

Phone: (907) 561-4085 907 East Dowling Road, Suite 27, Anchorage, Alaska 99518

SIEVE ANALYSIS TEST

SIEVE SIZE	DIAMETER (mm)	TOTAL % PASSING
6"	152.4	
4"	100	
3"	76.2	
2"	50.8	
1"	25.4	
3/4"	19	100
1/2"	12.7	99
3/8"	9.5	97
# 4	4.75	95
#10	2	93
#20	0.85	91
#40	0.425	90
#60	0.25	71
#100	0.15	26
#200	0.075	7.1

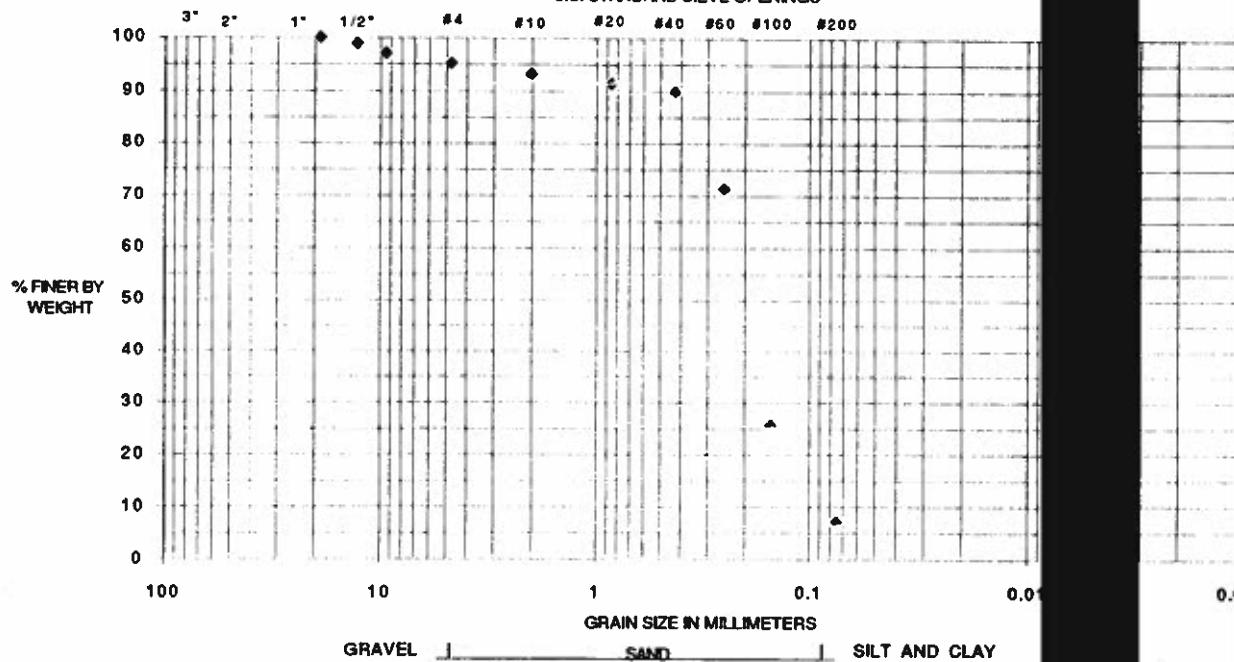
HYDROMETER TEST

HYDROMETER TEST		
ELAPSED TIME	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

% GR	4.7
%	88.2
% SILT	7.1
	0.23
	0.16
	0.09
	2.6
	1.3
	0.0%
	SP-SM
% CL	

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE OPENINGS



GRAIN SIZE ANALYSIS (ASTM D422)

PROJECT NAME: EMI-6179
 PROJECT NO.: 5064
 CLIENT: EMI
 BOREHOLE/LOCATION: 94 + 75
 SAMPLE NO.: MW4
 DEPTH: NA

DATE TESTED: 7/21/93
 TESTED BY: RDL
 REVIEWED BY:
 DESCRIPTION: Poorly

EBA Engineering Inc.

Phone: (907) 561-4085

907 East Dowling Road, Suite 27, Anchorage, Alaska 99518

Phone: (907) 5

SIEVE ANALYSIS TEST

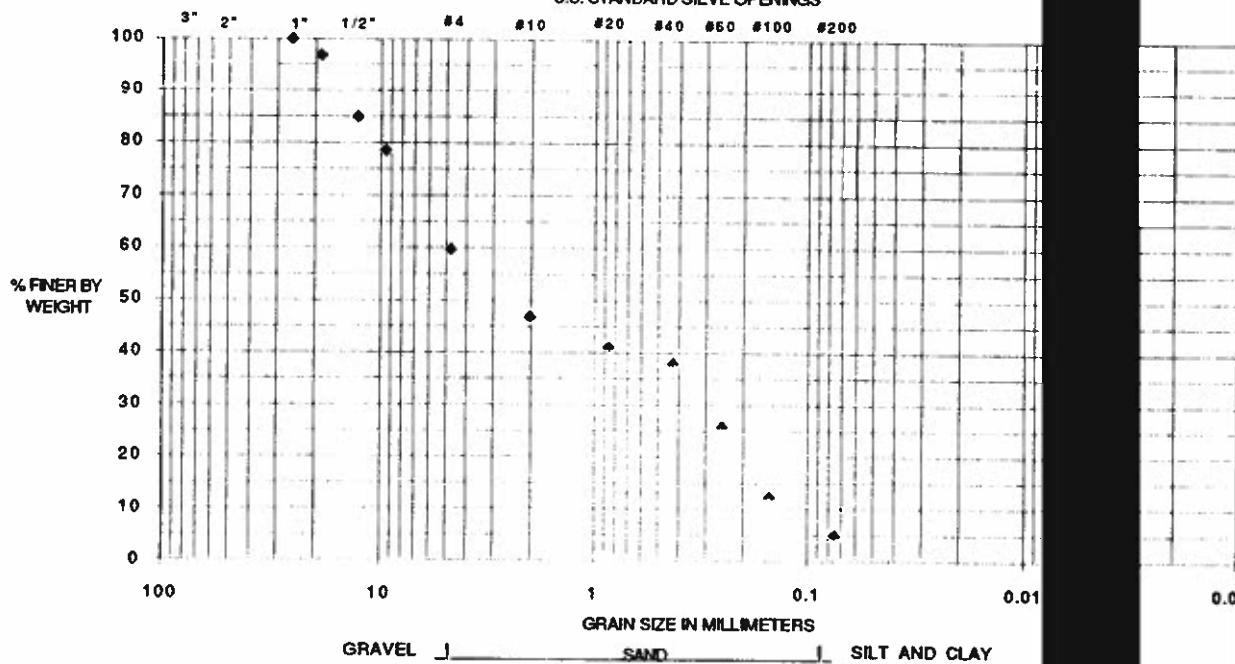
SIEVE SIZE	DIAMETER (mm)	TOTAL % PASSING
6"	152.4	
4"	100	
3"	76.2	
2"	50.8	
1"	25.4	100
3/4"	19	97
1/2"	12.7	85
3/8"	9.5	78
# 4	4.75	60
# 10	2	47
# 20	0.85	41
# 40	0.425	38
# 60	0.25	26
# 100	0.15	12
# 200	0.075	4.9

