

**2nd Water Sampling Report**  
**MarkAir Facility, Fairbanks, Alaska**

**Table of Contents**

	<u>Pages</u>
<b>Introduction</b>	2
<b>Summary of Findings</b>	2
<b>Water Sampling Procedures</b>	3
<b>Water Quality</b>	3
<b>Discussion of Findings</b>	5
<b>Data Validation</b>	6
<b>Recommendations</b>	7
<b>Closure</b>	7
<b>Attachments:</b>	
A - Figures	3 pages
B - Photographs	7 pages
C - Tables	19 pages
D - Laboratory Results	16 pages

2nd Water Sampling Report  
MarkAir Facility, Fairbanks, Alaska

## **Introduction**

This phase of groundwater evaluation is being performed as a corrective action for the Fairbanks, MarkAir Facility. This report summarizes sampling procedures and the results of the second water sampling event. These activities were carried out in accordance with Environmental Management, Inc.'s (EMI) Quality Assurance Program Plan (QAPP).

During the week of June 21, 1993, nine monitoring wells were installed around the Fairbanks, MarkAir Facility. On June 30, 1993, EMI collected the first water samples from the nine monitoring wells. The results of this phase of work were submitted in a report titled MarkAir Fairbanks Monitoring Well Report.

This phase of groundwater evaluation is being performed on a quarterly basis, so that, contamination can be monitored for the seasonal cycle of watertable fluctuations.

## **Summary of Findings**

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

- Generally, the groundwater is flowing in the same direction as indicated during the first sampling event, in the northwesterly direction.
- Some monitoring wells detected petroleum constituents which were not detected in previous sampling. In other cases, some monitoring wells did not detect contaminants that were detected in previous sampling.
- Metals such as Arsenic and Lead have been detected in the groundwater samples analyzed. High metal concentrations in the groundwater from the

Fairbanks region occur naturally.

- Water quality was checked for pH, temperature, dissolved oxygen, and conductivity. These water quality parameters are important factors for optimizing microbiological growth.

## **Water Sampling Procedures**

On September 29, 1993, monitoring wells were purged by removing 3 well casing volumes of water.

On September 30, 1993 monitoring well samples were collected and sent to Superior Precision Analytical, Inc. in Martinez, California for laboratory 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), Total Range Petroleum Hydrocarbons (EPA Method 3550/418.1), PCB's (EPA Method 3550/8080), Volatile Chlorinated Solvents (EPA Method 5030/601), and Leachable Metals (Arsenic EPA Method 3020/7060), (Cadmium EPA Method 3010/6010), (Chromium EPA Method 3010/6010), (Lead EPA Method 3020/7421). Summary results may be found in Attachment C Tables 1-15. The chain of custody and complete analytical results can be found in Attachment D.

## **Water Quality**

Contaminant concentrations that are above the maximum contaminant levels (18 AAC 80, Drinking Water Standards, March 18, 1993) are depicted on sheet 2 of 3 and sheet 3 of 3 of Attachment A. Some monitoring wells detected petroleum constituents which were not detected in previous sampling. These new detected petroleum constituents are from:

### Weaver Brothers Monitoring Wells

MW#1	Benzene @ 1.4 ppb
	Arsenic @ 0.01 ppm right at the detection limit
MW#2	Solvents @ 0.6 ppb
MW#4	Ethyl Benzene @ 0.5 ppb
	Xylenes @ 3.3 ppb

### MarkAir Hangar Monitoring Wells

MW#1	Diesel @ 320 ppb
MW#2	Gasoline @ 90 ppb
	Benzene @ 2.9 ppb

In other cases, some monitoring wells did not detect contaminants that were detected in previous sampling. These undetected contaminants that were detected previously are from:

### Weaver Brothers Monitoring Wells

MW#2	Diesel @ 210 ppb on 6/30/93
MW#3	Xylenes @ 4 ppb on 6/30/93
MW#4	Diesel @ 140 ppb on 6/30/93

### MarkAir Hangar Monitoring Wells

MW#1	Benzene @ 16 ppb on 6/30/93
	Ethyl Benzene @ 1 ppb on 6/30/93
	Toluene @ 3 ppb on 6/30/93
	Xylenes @ 16 ppb on 6/30/93
	Lead @ 0.01 ppm on 6/30/93
MW#2	Other solvents were detected see Table #6
	Toluene @ 3 ppb on 6/30/93
MW#3	Benzene @ 1 ppb on 6/30/93

### **Other Water Quality Parameters**

Other water quality parameters were checked by the use of a Hana Temperature/pH meter and a Hana Dissolved Oxygen/Conductivity meter. Temperature values from these first 2 sampling events ranged between 38 degrees F to 42 degrees F. pH values from these first 2 sampling events ranged between 6.41 pH to 7.1 pH. Dissolved oxygen values ranged between 38% to 45.3% during this second sampling event. Dissolved oxygen results from the first sampling event were approximately 250%. These first time dissolved oxygen results seemed extremely high and we felt that they were out of the range of acceptable values. This unacceptable data might have been generated from instrument and/or operational error. Conductivity was not a parameter requested to be checked. But, due to the capability to check conductivity with the dissolved oxygen meter, conductivity was checked. Conductivity values from these first 2 sampling events ranged between 340 uS to 410 uS.

These water quality results are easily seen from the tables located in Attachment C.

### **Discussion of Findings**

Due to the detection and non-detection of petroleum hydrocarbons, the plume of contamination seems to have a general migrant pattern down gradient. Up gradient monitoring wells (MW#4 @ the Weaver Brothers Bldg. and MW#5 @ the MarkAir Hangar) are detecting petroleum hydrocarbons. This could be due to contamination from nearby sources encroaching on to MarkAir properties. Up gradient contamination might possibly be from up gradient migration of the plume maybe from capillary reaching or the plume following some path of lesser resistance.

Other contamination in the groundwater of importance are the heavy metal concentrations. Levels of arsenic and lead just above detection limits were found in some of the monitoring wells. The quality of groundwater is naturally impaired in the Fairbanks area, where high metal concentrations are found. Concentrations of arsenic

in the water from many wells in the Fairbanks area exceeds the State's drinking-water standards of 50 parts per billion.

The environment that microorganisms occupy dictate the efficiency of their enzymes systems and subsequently their growth and utilization rate for biodegradation. While indigenous microbes can and do exist over a broad range of conditions, major considerations for optimizing growth are oxygen availability temperature and pH. As a rule of thumb for every 10°C decrease from optimum temperature the growth rate is reduced by 1/2. Temperature also has a direct effect on the solubility and consequential availability of oxygen. For pH most bacteria are limited to a range of 4 and 9 with the optimum between 6.5 and 7.5. From the results of the above water quality parameters at the sites, it seems that this environment is promising for in-situ bioremediation treatment.

## **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, Inc. located in Martinez California.

Related information is located as follows:

- A complete summary listing of analytic laboratory results are included in Tables #1 - #15 of Attachment C.
- A complete summary listing of field water quality parameters are included in Table #16 of Attachment C.
- A complete summary listing of quality assurance and quality control (QA/QC) results are included in , Tables #17 - #19 of Attachment C.
- The complete laboratory data deliverables are included in Attachment D.

All QA/QC objectives were met, except for the field precision in BTEX EPA Method 8020, which was 30% from the allowable limit and Arsenic EPA method 7060, which

was 180% 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, so that, contamination can be monitored through 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. Site specific information obtained during this sampling event, previous sampling events, and future sampling events, should be compiled and reviewed to better define the extent and levels of hydrocarbons prior to developing a remediation plan. Once a better history of quantitative contamination is established on the monitoring wells, a decision in conjunction with the ADEC can be made regarding further action.