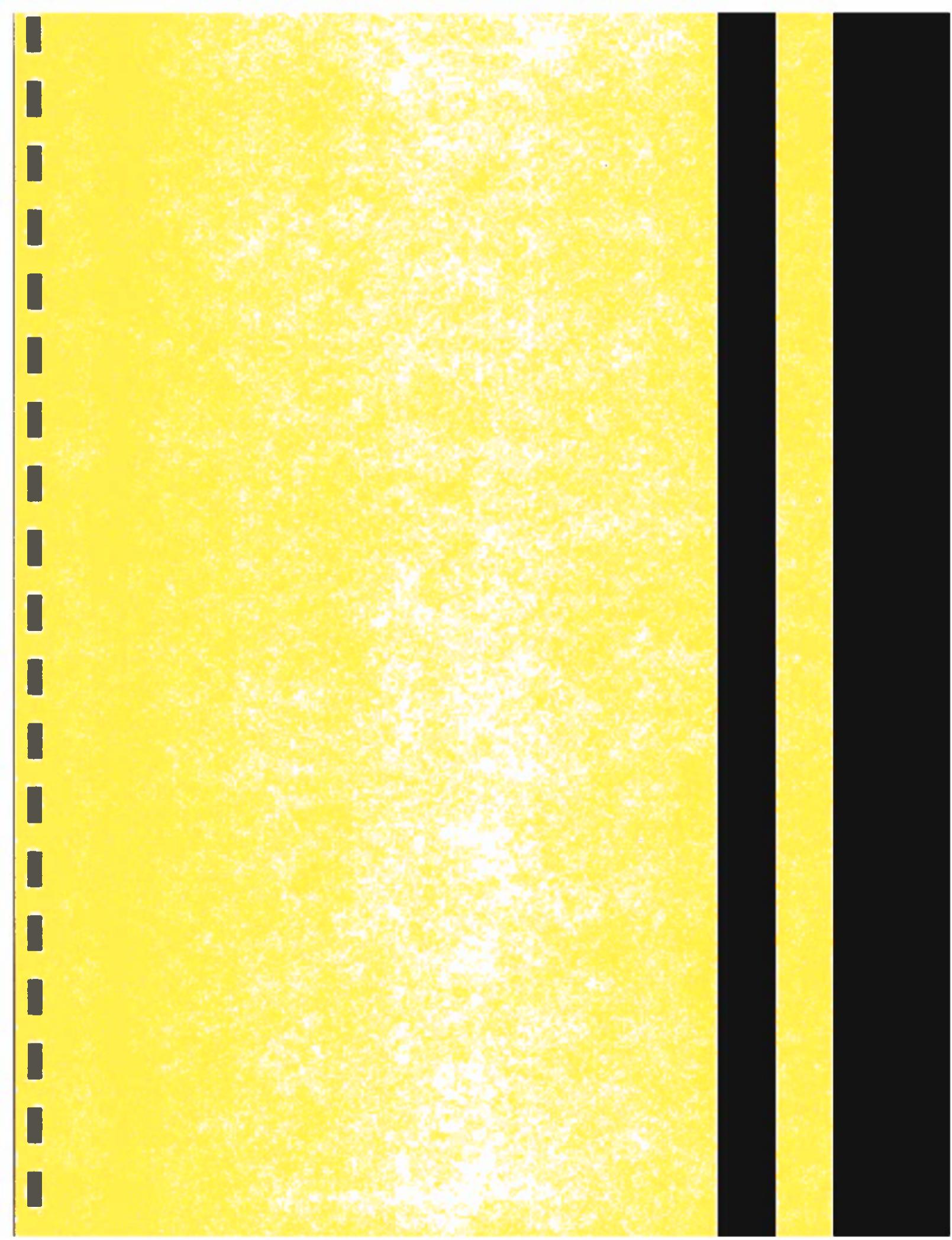
HYDROMETER TEST

ELAPSED TIME	DIAMETER (mm)	TOTAL % PASSING
0		
0.5		
1		
2		
4		
8		
15		
30		
60		
250		
1440		

% GP	40.4
%	54.7
% SILT	4.9
	4.84
	0.31
	0.13
	38.2
	0.2
	0.0%
	SP
	% .0

GRAIN SIZE DISTRIBUTION U.S. STANDARD SIEVE OPENINGS





ALASKA Chain of Custody and Analysis Request

Company: Environmental Management Inc.
 Address: 107 E. Dowling Rd., Suite #2
 City: Anchorage
 State: AK
 Zip: 99518
 Phone: (907) 562-2580
 Project Manager: Bill Patterson
 Alternate Contact: Stan Dallhoff
 Project No.: 617A P.O. No. 18/7

Page 1 of 1

TURN AROUND TIME (circle one)	72 Hrs.
Same Day	
24 Hrs.	48 Hrs.
Normal 5 Day	

Section II: Analysis Request

Sample Identification	W = Soil A = Air S = Soil B = Air M = Water	AK100 (Dissell)	8015M/TPH-GI	AK101(TPH-GI)	8015M/8020	8010	8270 (SVOC)	418.1 (TPH)	AK101/802	PC85	8080	SPC 1891	Date Sampled	Time Sampled	# of Containers	Previous Test(s) (Yes or No)	Sampling Remarks Bioremediation UST Monitoring Recent Contamination Unknown Compounds COMMENTS:	Regulatory Agency: EEC ADEC	Sampler: Stan Dallhoff	Martinez I: (510) 229-1512 Martinez II: (510) 229-0166 San Francisco: (415) 647-2081	Superior Precision Analytical Inc. P.O. Box 1545 Martinez, California 94553
1 DB#1	W																				
2 DB#2	W																				
3 DB#3	W																				
4 DB#4	W	✓																			
5 DB#5	W																				
6 DB#6	W																				
7 DB#6 (extra)	W																				
8																					
9																					
10																					

Requisitioned By: Stan Dallhoff
 Organization: EEC Date/Time: 6-24-93 Received By:
 Organization: Lab: Please initial the following:

Date/Time



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report Project
-July

HALOGENATED VOLATILE ORGANICS by EPA SW-846 Methods

/8010

Chronology

Laboratory Number

Identification	Sampled	Received	Extracted	Analyzed	Run #
----------------	---------	----------	-----------	----------	-------

DB#1	06/24/93	06/25/93	/	/	06/28/93
------	----------	----------	---	---	----------



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

229-1526

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No. 6-July

HALOGENATED VOLATILE ORGANICS by EPA SW-846 Methods

0/8010

Laboratory Number	Sample Identification	Matrix
89093- 1	DB#1	Water

RESULTS OF ANALYSIS

Laboratory Number: 89093- 1

Chloromethane/Vinyl Ch:ND<1
Bromomethane: ND<0.5
Chloroethane: ND<0.5
Trichlorofluoromethane: ND<0.5
1,1-Dichloroethene: ND<0.5
Dichloromethane: 3.4
t-1,2-Dichloroethene: ND<0.5
1,1-Dichloroethane: ND<0.5
c-1,2-Dichloroethene: ND<0.5
Chloroform: 4.5
1,1,1-Trichloroethane: ND<0.5
Carbon tetrachloride: ND<0.5
1,2-Dichloroethane: ND<0.5
Trichloroethene: ND<0.5
c-1,3-Dichloropropene: ND<0.5
1,2-Dichloropropane: ND<0.5
t-1,3-Dichloropropene: ND<0.5
Bromodichloromethane: ND<0.5
1,1,2-Trichloroethane: ND<0.5
Tetrachloroethene: ND<0.5
Dibromochloromethane: ND<0.5
Chlorobenzene: ND<0.5
Bromoform: ND<0.5
1,1,2,2-Tetrachloroethene: ND<0.5
1,3-Dichlorobenzene: ND<0.5
1,2-Dichlorobenzene: ND<0.5
1,4-Dichlorobenzene: ND<0.5

Concentration: ug/L



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

HALOGENATED VOLATILE ORGANICS by EPA SW-846 Methods

Quality Assurance and Control Data - Water

8010

Laboratory Number 89093

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limit (%)	RPD (%)
Chloromethane/Vinyl Ch:	ND<1	1			
Bromomethane:	ND<0.5	0.5			
Chloroethane:	ND<0.5	0.5			
Trichlorofluoromethane:	ND<0.5	0.5			
1,1-Dichloroethene:	ND<0.5	0.5	101%	75-12	0%
Dichloromethane:	ND<0.5	0.5			
t-1,2-Dichloroethene:	ND<0.5	0.5			
1,1-Dichloroethane:	ND<0.5	0.5			
c-1,2-Dichloroethene:	ND<0.5	0.5			
Chloroform:	ND<0.5	0.5			
1,1,1-Trichloroethane:	ND<0.5	0.5			
Carbon tetrachloride:	ND<0.5	0.5			
1,2-Dichloroethane:	ND<0.5	0.5			
Trichloroethene:	ND<0.5	0.5	98%	75-12	0%
c-1,3-Dichloropropene:	ND<0.5	0.5			
1,2-Dichloropropane:	ND<0.5	0.5			
t-1,3-Dichloropropene:	ND<0.5	0.5			
Bromodichloromethane:	ND<0.5	0.5			
1,1,2-Trichloroethane:	ND<0.5	0.5			
Tetrachloroethene:	ND<0.5	0.5			
Dibromochloromethane:	ND<0.5	0.5			
Chlorobenzene:	ND<0.5	0.5	108%	75-12	1%
Bromoform:	ND<0.5	0.5			
1,1,2,2-Tetrachloroeth:	ND<0.5	0.5			
1,3-Dichlorobenzene:	ND<0.5	0.5			
1,2-Dichlorobenzene:	ND<0.5	0.5			
1,4-Dichlorobenzene:	ND<0.5	0.5			

Definitions:

ND = Not Detected

RPD = Relative Percent Difference

PQL = Practical Quantitation Limit

QC File No. 89093

Afsaneh. S. Op
Senior Analyst



Superior Precision Analytical, Inc.

825 Arnold Drive, Suite 114 • Martinez, California 94553 • (510) 229-1512 / fax (510) 229-1526

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report
Revised 2

Project
2-Jul
tembe

VOLATILE PETROLEUM HYDROCARBONS

Sample preparation by Purge and Trap (EPA SW-846 method 8015 modified). Gasoline range analysis by SW-846 method 8015 modified. Gasoline range compounds between C6 and C10. Benzene, Toluene, Ethyl Benzene and m,p-xylene analyses by EPA method 602.

Chronology	Identification	Sampled	Received	Extracted	Analyzed	Laboratory Number	Run #
DB#2		06/24/93	06/25/93	/	/	07/02/	



Superior Precision Analytical, Inc.

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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Project
Report
Revised 2

VOLATILE PETROLEUM HYDROCARBONS

Laboratory Number	Sample Identification	Matrix
89093- 2	DB#2	Water

RESULTS OF ANALYSIS

Laboratory Number: 89093- 2

Gasoline:	ND<100
Benzene:	ND<1
Toluene:	1
Ethyl Benzene:	ND<1
Xylenes:	ND<3
Surrogate Recovery:	88%

Concentration: ug/L



VOLATILE PETROLEUM HYDROCARBONS
Quality Assurance and Control Data - Wat

Laboratory Number 89093

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limit (%)	RPD (%)
Gasoline:	ND<100	100	73%	70-1	1%
Benzene:	ND<1	1	97%	70-1	2%
Toluene:	ND<1	1	92%	70-1	2%
Ethyl Benzene:	ND<1	1	93%	70-1	2%
Xylenes:	ND<3	3	89%	70-1	2%

Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 89093

RPD = Relative Precision Di

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229-1526

ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No. Project No. 2-July

TOTAL RECOVERABLE HYDROCARBONS by EPA Method

Identification	Sampled	Received	Extracted	Analyzed	Laboratory Number	Analyst
DB#3	06/24/93	06/25/93	07/01/93	07/01/93		



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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report

Project
8-July

TOTAL RECOVERABLE HYDROCARBONS by EPA Method

Laboratory Number	Sample Identification	Matrix
89093- 3	DB#3	Water

RESULTS OF ANALYSIS

Laboratory Number: 89093- 3

PETROLEUM HYDROCARBONS:ND<1

Concentration: mg/L



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29-1526

TOTAL RECOVERABLE HYDROCARBONS by EPA Method Quality Assurance and Control Data - Water

Laboratory Number 89093

Compound	Method	Average				RPD (%)
		Blank (mg/L)	PQL (mg/L)	Spike Recovery (%)	Limit (%)	
PETROLEUM HYDROCARBONS:	ND<1	1		94%	75-125	3%

Definitions:

ND = Not Detected

RPD = Relative Percent Difference

PQL = Practical Quantitation Limit

QC File No. 89093

Saye
Senior Analyst



Superior Precision Analytical, Inc.

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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No. Project No. Date: 8-July

DIESEL RANGE TOTAL PETROLEUM HYDROCARBONS by EPA SW-846 Method 81

Diesel range quantified as all compounds between C₁₂ and C₂₈.

Chronology	Laboratory Number
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Identification	Sampled	Received	Extracted	Analyzed	Run #
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DB#4	06/24/93	06/25/93	06/29/93	06/30/93	
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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No. 8-July

DIESEL RANGE TOTAL PETROLEUM HYDROCARBONS by EPA SW-846

Laboratory Number	Sample Identification	Matrix
89093- 4	DB#4	Water

RESULTS OF ANALYSIS

Laboratory Number: 89093- 4

Diesel Range: ND<100

Concentration: ug/L

Surrogate Recovery: 123%



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DIESEL RANGE TOTAL PETROLEUM HYDROCARBONS by EPA SW-846 Method 8110

Quality Assurance and Control Data - Water

Laboratory Number 89093

Compound	Method	Average			RPD (%)
		Blank (ug/L)	PQL (ug/L)	Spike Recovery (%)	
Diesel Range:		ND<100	100	87%	75-125

Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 89093

RPD = Relative Percent Difference

Say
Senior Analyst

Yes
st



Superior Precision Analytical, Inc.

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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report Project
-July

ANALYSIS FOR POLYCHLORINATED BIPHENYLS

Sample preparation by microextraction into hexane,
chromatography using an electron capture detector.
(8080).