## **Closure**

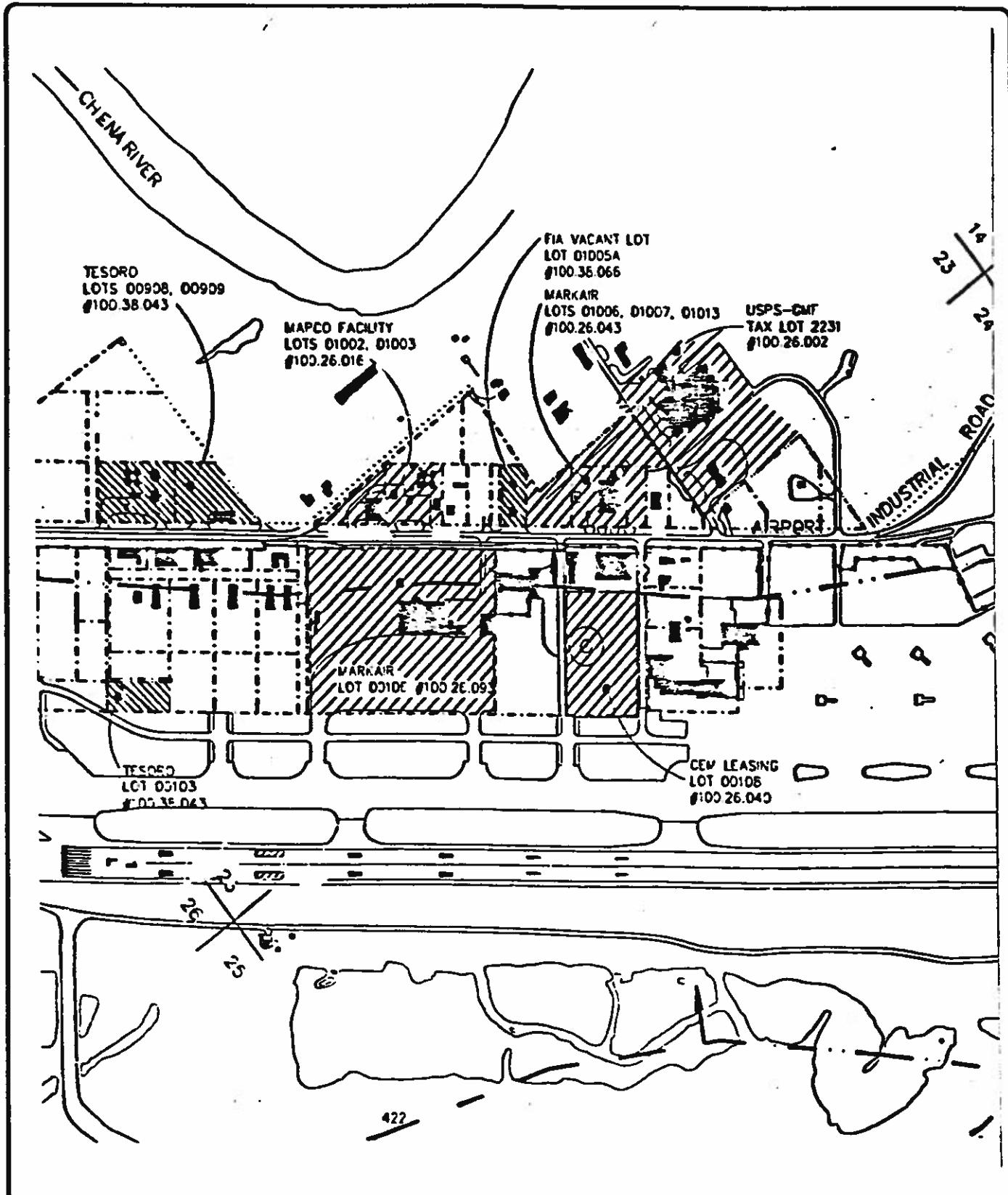
The discussion presented in this report is based on our understanding of ADEC guidelines, our investigations, our Quality Assurance Program Plan, and other pertinent information referred to herein.

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		

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INCORPORATED

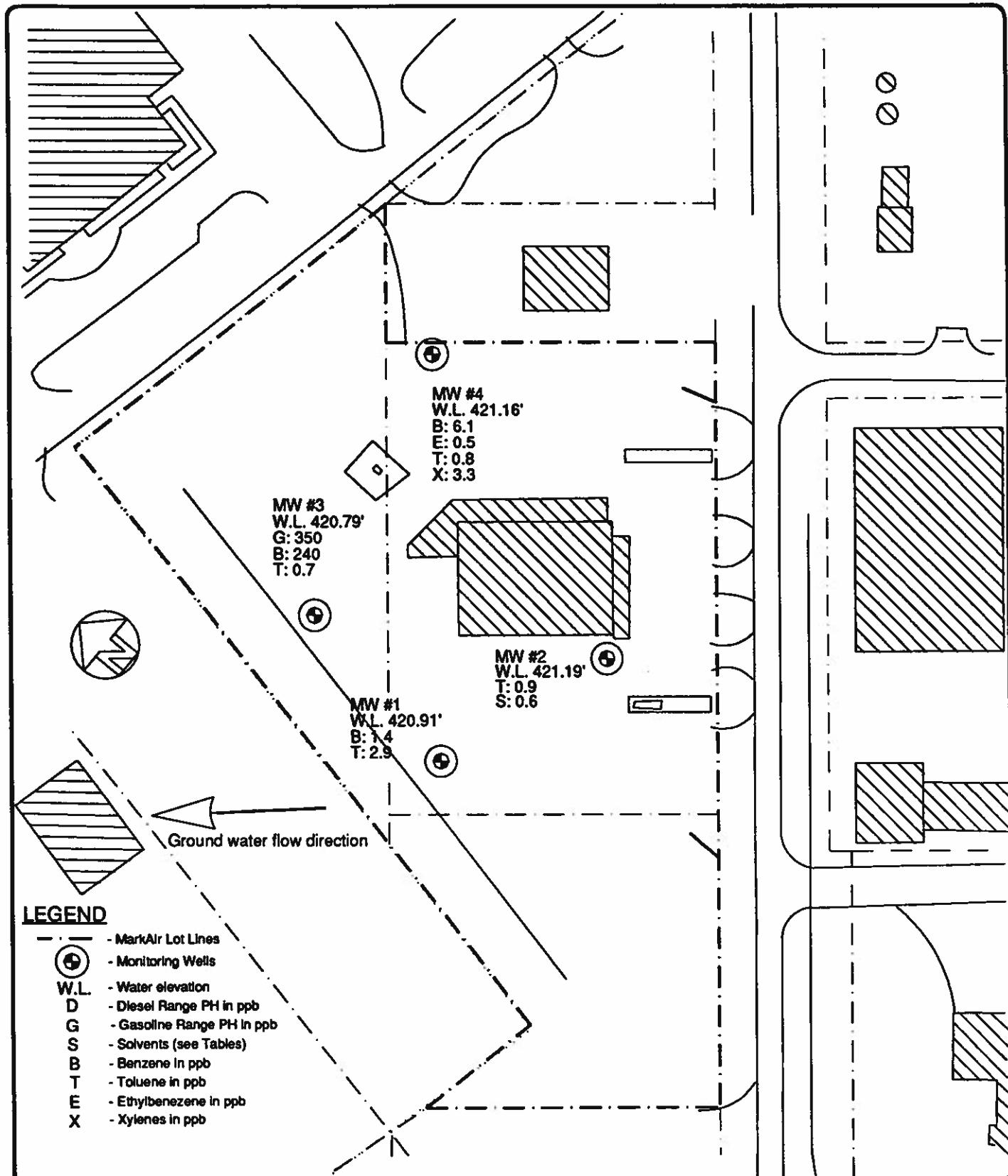
907 EAST DOWLING ROAD - SUITE #21  
ANCHORAGE, ALASKA 99518  
(907) 562-2580 -FAX 562-1561

MARKAIR FAIRBANKS FACILITY  
Vicinity Map  
Range 2 West, Township 1 South  
Fairbanks Meridian, Alaska

DATE 12/17/93  
EMI NO. 6211

A-1

SHEET  
1 OF 3



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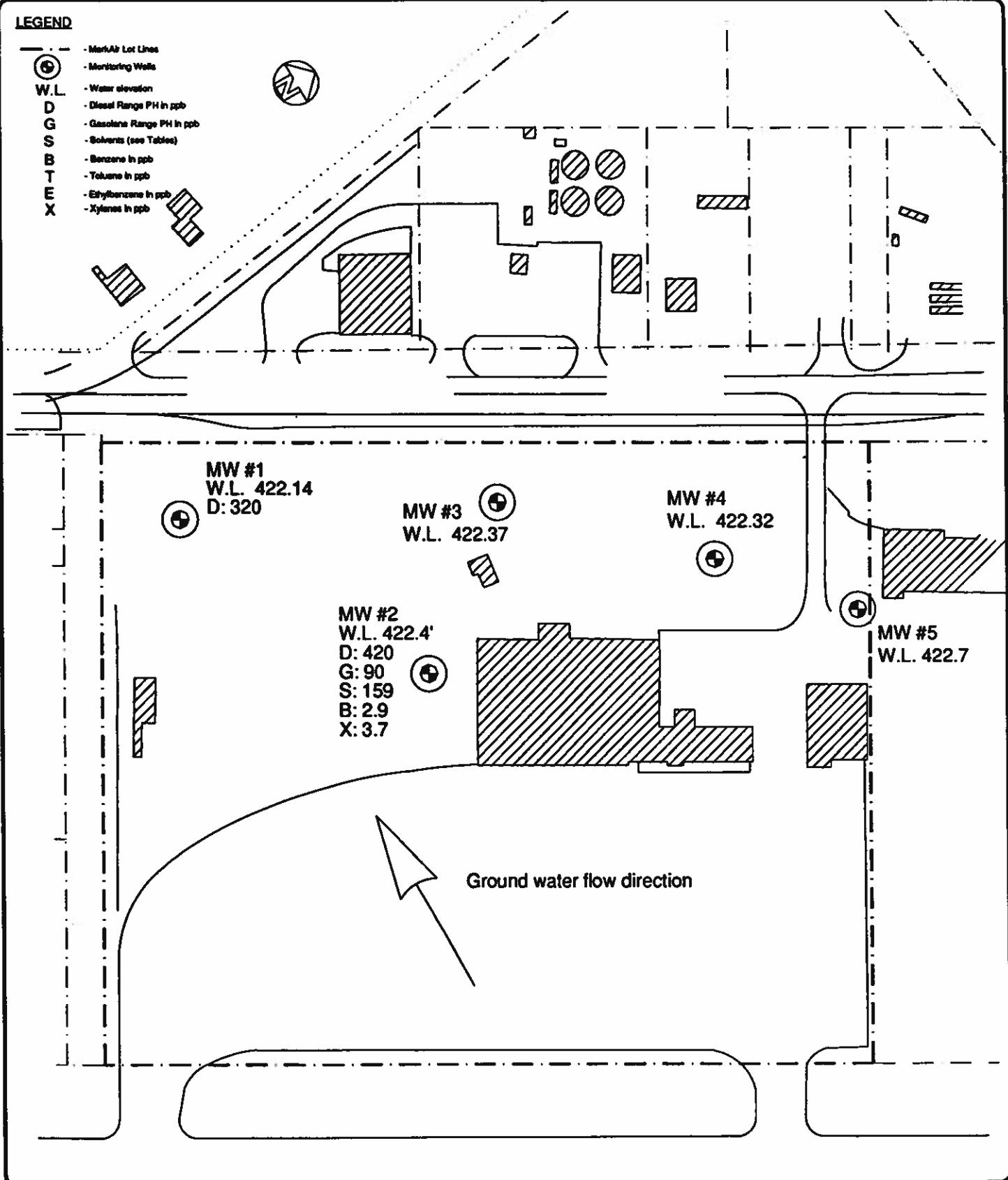
907 EAST DOWLING ROAD - SUITE #21  
ANCHORAGE, ALASKA 99518  
(907) 562-2580 -FAX 562-1561

**MARKAIR FAIRBANKS FACILITY**  
Monitoring Well Results  
June 30, 1993  
Weaver Brothers Building  
Not to Scale

DATE 12/17/93  
EMI NO. 8211  
**A-2**  
SHEET  
2 OF 3

**LEGEND**

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



DESIGN	WEP
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**MARKAIR FAIRBANKS FACILITY**  
MONITORING WELL RESULTS  
September 30, 1993  
HANGAR/OFFICE BUILDING  
Not to scale

DATE	12/17/93
EMI NO.	0211
A-3	
SHEET	3 OF 3

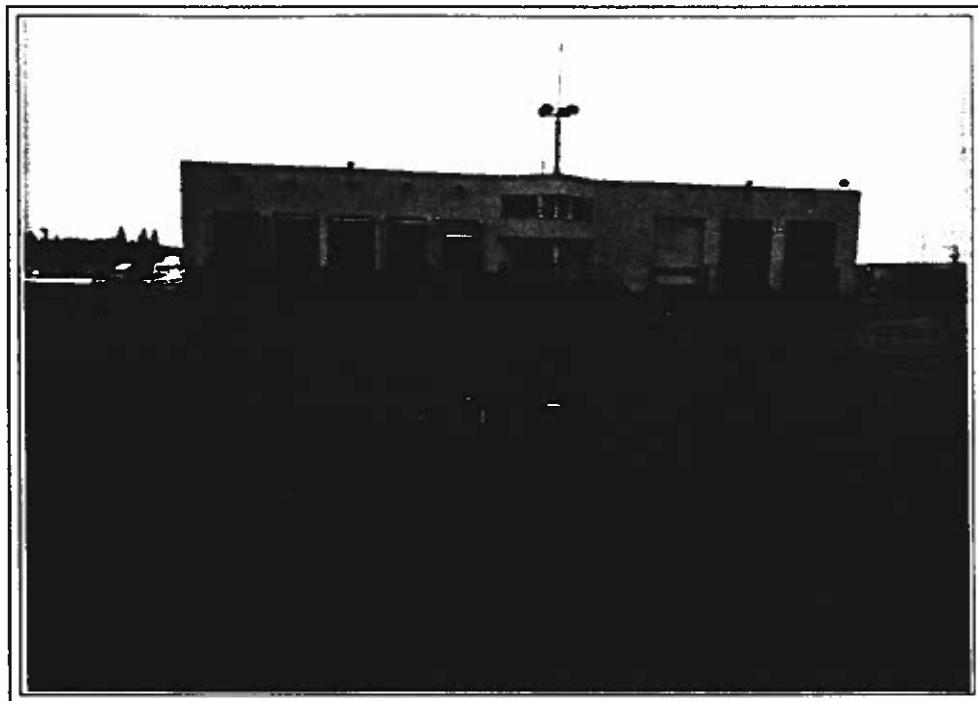
**ATTACHMENT B**

**PHOTOGRAPHS**



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**PHOTO PAGE**  
**MARKAIR FAIRBANKS, ALASKA**  
**SEPTEMBER 30, 1993**