Identification	Sampled	Received	Extracted	Analyzed	Laboratory Number
DB#5	06/24/93	06/25/93	06/28/93	06/28/93	



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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report

Project
-July

ANALYSIS FOR POLYCHLORINATED BIPHENYLS

Laboratory Number	Sample Identification	Matrix
89093- 5	DB#5	water

RESULTS OF ANALYSIS

Laboratory Number: 89093- 5

AROCLOR 1016:	ND<0.1
AROCLOR 1221:	ND<0.1
AROCLOR 1232:	ND<0.1
AROCLOR 1242:	ND<0.1
AROCLOR 1248:	ND<0.1
AROCLOR 1254:	ND<0.1
AROCLOR 1260:	ND<0.1

Concentration: ug/L

SURROGATE RECOVERY: 130%



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ANALYSIS FOR POLYCHLORINATED BIPHENYLS Quality Assurance and Control Data - Water

Laboratory Number 89093

Compound	Method	Average			Limit	RPD
		Blank (ug/L)	PQL (ug/L)	Spike Recovery (%)		
AROCLOR 1016:		ND<0.1	0.1			
AROCLOR 1221:		ND<0.1	0.1			
AROCLOR 1232:		ND<0.1	0.1			
AROCLOR 1242:		ND<0.1	0.1			
AROCLOR 1248:		ND<0.1	0.1			
AROCLOR 1254:		ND<0.1	0.1	102%	60-140	9%
AROCLOR 1260:		ND<0.1	0.1			

Definitions:

ND = Not Detected

RPD = Relative Percent Difference

PQL = Practical Quantitation Limit

QC File No. 89093

Sayer
Senior Analyst



Superior Precision Analytical, Inc.

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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report No. Project
-July

ANALYSIS OF ARSENIC, CADMIUM, CHROMIUM, LEAD BY SW-846 METHOD 6010 & 7060

Identification	Sampled	Received	Extracted	Analyzed	Laboratory Number	Analysis #
DB#6	06/24/93	06/25/93	06/30/93	07/01/93		



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ENVIRONMENTAL MANAGEMENT INC
Attn: BILL PATTERSON

Report

object
-July

Laboratory Number Sample Identification Matrix

89093- 6 DB#6 Water

RESULTS OF ANALYSIS

Laboratory Number: 89093- 6

ARSENIC: ND<0.01
CADMIUM: ND<0.01
CHROMIUM: ND<0.05
LEAD: ND<0.01

Concentration: mg/L



Superior Precision Analytical, Inc.

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Quality Assurance and Control Data - Water

Laboratory Number 89093

Compound	Method	Average			RPD (%)
		Blank (mg/L)	PQL (mg/L)	Spike Recovery (%)	
ARSENIC:	ND<0.01	0.01	110%	75-125	5%
CADMIUM:	ND<0.01	0.01	99%	75-125	5%
CHROMIUM:	ND<0.05	0.05	95%	75-125	6%
LEAD:	ND<0.01	0.01	99%	75-125	6%

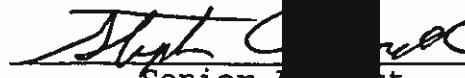
Definitions:

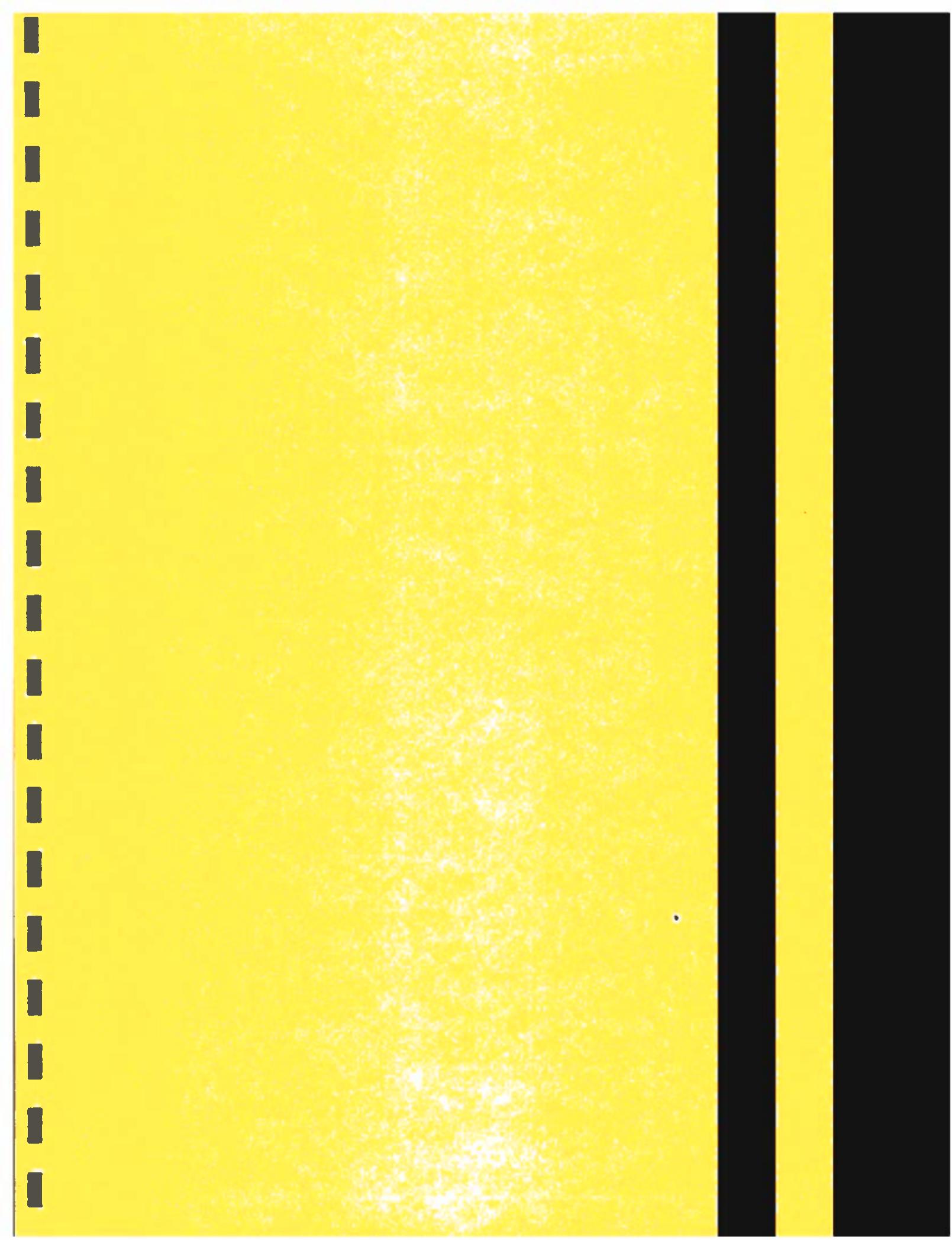
ND = Not Detected

RPD = Relative Percent Difference

PQL = Practical Quantitation Limit

QC File No. 89093


Stephen C. Ward
Senior Analyst



COMMERCIAL TESTING & ENGINEERING CO.
AK DIVISION CHEMICAL & GEOLOGICAL LABORATORY

Sample Acknowledgement

ChemLab Ref.# : 93-3190
Client BPO :
BPO Req# :
Client PO : E-4360 1847
PO Req.# :
Est. Due Date : 07/14/93

Ordered By :
VIA : HAND
Send : ENVIR
Reports : 907 E
To : ANCHORAGE
MGMT INC
RD, WELLS
99518
(907)

Client Name :ENVIRONMENTAL MGMT INC (EMI)
Contact Person :JOHN SIMPSON
Billing Address :ACCOUNTS PAYABLE
907 E DOWLING RD, WELLS BUS PK #21
ANCHORAGE, AK 99518

Additional :
Reports :
To :

Special Instructions :JOB #6179 MARK AIR PROJECT - FAIRBANKS.