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



**Another view of Monitoring Well #1 located at Weaver Brothers Bldg.**

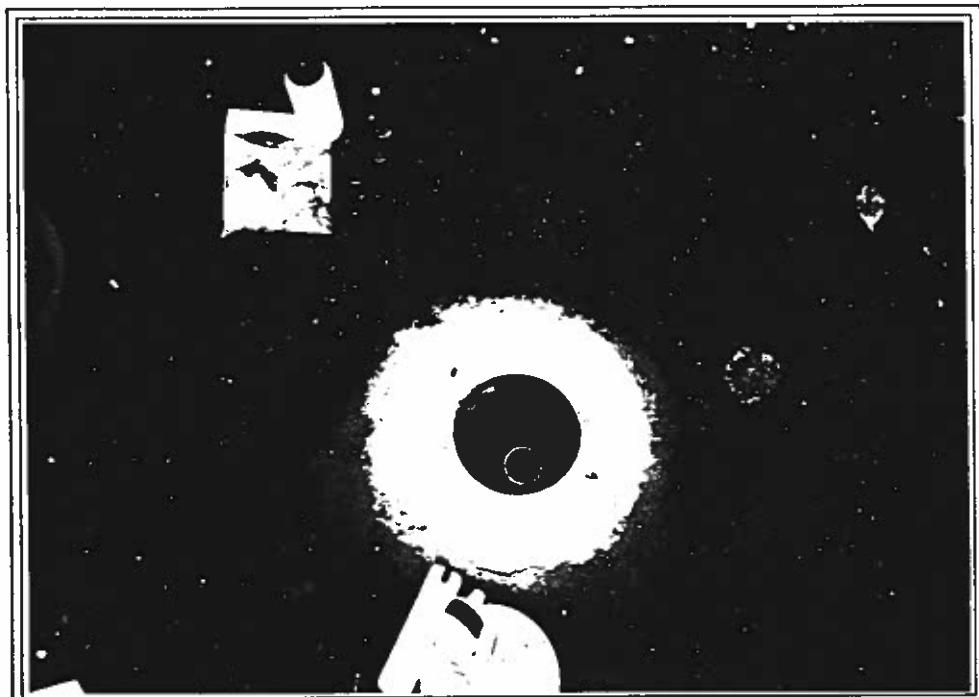


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**MARKAIR FAIRBANKS, ALASKA**  
**SEPTEMBER 30, 1993**



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



**Another view of Monitoring Well #2 located at Weaver Brothers Bldg.**



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**SEPTEMBER 30, 1993**



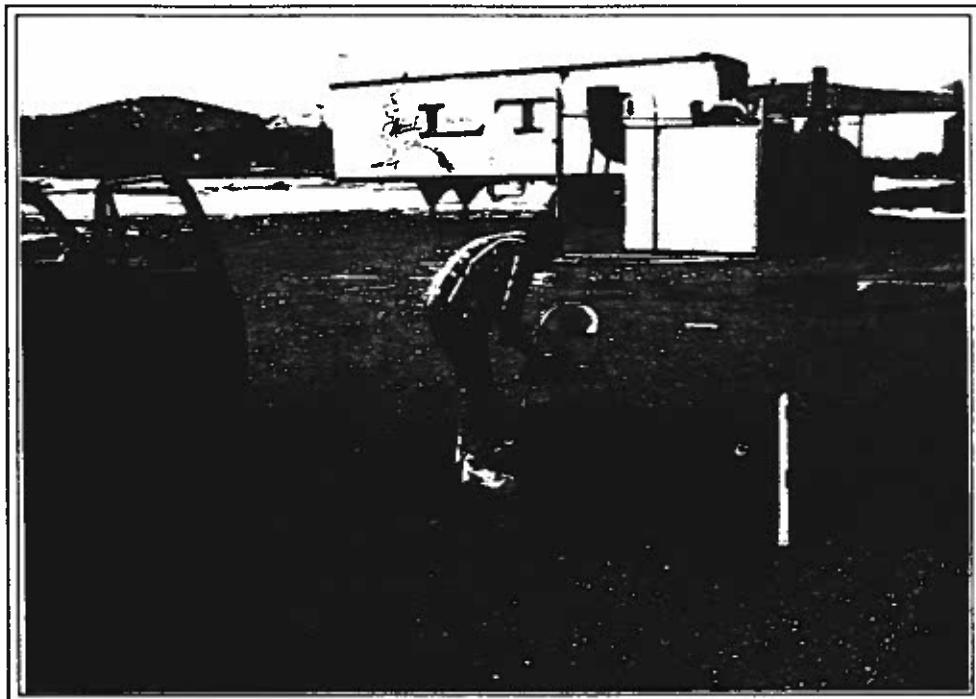
**View of Monitoring Well #3 located at Weaver Brothers Bldg.**



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



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**MARKAIR FAIRBANKS, ALASKA**  
**SEPTEMBER 30, 1993**



**Measurement of water level in Monitoring Well #2 located at the hangar**



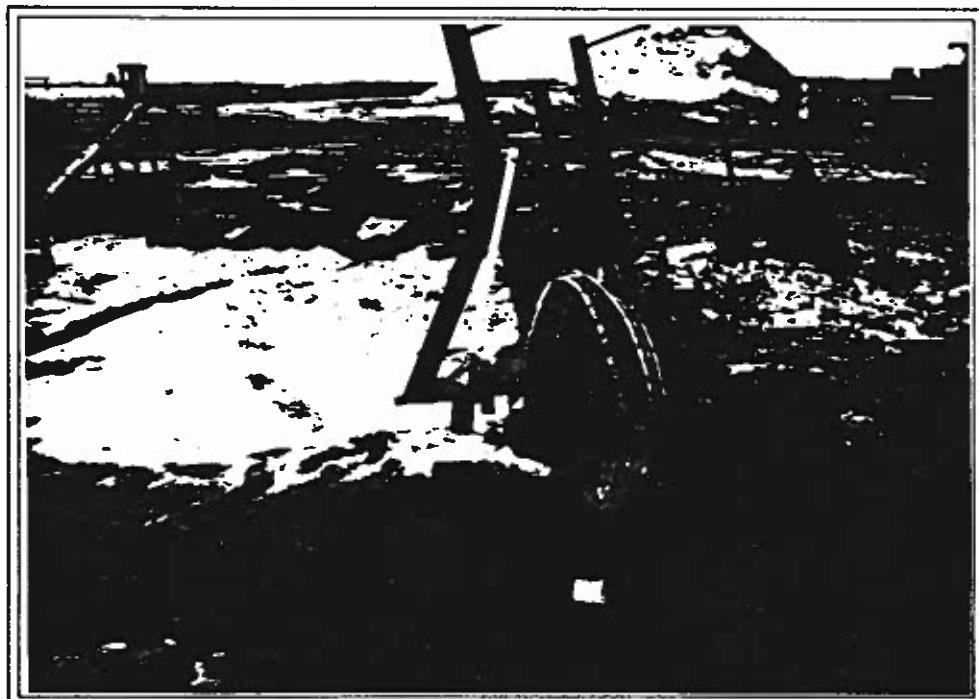
**Water sample collection at Monitoring Well #2 located at the hangar**



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**MARKAIR FAIRBANKS, ALASKA**  
**SEPTEMBER 30, 1993**



**Water sample collection at Monitoring Well #2 located at the hangar**



**Water sample collection at Monitoring Well #1 located at the hangar**



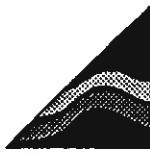
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**MARKAIR FAIRBANKS, ALASKA**  
**SEPTEMBER 30, 1993**