ChemLab Sample#	Client Sample Description	Parameter Tested	Me
1	6179-05	Halogenated Volatiles	EP
2	6179-03	Halogenated Volatiles	EP
3	6179-04	Halogenated Volatiles	EP
4	6179-09	Halogenated Volatiles	EP
5	6179-10	Halogenated Volatiles	EP

The above samples were received on 07/02/93 and will receive the test as described above, as per your request. These samples will be disposed 30 days after completion of analysis unless previous arrangements have been made.

For technical information call: 562-2343 Ask for Stephen Ede or Chuck Homestead.
For turnaround times or status call: 562-2343 Ask for Joyce Windebank or Gene Yonkin.

COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT OF ANALYSIS

Chemlab Ref.# : 93.3190-1
Client Sample ID : 6179-05
Matrix : WATER

Client Name	: ENVIRONMENTAL MGMT INC (EMI)	WORK Order	7
Ordered By	:	Report Completed	4/93
Project Name	: MARK AIR PROJECT - FAIRBANKS	Collected	0/93
Project#	: 6179	Received	2/93
PWSID	: UA	Technical Director	HEN C.
		Released By	<i>[Signature]</i>

Sample Remarks: SAMPLE COLLECTED BY: STAN DOLLOFF/BAILER USED. JOB #6
PROJECT - FAIRBANKS.

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Parameter	Results	QC	Qual	Units	Method	Allocated Line	Ext. Date
Halogenated Volatiles							
Methylene Chloride	0.0010	U		mg/L	EPA 601		07/12
1, 1 Dichloroethylene	0.0010	U		mg/L	EPA 601		07/12
1, 1 Dichloroethane	0.0010	U		mg/L	EPA 601		07/12
Chloroform	0.0010	U		mg/L	EPA 601		07/12
Carbontetrachloride	0.0010	U		mg/L	EPA 601		07/12
1, 2 Dichloroproppane	0.0010	U		mg/L	EPA 601		07/12
Trichloroethylene	0.0010	U		mg/L	EPA 601		07/12
1,1,2 Trichloroethane	0.0010	U		mg/L	EPA 601		07/12
Dibromochloromethane	0.0010	U		mg/L	EPA 601		07/12
Tetrachloroethylene	0.0010	U		mg/L	EPA 601		07/12
Chlorobenzene	0.0010	U		mg/L	EPA 601		07/12
Trichlorofluoromethane	0.0010	U		mg/L	EPA 601		07/12
trans1,2Dichloroethylene	0.0010	U		mg/L	EPA 601		07/12
1,2 Dichloroethane	0.0010	U		mg/L	EPA 601		07/12
1,1,1 Trichloroethane	0.0010	U		mg/L	EPA 601		07/12
Bromodichloromethane	0.0010	U		mg/L	EPA 601		07/12
trans1,3Dichloropropene	0.0010	U		mg/L	EPA 601		07/12
cis-1,3-Dichloropropene	0.0010	U		mg/L	EPA 601		07/12
Bromoform	0.0010	U		mg/L	EPA 601		07/12
1122-Tetrachloroethane	0.0010	U		mg/L	EPA 601		07/12
Chloromethane	0.0010	U		mg/L	EPA 601		07/12
Bromomethane	0.0010	U		mg/L	EPA 601		07/12
Vinyl chloride	0.0010	U		mg/L	EPA 601		07/12
Chloroethane	0.0010	U		mg/L	EPA 601		07/12
1, 4 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/12
2-Chloroethylvinylether	0.0010	U		mg/L	EPA 601		07/12
1,3 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/12
1,2 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/12

* See Special Instructions Above

** See Sample Remarks Above

U = Undetected, Reported value is the practical quantification limit.

D = Secondary dilution.

= Unava

= Not A

= Less

= Great



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Y, SOUTH



COMMERCIAL TESTING & ENGINEERING
ENVIRONMENTAL LABORATORY SERVICES

CO.

Chemlab Ref.# : 93.3190-2
Client Sample ID : 6179-03
Matrix : WATER

REPORT OF ANALYSIS

Client Name	: ENVIRONMENTAL MGMT INC (EMI)	WORK Order	7
Ordered By	:	Report Completed	4/93
Project Name	: MARK AIR PROJECT - FAIRBANKS	Collected	0/93
Project#	: 6179	Received	2/93
PWSID	: UA	Technical Director	HEN C.
		Released By	<i>[Signature]</i>

Sample Remarks: SAMPLE COLLECTED BY: STAN DOLLOFF/BAILER USED. JOB #6179-03
PROJECT - FAIRBANKS.

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HEN C.
[Signature]
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Parameter	Results	QC Qual	Units	Method	Allocated Limit	Ext. Date
Halogenated Volatiles						
Methylene Chloride	0.0010	U	mg/L	EPA 601		07/12
1, 1 Dichloroethylene	0.0010	U	mg/L	EPA 601		07/12
1, 1 Dichloroethane	0.0010	U	mg/L	EPA 601		07/12
Chloroform	0.0010	U	mg/L	EPA 601		07/12
Carbontetrachloride	0.0010	U	mg/L	EPA 601		07/12
1, 2 Dichloropropane	0.0010	U	mg/L	EPA 601		07/12
Trichloroethylene	0.0010	U	mg/L	EPA 601		07/12
1,1,2 Trichloroethane	0.0010	U	mg/L	EPA 601		07/12
Dibromochloromethane	0.0010	U	mg/L	EPA 601		07/12
Tetrachloroethylene	0.0010	U	mg/L	EPA 601		07/12
Chlorobenzene	0.0010	U	mg/L	EPA 601		07/12
Trichlorofluoromethane	0.0010	U	mg/L	EPA 601		07/12
trans1,2Dichloroethylene	0.0010	U	mg/L	EPA 601		07/12
1,2 Dichloroethane	0.0010	U	mg/L	EPA 601		07/12
1,1,1 Trichloroethane	0.0010	U	mg/L	EPA 601		07/12
Bromodichloromethane	0.0010	U	mg/L	EPA 601		07/12
trans1,3Dichloropropene	0.0010	U	mg/L	EPA 601		07/12
cis-1,3-Dichloropropene	0.0010	U	mg/L	EPA 601		07/12
Bromoform	0.0010	U	mg/L	EPA 601		07/12
1122-Tetrachloroethane	0.0010	U	mg/L	EPA 601		07/12
Chloromethane	0.0010	U	mg/L	EPA 601		07/12
Bromomethane	0.0010	U	mg/L	EPA 601		07/12
Vinyl chloride	0.0010	U	mg/L	EPA 601		07/12
Chloroethane	0.0010	U	mg/L	EPA 601		07/12
1, 4 Dichlorobenzene	0.0010	U	mg/L	EPA 601		07/12
2-Chloroethylvinylether	0.0010	U	mg/L	EPA 601		07/12
1,3 Dichlorobenzene	0.0010	U	mg/L	EPA 601		07/12
1,2 Dichlorobenzene	0.0010	U	mg/L	EPA 601		07/12

* See Special Instructions Above

** See Sample Remarks Above

U = Undetected, Reported value is the practical quantification limit.