**Water sample collection at Monitoring Well #3 located at the hangar**

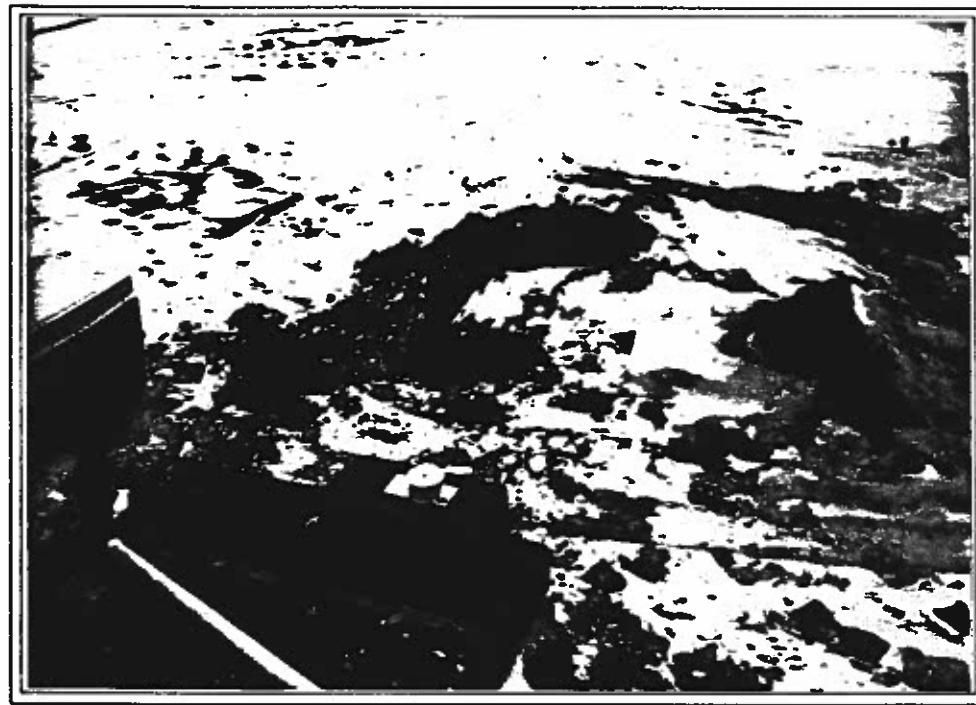


**Another view of water sample collection at Monitoring Well #3 located at the hangar**

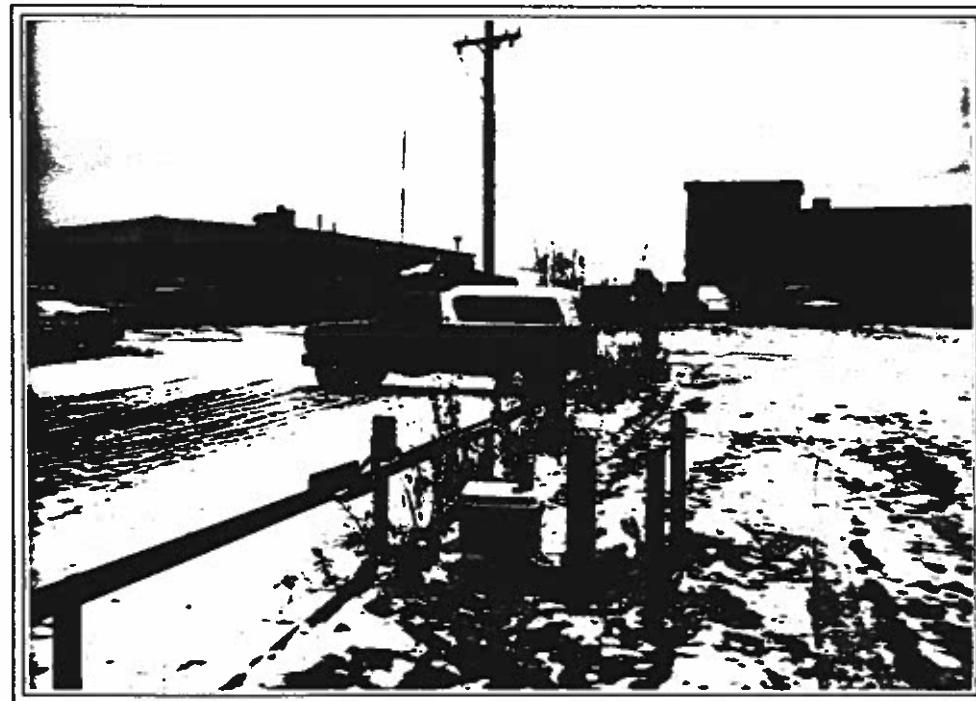


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**MARKAIR FAIRBANKS, ALASKA**  
**SEPTEMBER 30, 1993**



**View of Monitoring Well #3 located at the hangar**



**View of Monitoring Well #4 located at the hangar**

**ATTACHMENT C**

**TABLES**

Summary of Field Analysis of Monitoring Well Water Elevations					
June 30, 1993 & September 30 1993					
Well ID	Runway Station	Offset Left	MW Elevation (feet)	Water Elevation (feet)	Water Elevation (9/30/93) (feet)
MW#1 @ WB	101+47	2081	428.79	421.21	420.91
MW#2 @ WB	102+50	1941	431.48	422.44	421.19
MW#3 @ WB	102+62	2191	427.33	420.44	420.79
MW#4 @ WB	104+86	2142	428.49	421.74	421.16
MW#1 @ H	87+26	1603	429.72	423.22	422.14
MW#2 @ H	90+83	1391	434.57	423.65	422.4
MW#3 @ H	91+32	1653	430.04	423.37	422.37
MW#4 @ H	93+86	1582	433.78	423.53	422.32
MW#5 @ H	96+16	1571	430.78	423.78	422.7

**LEGEND:** WB = Weaver Bros.

Summary of Analytical Monitoring Well Water Samples for Diesel Samples Collected on June 30, 1993 & September 30, 1993					
Well ID	Sample ID#	DRPH(6/30/93) 3510/8100M (ppb)	DRPH(9/30/93) 3510/8100M (ppb)	DRPH(12/30/93) 3510/8100M (ppb)	DRPH(3/30/94) 3510/8100M (ppb)
MW#1 @ WB	6179-03	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)
Duplicate	6179-04	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)
MW#2 @ WB	6179-05	210	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)
MW#3 @ WB	6179-02	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)
MW#4 @ WB	6179-01	140	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)
MW#1 @ H	6179-09	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)	320
MW#2 @ H	6179-10	470	470	420	420
MW#3 @ H	6179-08	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)
MW#4 @ H	6179-07	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)
MW#5 @ H	6179-06	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)	ND (100 ppb)

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

DRPH = Diesel Range Petroleum Hydrocarbons

ND ( ) = Not Detected (Detection Limit)

ppb = parts per billion

**Table #3**

**Summary of Analytical Monitoring Well Water Samples for Gasoline  
Samples Collected on June 30, 1993 & September 30, 1993**

Summary of Analytical Monitoring Well Water Samples for Gasoline Samples Collected on June 30, 1993 & September 30, 1993					
Well ID	Sample ID#	GRPH(6/30/93) 5030/8015M(ppb)	GRPH(9/30/93) 5030/8015M(ppb)	GRPH(12/30/93) 5030/8015M(ppb)	GRPH(3/30/94) 5030/8015M(ppb)
MW#1 @ WB	6179-03	ND (100 ppb)	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)
Duplicate	6179-04	ND (100 ppb)	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)
MW#2 @ WB	6179-05	ND (100 ppb)	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)
MW#3 @ WB	6179-02	130	350		
MW#4 @ WB	6179-01	ND (100 ppb)	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)
MW#1 @ H	6179-09	150	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)
MW#2 @ H	6179-10	ND (100 ppb)	90		
MW#3 @ H	6179-08	ND (100 ppb)	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)
MW#4 @ H	6179-07	ND (100 ppb)	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)
MW#5 @ H	6179-06	ND (100 ppb)	ND (50 ppb)	ND (50 ppb)	ND (50 ppb)

**LEGEND:** WB = Weaver Brothers

**Duplicate = Duplicate of MW#1**

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CRPH = Crayfish Banca Petrolatum Hydrocarbons