D = Secondary dilution.

= Unav

= Not

= Less

= Great



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EW, SOUTH



COMMERCIAL TESTING & ENGINEERING CO.
ENVIRONMENTAL LABORATORY SERVICES

REPORT OF ANALYSIS

Chemlab Ref.# : 93.3190-3
Client Sample ID : 6179-04
Matrix : WATER

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2/93
HEN Z.
Released By
[Signature]

Client Name : ENVIRONMENTAL MGMT INC (EMI)
Ordered By :
Project Name : MARK AIR PROJECT - FAIRBANKS
Project# : 6179
PWSID : UA

WORK Order
Report Completed
Collected
Received
Technical Director
Released By

Sample Remarks: SAMPLE COLLECTED BY: STAN DOLLOFF/BAILER USED. JOB #6
PROJECT - FAIRBANKS.

ARK AI

Parameter	Results	QC	Qual	Units	Method	Allocated Limit	Ext. Date
Halogenated Volatiles							
Methylene Chloride	0.0010	U		mg/L	EPA 601		07/13
1, 1 Dichloroethylene	0.0010	U		mg/L	EPA 601		07/13
1, 1 Dichloroethane	0.0010	U		mg/L	EPA 601		07/13
Chloroform	0.0010	U		mg/L	EPA 601		07/13
Carbontetrachloride	0.0010	U		mg/L	EPA 601		07/13
1, 2 Dichloropropane	0.0010	U		mg/L	EPA 601		07/13
Trichloroethylene	0.0010	U		mg/L	EPA 601		07/13
1,1,2 Trichloroethane	0.0010	U		mg/L	EPA 601		07/13
Dibromochloromethane	0.0010	U		mg/L	EPA 601		07/13
Tetrachloroethylene	0.0010	U		mg/L	EPA 601		07/13
Chlorobenzene	0.0010	U		mg/L	EPA 601		07/13
Trichlorofluoromethane	0.0010	U		mg/L	EPA 601		07/13
trans1,2Dichloroethylene	0.0010	U		mg/L	EPA 601		07/13
1,2 Dichloroethane	0.0010	U		mg/L	EPA 601		07/13
1,1,1 Trichloroethane	0.0010	U		mg/L	EPA 601		07/13
Bromodichloromethane	0.0010	U		mg/L	EPA 601		07/13
trans1,3Dichloropropene	0.0010	U		mg/L	EPA 601		07/13
cis-1,3-Dichloropropene	0.0010	U		mg/L	EPA 601		07/13
Bromoform	0.0010	U		mg/L	EPA 601		07/13
1,1,2-Tetrachloroethane	0.0010	U		mg/L	EPA 601		07/13
Chloromethane	0.0010	U		mg/L	EPA 601		07/13
Bromomethane	0.0010	U		mg/L	EPA 601		07/13
Vinyl chloride	0.0010	U		mg/L	EPA 601		07/13
Chloroethane	0.0010	U		mg/L	EPA 601		07/13
1, 4 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/13
2-Chloroethylvinylether	0.0010	U		mg/L	EPA 601		07/13
1,3 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/13
1,2 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/13

* See Special Instructions Above

** See Sample Remarks Above

U = Undetected, Reported value is the practical quantification limit.

D = Secondary dilution.

= Unav

= Not

= Less

= Great



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EW, SOUTH



COMMERCIAL TESTING & ENGINEERING CO.

ENVIRONMENTAL LABORATORY SERVICES

REPORT OF ANALYSIS

Chemlab Ref.# : 93.3190-4
Client Sample ID : 6179-09
Matrix : WATER

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Client Name : ENVIRONMENTAL MGMT INC (EMI)
Ordered By :
Project Name : MARK AIR PROJECT - FAIRBANKS
Project# : 6179
PWSID : UA

WORK Order 7
Report Completed 4/93
Collected 0/93
Received 2/93
Technical Director HEN C.
Released By [Signature]

Sample Remarks: SAMPLE COLLECTED BY: STAN DOLLOFF/BAILER USED. JOB #6
PROJECT - FAIRBANKS.

MARK AI

Parameter	Results	QC	Qual	Units	Method	Allocated Limit	Ext. Date
Halogenated Volatiles							
Methylene Chloride	0.0010	U		mg/L	EPA 601		07/13
1, 1 Dichloroethylene	0.0010	U		mg/L	EPA 601		07/13
1, 1 Dichloroethane	0.0010	U		mg/L	EPA 601		07/13
Chloroform	0.0010	U		mg/L	EPA 601		07/13
Carbontetrachloride	0.0010	U		mg/L	EPA 601		07/13
1, 2 Dichloroproppane	0.0010	U		mg/L	EPA 601		07/13
Trichloroethylene	0.0010	U		mg/L	EPA 601		07/13
1,1,2 Trichloroethane	0.0010	U		mg/L	EPA 601		07/13
Dibromochloromethane	0.0010	U		mg/L	EPA 601		07/13
Tetrachloroethylene	0.0010	U		mg/L	EPA 601		07/13
Chlorobenzene	0.0010	U		mg/L	EPA 601		07/13
Trichlorofluoromethane	0.0010	U		mg/L	EPA 601		07/13
trans-1,2-Dichloroethylene	0.0010	U		mg/L	EPA 601		07/13
1,2 Dichloroethane	0.0010	U		mg/L	EPA 601		07/13
1,1,1 Trichloroethane	0.0010	U		mg/L	EPA 601		07/13
Bromodichloromethane	0.0010	U		mg/L	EPA 601		07/13
trans-1,3-Dichloropropene	0.0010	U		mg/L	EPA 601		07/13
cis-1,3-Dichloropropene	0.0010	U		mg/L	EPA 601		07/13
Bromoform	0.0010	U		mg/L	EPA 601		07/13
1,1,2-Tetrachloroethane	0.0010	U		mg/L	EPA 601		07/13
Chloromethane	0.0010	U		mg/L	EPA 601		07/13
Bromomethane	0.0010	U		mg/L	EPA 601		07/13
Vinyl chloride	0.0010	U		mg/L	EPA 601		07/13
Chloroethane	0.0010	U		mg/L	EPA 601		07/13
1, 4 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/13
2-Chloroethylvinylether	0.0010	U		mg/L	EPA 601		07/13
1,3 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/13
1,2 Dichlorobenzene	0.0010	U		mg/L	EPA 601		07/13

* See Special Instructions Above

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** See Sample Remarks Above

= Not

U = Undetected, Reported value is the practical quantification limit.

= Less

D = Secondary dilution.

= Great



Member of the SGS Group (Société Générale de Surveillance)

ENVIRONMENTAL SERVICES IN ALASKA, COLORADO, UTAH, ILLINOIS, OHIO, MARYLAND, WEST VIRGINIA, N

EW, SOUTH

COMMERCIAL TESTING & ENGINEERING
ENVIRONMENTAL LABORATORY SERVICES

SINCE 1970

REPORT OF ANALYSIS

Chemlab Ref.# : 93.3190-5
Client Sample ID : 6179-10
Matrix : WATER

Client Name : ENVIRONMENTAL MGMT INC (EMI)
Ordered By :
Project Name : MARK AIR PROJECT - FAIRBANKS
Project# : 6179
PWSID : UA

WORK Order
Report Completed
Collected
Received
Technical Director
Released By

Sample Remarks: SAMPLE COLLECTED BY: STAN DOLLOFF/BAILER USED. JOB #6
PROJECT - FAIRBANKS. SAMPLE ALSO CONTAINS 0.012 PPB B

ANCHORAGE
TACOMA
FAIRBANKS

JULY
4/93
0/93
2/93
HEN C.