GRPH = Gasoline Rating Petroleum Hydrc

NU( ) = Not Detected

Table #4						
Summary of Analytical Monitoring Well Water Samples for PCBs						
Samples Collected on June 30, 1993 & September 30, 1993						
Well ID	Sample ID#	PCBs(6/30/93) 3550/8080(ppb)	PCBs(9/30/93) 3550/8080(ppb)	PCBs(12/30/93) 3550/8080(ppb)	PCBs(3/30/94) 3550/8080(ppb)	PCBs(6/30/94) 3550/8080(ppb)
MW#1 @ WB	6179-03	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)
Duplicate	6179-04	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)
MW#2 @ WB	6179-05	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)
MW#3 @ WB	6179-02	NA	NA	NA	NA	NA
MW#4 @ WB	6179-01	NA	NA	NA	NA	NA
MW#1 @ H	6179-09	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)
MW#2 @ H	6179-10	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)	ND (0.1 ppb)
MW#3 @ H	6179-08	NA	NA	NA	NA	NA
MW#4 @ H	6179-07	NA	NA	NA	NA	NA
MW#5 @ H	6179-06	NA	NA	NA	NA	NA

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

PCB's = Polychlorinated Biphenyls

ND ( ) = Not Detected (Detection Limit)

ppb = parts per billion

Table #5 Summary of Analytical Monitoring Well Water Samples for TPH Samples Collected on June 30, 1993 & September 30, 1993					
Well ID	Sample ID#	TPH (6/30/93) 418.1 (ppm)	TPH (9/30/93) 418.1 (ppm)	TPH (12/30/93)	TPH (6/30/94)
MW#1 @ WB	6179-03	ND (1 ppm)	ND (1 ppm)	ND (1 ppm)	
Duplicate	6179-04	ND (1 ppm)	ND (1 ppm)	ND (1 ppm)	
MW#2 @ WB	6179-05	ND (1 ppm)	ND (1 ppm)	ND (1 ppm)	
MW#3 @ WB	6179-02	NA	NA	NA	
MW#4 @ WB	6179-01	NA	NA	NA	
MW#1 @ H	6179-09	ND (1 ppm)	ND (1 ppm)	ND (1 ppm)	
MW#2 @ H	6179-10	ND (1 ppm)	ND (1 ppm)	ND (1 ppm)	
MW#3 @ H	6179-08	NA	NA	NA	
MW#4 @ H	6179-07	NA	NA	NA	
MW#5 @ H	6179-06	NA	NA	NA	

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

TPH = Total Range Petroleum Hydrocarbons

ND ( ) = Not Detected (Detection Limit)

ppm = parts per million

**Table #6**

**Summary of Analytical Monitoring Well Water Samples for VCS  
Samples Collected on June 30, 1993 & September 30, 1993**

**LEGEND:** WB = Weaver Brothers Books

WB = Weave Bias.

Duplicate

H = Hanger

VCS = Volatile Chlorine

AND ( ) = Not Detected

NAME \_\_\_\_\_

**ppb = parts per billion**

1, 2 Trichloroethane - 1.3 ppb

tetrachloroethene - 0.6 ppb

## 2 Dichlorobenzene = 13 000

Dichterberichte - 13 11

4. Dihlorobenzene = 3,1 pp

Trichloroethylene - 20 ppb

Chloroform - 2.4 ppb

Summary of Analytical Monitoring Well Water Samples for Total BTEX Samples Collected on June 30, 1993 & September 30, 1993					
Well ID	Sample ID#	BTEX(6/30/93)	BTEX(9/30/93)	BTEX(12/30/93)	BTEX(3/30/94)
		5030/602 (ppb)	5030/602 (ppb)	5030/602 (ppb)	5030/602 (ppb)
MW#1 @ WB	6179-03	2	2	2.3	
Duplicate	6179-04	4	4	4.3	
MW#2 @ WB	6179-05	2	2	0.9	
MW#3 @ WB	6179-02	61	61	240.7	
MW#4 @ WB	6179-01	16	16	10.7	
MW#1 @ H	6179-09	36	36	ND (3 ppb)	
MW#2 @ H	6179-10	7	7	6.6	
MW#3 @ H	6179-08	1	1	ND (3 ppb)	
MW#4 @ H	6179-07	ND (6 ppb)	ND (6 ppb)	ND (3 ppb)	
MW#5 @ H	6179-06	1	1	ND (3 ppb)	

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes

ND ( ) = Not Detected (Detection limit)

ppb = parts per billion

Summary of Analytical Monitoring Well Water Samples for Benzene Samples Collected on June 30, 1993 & September 30, 1993					
Well ID	Sample ID#	Ben(6/30/93) 5030/602 (ppb)	Ben(9/30/93) 5030/602 (ppb)	Ben(12/30/93) 5030/602 (ppb)	Ben(3/30/94) 5030/602 (ppb)
MW#1 @ WB	6179-03	ND (1 ppb)	0.7		
Duplicate	6179-04	ND (1 ppb)	1.4		
MW#2 @ WB	6179-05	ND (1 ppb)	ND (0.5 ppb)		
MW#3 @ WB	6179-02	52	240		
MW#4 @ WB	6179-01	3	6.1		
MW#1 @ H	6179-09	16	ND (0.5 ppb)		
MW#2 @ H	6179-10	ND (1 ppb)	2.9		
MW#3 @ H	6179-08	1	ND (0.5 ppb)		
MW#4 @ H	6179-07	ND (1 ppb)	ND (0.5 ppb)		
MW#5 @ H	6179-06	ND (1 ppb)	ND (0.5 ppb)		

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

ND ( ) = Not Detected (Detection limit)

ppb = parts per billion

Ben = Benzene

Summary of Analytical Monitoring Well Water Samples for Ethyl Benzene						
Samples Collected on June 30, 1993 & September 30, 1993						
Well ID	Sample ID#	EB(6/30/93) 5030/602 (ppb)	EB(9/30/93) 5030/602 (ppb)	EB(12/30/93) 5030/602 (ppb)	EB(3/30/94) 5030/602 (ppb)	EB(6/30/94) 5030/602 (ppb)
MW#1 @ WB	6179-03	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
Duplicate	6179-04	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#2 @ WB	6179-05	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#3 @ WB	6179-02	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#4 @ WB	6179-01	ND (1 ppb)	0.5	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#1 @ H	6179-09	1	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#2 @ H	6179-10	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#3 @ H	6179-08	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#4 @ H	6179-07	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)
MW#5 @ H	6179-06	ND (1 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)	ND (0.5 ppb)

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

ND ( ) = Not Detected (Detection limit)

ppb = parts per billion

EB = Ethyl Benzene

		Table #10			
		Summary of Analytical Monitoring Well Water Samples for Toluene Samples Collected on June 30, 1993 & September 30, 1993			
Well ID	Sample ID#	Tol(6/30/93) 5030/602 (ppb)	Tol(9/30/93) 5030/602 (ppb)	Tol(12/30/93) 5030/602 (ppb)	Tol(3/30/94) 5030/602 (ppb)
MW#1 @ WB	6179-03	2	1.6		
Duplicate	6179-04	4	2.9		
MW#2 @ WB	6179-05	2	0.9		
MW#3 @ WB	6179-02	5	0.7		
MW#4 @ WB	6179-01	13	0.8		
MW#1 @ H	6179-09	3	ND (0.5 ppb)		
MW#2 @ H	6179-10	3	ND (0.5 ppb)		
MW#3 @ H	6179-08	ND (1 ppb)	ND (0.5 ppb)		
MW#4 @ H	6179-07	ND (1 ppb)	ND (0.5 ppb)		
MW#5 @ H	6179-06	1	ND (0.5 ppb)		

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

ND ( ) = Not Detected (Detection limit)

ppb = parts per billion

Tol = Toluene

Table #11

**Summary of Analytical Monitoring Well Water Samples for Xylenes**  
**Samples Collected on June 30, 1993 & September 30, 1993**

Well ID	Sample ID#	Xyl(6/30/93) 5030/602 (ppb)	Xyl(9/30/93) 5030/602 (ppb)	Xyl(12/30/93) 5030/602 (ppb)	Xyl(3/30/94) 5030/602 (ppb)	Xyl(6/30/94) 5030/602 (ppb)
MW#1 @ WB	6179-03	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
Duplicate	6179-04	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#2 @ WB	6179-05	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#3 @ WB	6179-02	4	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#4 @ WB	6179-01	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#1 @ H	6179-09	1.6	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#2 @ H	6179-10	4	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#3 @ H	6179-08	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#4 @ H	6179-07	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)
MW#5 @ H	6179-06	ND (3 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)	ND (1.5 ppb)

LEGEND: WB = Weaver Brothers Bldg.

Duplicate = Duplicate of MW#1

H = Hanger

ND ( ) = Not Detected (Detection limit)

ppb = parts per billion

Xyl = Xylenes

Summary of Analytical Monitoring Well Water Samples for Arsenic						
Samples Collected on June 30, 1993 & September 30, 1993						
Well ID	Sample ID#	As(6/30/93) 3020/7060 (ppm)	As(9/30/93) 3020/7060 (ppm)	As(12/30/93) 3020/7060 (ppm)	As(3/30/94) 3020/7060 (ppm)	As(6/30/94) 3020/7060 (ppm)
MW#1 @ WB	6179-03	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)
Duplicate	6179-04	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)
MW#2 @ WB	6179-05	0.01	0.01	0.01	0.01	0.03
MW#3 @ WB	6179-02	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#4 @WB	6179-01	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#1 @ H	6179-09	0.01	0.01	0.01	0.02	0.02
MW#2 @ H	6179-10	0.02	0.02	0.02	0.03	0.03
MW#3 @ H	6179-08	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#4 @ H	6179-07	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed
MW#5 @ H	6179-06	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of WB #1

H = Hanger

ND ( ) = Not Detected (Detection Limit)

ppm = parts per million

As = Arsenic

Summary of Analytical Monitoring Well Water Samples for Cadmium Samples Collected on June 30, 1993 & September 30, 1993						
Well ID	Sample ID#	Cd(6/30/93) 3010/6010 (ppm)	Cd(9/30/93) 3010/6010 (ppm)	Cd(12/30/93) 3010/6010 (ppm)	Cd(3/30/94) 3010/6010 (ppm)	Cd(6/30/94) 3010/6010 (ppm)
MW#1 @ WB	6179-03	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	
Duplicate	6179-04	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	
MW#2 @ WB	6179-05	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	
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	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	
MW#2 @ H	6179-10	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	ND (0.01ppm)	
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	

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of WB #1

H = Hanger

ND ( ) = Not Detected (Detection Limit)

ppm = parts per million

Cd = Cadmium

Summary of Analytical Monitoring Well Water Samples for Chromium Samples Collected on June 30, 1993						
Well ID	Sample ID#	Cr(6/30/93) 3010/6010 (ppm)	Cr(9/30/93) 3010/6010 (ppm)	Cr(12/30/93) 3010/6010 (ppm)	Cr(3/30/94) 3010/6010 (ppm)	Cr(6/30/94) 3010/6010 (ppm)
MW#1 @ WB	6179-03	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	
Duplicate	6179-04	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	
MW#2 @ WB	6179-05	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	
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	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	
MW#2 @ H	6179-10	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	ND (0.05 ppm)	
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	

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of WB #1

H = Hanger

ND ( ) = Not Detected (Detection Limit)

ppm = parts per million

Cr = Chromium

Table #15					
Summary of Analytical Monitoring Well Water Samples for Lead					
Samples Collected on June 30, 1993 & September 30, 1993					
Well ID	Sample ID#	Pb(6/30/93) 3020/7421 (ppm)	Pb(9/30/93) 3020/7421 (ppm)	Pb(12/30/93) 3020/7421 (ppm)	Pb(3/30/94) 3020/7421 (ppm)
MW#1 @ WB	6179-03	0.011		ND (0.005 ppm)	
Duplicate	6179-04	0.01		ND (0.005 ppm)	
MW#2 @ WB	6179-05	0.012	0.008		
MW#3 @ WB	6179-02	Not Analyzed		Not Analyzed	
MW#4 @WB	6179-01	Not Analyzed		Not Analyzed	
MW#1 @ H	6179-09	0.01		ND (0.005 ppm)	
MW#2 @ H	6179-10	0.01	0.018		
MW#3 @ H	6179-08	Not Analyzed		Not Analyzed	
MW#4 @ H	6179-07	Not Analyzed		Not Analyzed	
MW#5 @ H	6179-06	Not Analyzed		Not Analyzed	

**LEGEND:** WB = Weaver Brothers Bldg.

Duplicate = Duplicate of WB #1

H = Hanger

ND ( ) = Not Detected (Detection Limit)

ppm = parts per million

Pb = Lead

Table #16

**Summary of Field Analysis of Monitoring Well Water Samples Collected on June 30 1993 & September 30, 1993**

Summary of Field Analysis of Monitoring Well Water						
Samples Collected on June 30 1993 & September 30, 1993						
	June 30 1993			September 30 1993		
Well ID	Temp degrees C (F)	pH	Cond. uS	D.O. %	Temp degrees C (F)	pH
MW#1 @ WB	4.5 (40)	6.41	380	R	4.5 (40)	6.62
MW#2 @ WB	5.0 (41)	6.67	370	R	4.5 (40)	6.53
MW#3 @ WB	5.5 (42)	6.62	410	R	5.0 (41)	6.76
MW#4 @ WB	5.0 (41)	6.59	380	R	4.5 (40)	6.63
MW#1 @ H	3.5 (38)	7.09	340	R	3.5 (38)	6.76
MW#2 @ H	3.5 (38)	6.58	400	R	3.5 (38)	6.91
MW#3 @ H	4.0 (39)	6.70	400	R	4.0 (39)	6.64
MW#4 @ H	3.5 (38)	6.66	360	R	3.5 (38)	6.83
MW#5 @ H	3.5 (38)	6.67	390	R	3.5 (38)	6.56
						400
						38.7

**Table #17**  
**Holding Times and Surrogate Recovery**

QC Designation	Tolerance	Results for this Project
<b><u>Holding Times</u></b>		
8100M,DRPH,water	extraction    14 days max. analysis    40 days max.	< 14 days < 14 days
8015M,GRPH,water	analysis    14 days max.	< 14 days
418.1,TPH,water	extraction    14 days max. analysis    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    14 days max. analysis    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
<b><u>Surrogate Recovery</u></b>		(+/-%)
8100M,DRPH,water	40%	75% - 125%
8015M,GRPH,water	40%	70% - 130%

**Table #18**  
**Laboratory Accuracy and Completeness**

QC Designation	Tolerance	Results for this Project
<b><u>Laboratory Accuracy</u></b>		
8100M, DRPH, water	60% - 130%	114%
8015M, GRPH, water	60% - 130%	100%
418.1, TPH, water	60% - 130%	97%
8020, BTEX, water	60% - 130%	97% - 107%
8010, HVO, water	40% - 130%	100% - 131%
8080, PCBs, water	60% - 140%	95%
7060, Arsenic, water	80% - 120%	110%
6010, Cadmium, water	80% - 120%	105%
6010, Chromium, water	80% - 120%	99%
7421, Lead, water	80% - 120%	102%
<b><u>Completeness</u></b>		
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%