MARK AIR
.

Parameter	Results	QC Qual	Units	Method	Allocated Li	Ext. Date
Halogenated Volatiles				EPA 601		
Methylene Chloride	0.0012		mg/L	EPA 601		07/09
1, 1 Dichloroethylene	0.0010	U	mg/L	EPA 601		07/09
1, 1 Dichloroethane	0.027		mg/L	EPA 601		07/09
Chloroform	0.0024		mg/L	EPA 601		07/09
Carbontetrachloride	0.0010	U	mg/L	EPA 601		07/09
1, 2 Dichloroproppane	0.0010	U	mg/L	EPA 601		07/09
Trichloroethylene	0.020		mg/L	EPA 601		07/09
1,1,2 Trichloroethane	0.0010	U	mg/L	EPA 601		07/09
Dibromochloromethane	0.0010	U	mg/L	EPA 601		07/09
Tetrachloroethylene	0.0010	U	mg/L	EPA 601		07/09
Chlorobenzene	0.0010	U	mg/L	EPA 601		07/09
Trichlorofluoromethane	0.0010	U	mg/L	EPA 601		07/09
trans1,2Dichloroethylene	0.0010	U	mg/L	EPA 601		07/09
1,2 Dichloroethane	0.0010	U	mg/L	EPA 601		07/09
1,1,1 Trichloroethane	0.037		mg/L	EPA 601		07/09
Bromodichloromethane	0.0010	U	mg/L	EPA 601		07/09
trans1,3Dichloropropene	0.0010	U	mg/L	EPA 601		07/09
cis-1,3-Dichloropropene	0.0010	U	mg/L	EPA 601		07/09
Bromoform	0.0010	U	mg/L	EPA 601		07/09
1,1,2-Tetrachloroethane	0.0010	U	mg/L	EPA 601		07/09
Chloromethane	0.0010	U	mg/L	EPA 601		07/09
Bromomethane	0.0010	U	mg/L	EPA 601		07/09
Vinyl chloride	0.0010	U	mg/L	EPA 601		07/09
Chloroethane	0.0010	U	mg/L	EPA 601		07/09
1, 4 Dichlorobenzene	0.0010	U	mg/L	EPA 601		07/09
2-Chloroethylvinylether	0.0010	U	mg/L	EPA 601		07/09
1,3 Dichlorobenzene	0.0010	U	mg/L	EPA 601		07/09
1,2 Dichlorobenzene	0.0010	U	mg/L	EPA 601		07/09

* See Special Instructions Above

** See Sample Remarks Above

U = Undetected, Reported value is the practical quantification limit.

D = Secondary dilution.

= Unav

= Not

= Less

= Great



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ENVIRONMENTAL SERVICES IN ALASKA, COLORADO, UTAH, ILLINOIS, OHIO, MARYLAND, WEST VIRGINIA, N

EW, SOUTH

Commercial Testing and Engineering Company
 Environmental Laboratory Services (Alaska)
HALOGENATED AND AROMATIC VOLATILE ORGANIC COMPOUNDS
QUALITY CONTROL SUMMARY

Date: 07/12/93 QC#: 61207080712 58901
 Method: 601 CT&E Work Order Number: 90

Surrogate Recoveries:	<u>Fluorobenzene</u>	<u>% Reco</u>
Blank 1	93.1	93
QC	98.6	99
Matrix Spike	99.4	99
Matrix Spike Dup.	99.7	100
Blank 5	96.0	96

Blank Analysis:	<u>Compounds</u>	<u>Concentration</u>
Blank 1	ND	1.0
Blank 5	ND	1.0

		<u>Criteri</u>
I. Holding Time:	Acceptance criteria met.	14 day
II. Analysis:		
A. Calibration:	Acceptance criteria met.	Linearity
B. Blanks:	Acceptance criteria met.	Below quantitation limit
C. Quality Control Sample	Acceptance criteria met.	80 - 120%
D. Matrix Spike:	Acceptance criteria met.	80 - 120%
E. Matrix Spike Duplicate:	Acceptance criteria met.	80 - 120%
F. Surrogates:	Acceptance criteria met.	80 - 120%
G. Other:	None	

III. I certify that this data package is in compliance with the terms and conditions agreed to by me and Commercial Testing and Engineering Company, both technically and for completeness, except as detailed above.

Signed:

Printed Name:



JENNY BERRENA

Date: 7/12/93

**HALOGENATED AND AROMATIC VOLATILE ORGANIC
MATRIX SPIKE & MATRIX SPIKE DUPLICATE RECOVERY**

Lab Name: Commercial Testing and Engineering Company
Environmental Laboratory Services (Alaska)

Matrix Spike File Number: SPK0712A Date Analyzed: 12/93

Matrix Spike Dup. File Number: SPK0712B Instrument ID: 01

MATRIX SPIKE COMPOUND	SPK ADDED (PPB)	SAMPLE CONC (PPB)	MS CONC (PPB)	MS REC (%)	QC LIM (%)
1,1-Dichloroethene	40.0	0.0	43.6	109	80 - 120
Benzene	40.0	0.0	40.6	102	80 - 120
Trichloroethene	40.0	0.0	43.5	109	80 - 120
Toluene	40.0	0.0	41.7	104	80 - 120
Chlorobenzene	40.0	0.0	41.0	103	80 - 120

MATRIX SPIKE DUP COMPOUND	SPK ADDED (PPB)	SAMPLE CONC (PPB)	MSD CONC (PPB)	MSD REC (%)	RPD (%)	SRPD (%)
1,1-Dichloroethene	40.0	0.0	41.5	104	4.9	25
Benzene	40.0	0.0	41.4	104	2.0	25
Trichloroethene	40.0	0.0	42.2	106	3.0	25
Toluene	40.0	0.0	42.0	105	0.7	25
Chlorobenzene	40.0	0.0	38.8	97	5.5	25

* Values outside of required quality control limits.

**HALOGENATED AND AROMATIC VOLATILE ORGANIC
CONTINUING CALIBRATION CHECK**

Lab Name: Commercial Testing and Engineering Company
Environmental Laboratory Services (Alaska)

Initial Calibration Date:	07/08/93	Instrument ID:	5890
Calibration Check Date:	07/12/93	Lab File ID:	QC0712A

COMPOUND	CCC CONC (PPB)	TRUE CONC (PPB)	RECOVERY (%)	LIMITS (%)
1,1-Dichloroethene	54.2	50.0	108	-120
Methylene Chloride	53.8	50.0	108	-120
trans-1,2-Dichloroethene	56.5	50.0	113	-120
1,1-Dichloroethane	54.2	50.0	108	-120
Chloroform	53.4	50.0	107	-120
1,1,1-Trichloroethane	54.7	50.0	109	-120
Carbontetrachloride	55.3	50.0	111	-120
1,2-Dichloroethane	53.4	50.0	107	-120
1,1,2-Trichloroethane	-	-	-	-120
Trichloroethene	54.9	50.0	110	-120
1,2-Dichloropropane	54.9	50.0	110	-120
Bromodichloromethane	50.9	50.0	102	-120
Tetrachloroethene	57.9	50.0	116	-120
Trichlorofluoromethane	-	-	-	-120
Dibromochloromethane	50.7	50.0	101	-120
Chlorobenzene	52.8	50.0	106	-120
Bromoform	47.3	50.0	95	-120
1,1,2,2-Tetrachloroethane	53.5	50.0	107	-120
trans-1,3-Dichloropropene	-	-	-	-120
cis-1,3-Dichloropropene	-	-	-	-120
1,3-Dichlorobenzene	53.2	50.0	106	-120
1,4-Dichlorobenzene	54.6	50.0	109	-120
1,2-Dichlorobenzene	53.3	50.0	107	-120
Vinyl Chloride	-	-	-	-120
Chloroelthane	-	-	-	-120
2-Chloroethylvinylether	-	-	-	-120
Chloromethane	-	-	-	-120
Bromomethane	-	-	-	-120
Benzene	51.1	50.0	102	-120
Toluene	52.4	50.0	105	-120
Chlorobenzene	52.7	50.0	105	-120
Ethylbenzene	53.3	50.0	107	-120
P&M Xylene	53.4	50.0	107	-120
O Xylene	52.7	50.0	105	-120
1,3-Dichlorobenzene	53.5	50.0	107	-120
1,4-Dichlorobenzene	52.7	50.0	105	-120
1,2-Dichlorobenzene	53.7	50.0	107	-120

* Values outside of required quality control limits.

Commercial Testing and Engineering Company
 Environmental Laboratory Services (Alaska)
 HALOGENATED AND AROMATIC VOLATILE ORGANIC COMPOUNDS
 QUALITY CONTROL SUMMARY

Date: 07/09/93 QC#: 61204200709 890 II
 Method: 601 CT&E Work Order Number: 3190

Surrogate Recoveries:	Fluorobenzene	% Recov.
Blank 1	102.3	102
QC	101.4	101
Matrix Spike	101.9	102
Matrix Spike Dup.	104.9	105
Blank 5	100.7	101

Blank Analysis:	Compounds	Concentration
Blank 1	ND	1.0
Blank 5	ND	1.0

		Criteria	
I. Holding Time:	Acceptance criteria met.	14 days	
II. Analysis:			
A. Calibration:	Acceptance criteria met.	Linearity	Calibration range
B. Blanks:	Acceptance criteria met.	Below practical quantitation limit	
C. Quality Control Sample	Acceptance criteria met.	80 - 120%	
D. Matrix Spike:	Acceptance criteria met.	80 - 120%	
E. Matrix Spike Duplicate:	Acceptance criteria met.	80 - 120%	
F. Surrogates:	Acceptance criteria met.	80 - 120%	
G. Other:	None		

III. I certify that this data package is in compliance with the terms and conditions of my contract with Commercial Testing and Engineering Company, both technically and for commercial purposes, except as detailed above.

Signed: Jenny Berrena
 Printed Name: JENNY BERRENA

Date: 7-9-

HALOGENATED AND AROMATIC VOLATILE ORGANICS
MATRIX SPIKE & MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Commercial Testing and Engineering Company
 Environmental Laboratory Services (Alaska)

Matrix Spike File Number: SPK0709A Date Analyzed: /93

Matrix Spike Dup. File Number: SPK0709B Instrument ID: II

MATRIX SPIKE COMPOUND	SPK ADDED (PPB)	SAMPLE CONC (PPB)	MS CONC (PPB)	MS REC (%)	QC LIMIT (%)
1,1-Dichloroethene	40.0	0.0	42.7	107	80 - 120
Benzene	40.0	0.0	43.1	108	80 - 120
Trichloroethene	40.0	0.0	42.3	106	80 - 120
Toluene	40.0	0.0	44.7	112	80 - 120
Chlorobenzene	40.0	0.0	40.8	102	80 - 120

MATRIX SPK DUP COMPOUND	SPK ADDED (PPB)	SAMPLE CONC (PPB)	MSD CONC (PPB)	MSD REC (%)	RPD (%)	PPD (%)	QD (%)
1,1-Dichloroethene	40.0	0.0	37.1	93	14.0	5	
Benzene	40.0	0.0	44.4	111	3.0	5	
Trichloroethene	40.0	0.0	42.3	106	0.0	5	
Toluene	40.0	0.0	43.8	110	2.0	5	
Chlorobenzene	40.0	0.0	42.7	107	4.6	5	

- * Values outside of required quality control limits.

**HALOGENATED AND AROMATIC VOLATILE ORGANICS
CONTINUING CALIBRATION CHECK**

Lab Name: Commercial Testing and Engineering Company
Environmental Laboratory Services (Alaska)

Initial Calibration Date: 04/20/93 Instrument ID: 5890 I
Calibration Check Date: 07/09/93 Lab File ID: QC0709A

COMPOUND	CCC CONC (PPB)	TRUE CONC (PPB)	RECOVERY (%)	LIMITS (%)
Chloroethylvinylether	-	-	-	-
Chloromethane	41.2	50.0	82	- 120
Vinylchloride	45.8	50.0	92	- 120
Bromomethane	50.6	50.0	101	- 120
Chloroethane	57.3	50.0	115	- 120
Trichlorofluoromethane	54.4	50.0	109	- 120
1,1 Dichloroethene	55.1	50.0	110	- 120
Methylene Chloride	47.4	50.0	95	- 120
trans-1,2-Dichloroethene	52.5	50.0	105	- 120
1,1-Dichloroethane	49.5	50.0	99	- 120
cis-1,2-Dichloroethene	48.1	50.0	96	- 120
Chloroform	49.5	50.0	99	- 120
1,2-Dichloroethane	53.5	50.0	107	- 120
1,1,1-Trichloroethane	55.1	50.0	110	- 120
Carbontetrachloride	53.5	50.0	107	- 120
1,2-Dichloropropane	57.5	50.0	115	- 120
Trichloroethylene	58.0	50.0	116	- 120
Bromodichloromethane	57.7	50.0	115	- 120
cis-1,3-Dichloropropene	44.7	40.5	110	- 120
trans-1,3-dichloropropene	9.4	9.5	99	- 120
1,1,2-Trichloroethane	55.8	50.0	112	- 120
Dibromochloromethane	55.7	50.0	111	- 120
Tetrachloroethylene	59.2	50.0	118	- 120
Chlorobenzene	46.9	50.0	94	- 120
Bromoform	43.9	50.0	88	- 120
1,1,2,2-Tetrachloroethane	52.4	50.0	105	- 120
1,3-Dichlorobenzene	53.8	50.0	108	- 120
1,4-Dichlorobenzene	55.0	50.0	110	- 120
1,2-Dichlorobenzene	49.0	50.0	98	- 120
Benzene	52.2	50.0	104	- 120
Toluene	54.7	50.0	109	- 120
Chlorobenzene	51.0	50.0	102	- 120
Ethylbenzene	54.3	50.0	109	- 120
P & M Xylene	53.0	50.0	106	- 120
O Xylene	55.5	50.0	111	- 120
1,3-Dichlorobenzene	49.1	50.0	98	- 120
1,4-Dichlorobenzene	50.1	50.0	100	- 120
1,2-Dichlorobenzene	48.6	50.0	97	- 120

* Values outside of required quality control limits.