**Table #19**  
**Laboratory and Field Precision**

QC Designation	Tolerance +/-	Results for this Project +/-
<b><u>Laboratory Precision</u></b>		
8100M,DRPH,water	30%	22%
8015M,GRPH,water	30%	0%
418.1,TPH,water	30%	1%
8020,BTEX,water	30%	2% - 3%
8010,HVO,water	30%	1% - 2%
8080,PCBs,water	30%	13%
7060,Arsenic,water	20%	2%
6010,Cadmium,water	20%	0%
6010,Chromium,water	20%	0%
7421,Lead,water	20%	3%
<b><u>Field Precision</u></b>		
8100M,DRPH,water	30%	0%
8015M,GRPH,water	30%	0%
418.1,TPH,water	30%	0%
8020,BTEX,water	30%	60%
8010,HVO,water	30%	0%
8080,PCBs,water	30%	0%
7060,Arsenic,water	20%	200%
6010,Cadmium,water	20%	0%
6010,Chromium,water	20%	0%
7421,Lead,water	20%	0%

**ATTACHMENT D**

**LABORATORY RESULTS**



# Superior Precision Analytical, Inc.

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Environmental Management, Inc  
Attn: STAN DOLLOFF

Project 1224  
Reported 11-October-1993

HALOGENATED VOLATILE ORGANICS by EPA SW-846 Methods 5030/8010.

Chronology		Laboratory Number 90196					
Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #	
6179-03	09/30/93	10/04/93	/ /	10/06/93		3	
6179-04	09/30/93	10/04/93	/ /	10/06/93		4	
6179-05	09/30/93	10/04/93	/ /	10/10/93		5	
6179-09	09/30/93	10/04/93	/ /	10/07/93		9	
6179-10	09/30/93	10/04/93	/ /	10/07/93		10	

Page 1 of 3



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Project 1224  
Reported 11-October-1993

## HALOGENATED VOLATILE ORGANICS by EPA SW-846 Methods 5030/8010.

Laboratory Number	Sample Identification	Matrix
90196- 3	6179-03	Water
90196- 4	6179-04	Water
90196- 5	6179-05	Water
90196- 9	6179-09	Water
90196-10	6179-10	Water

### RESULTS OF ANALYSIS

Laboratory Number: 90196- 3 90196- 4 90196- 5 90196- 9 90196-10

Chloromethane/Vinyl Ch:	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
Bromomethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Chloroethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Trichlorofluoromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1-Dichloroethene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Dichloromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
t-1,2-Dichloroethene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1-Dichloroethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	34
c-1,2-Dichloroethene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	26
Chloroform:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1,1-Trichloroethane:	ND<0.5	ND<0.5	0.6	ND<0.5	53
Carbon tetrachloride:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,2-Dichloroethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Trichloroethene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	28
c-1,3-Dichloropropene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,2-Dichloropropane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
t-1,3-Dichloropropene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Bromodichloromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1,2-Trichloroethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	1.3
Tetrachloroethene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	0.6
Dibromochloromethane:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Chlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Bromoform:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,1,2,2-Tetrachloroeth:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,3-Dichlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
1,2-Dichlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	13
1,4-Dichlorobenzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	3.1
Concentration:	ug/L	ug/L	ug/L	ug/L	ug/L



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## HALOGENATED VOLATILE ORGANICS by EPA SW-846 Methods 5030/8010. Quality Assurance and Control Data - Water

Laboratory Number 90196

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
Chloromethane/Vinyl Ch:	ND<1.0	1.0			
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	131%	65-151	2%
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	100%	84-145	1%
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	121%	97-130	2%
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. 90196

  
Al Saad  
Senior Chemist  
Account Manager



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Environmental Management, Inc  
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Project 1224  
Reported 11-October-1993

## ANALYSIS FOR ARSENIC, CADMIUM, CHROMIUM, & LEAD

by EPA Method SW-846 6010 & 7000 Series

Identification	Sampled	Received	Extracted	Analyzed	Run #	Laboratory Number 90196	Lab #
6179-03	09/30/93	10/04/93	10/08/93	10/11/93			3
6179-04	09/30/93	10/04/93	10/08/93	10/11/93			4
6179-05	09/30/93	10/04/93	10/08/93	10/11/93			5
6179-09	09/30/93	10/04/93	10/08/93	10/11/93			9
6179-10	09/30/93	10/04/93	10/08/93	10/11/93			10



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Project 1224  
Reported 11-October-1993

## ANALYSIS FOR ARSENIC, CADMIUM, CHROMIUM, & LEAD

Laboratory Number	Sample Identification	Matrix
90196- 3	6179-03	Water
90196- 4	6179-04	Water
90196- 5	6179-05	Water
90196- 9	6179-09	Water
90196-10	6179-10	Water

### RESULTS OF ANALYSIS

Laboratory Number:	90196- 3	90196- 4	90196- 5	90196- 9	90196-10
Arsenic (As) :	ND<0.01	0.01	0.03	0.02	0.03
Cadmium (Cd) :	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
Lead (Pb) :	ND<.005	ND<.005	0.008	ND<.005	0.018
Concentration:	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, & LEAD Quality Assurance and Control Data - Water

Laboratory Number 90196

Compound	Method	Blank (mg/L)	PQL (mg/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
Arsenic	(As) :	ND<0.01	0.01	110%	75-125	2%
Cadmium	(Cd) :	ND<0.01	0.01	105%	75-125	0%
Chromium	(Cr) :	ND<0.05	0.05	99%	75-125	0%
Lead	(Pb) :	ND<.005	.005	102%	75-125	3%

### Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 90196

RPD = Relative Percent Difference

  
Alvaro Salazar  
Senior Chemist  
Account Manager



# Superior Precision Analytical, Inc.

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

Environmental Management, Inc  
Attn: STAN DOLLOFF

Project 1224  
Reported 11-October-1993

## VOLATILE PETROLEUM HYDROCARBONS

Sample preparation by Purge and Trap (EPA SW-846 method 5030). Gasoline analysis by SW-846 method 8015 modified. Gasoline range quantified as all compounds between C6 and C10. Benzene, Toluene, Ethyl Benzene and Xylenes analyses by EPA SW-846 method 8020.

Identification	Sampled	Received	Extracted	Analyzed	Run #	Laboratory Number 90196	Lab #
6179-01	09/30/93	10/04/93	/ /	10/07/93			1
6179-02	09/30/93	10/04/93	/ /	10/07/93			2
6179-03	09/30/93	10/04/93	/ /	10/09/93			3
6179-04	09/30/93	10/04/93	/ /	10/09/93			4
6179-05	09/30/93	10/04/93	/ /	10/09/93			5
6179-06	09/30/93	10/04/93	/ /	10/07/93			6
6179-07	09/30/93	10/04/93	/ /	10/07/93			7
6179-08	09/30/93	10/04/93	/ /	10/09/93			8
6179-09	09/30/93	10/04/93	/ /	10/09/93			9
6179-10	09/30/93	10/04/93	/ /	10/09/93			10



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Environmental Management, Inc  
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Project 1224  
Reported 11-October-1993

## VOLATILE PETROLEUM HYDROCARBONS

Laboratory Number	Sample Identification	Matrix
90196- 1	6179-01	Water
90196- 2	6179-02	Water
90196- 3	6179-03	Water
90196- 4	6179-04	Water
90196- 5	6179-05	Water
90196- 6	6179-06	Water
90196- 7	6179-07	Water
90196- 8	6179-08	Water
90196- 9	6179-09	Water
90196-10	6179-10	Water

## RESULTS OF ANALYSIS

Laboratory Number: 90196- 1 90196- 2 90196- 3 90196- 4 90196- 5

Gasoline:	ND<50	350	ND<50	ND<50	ND<50
Benzene:	6.1	240	0.7	1.4	ND<0.5
Toluene:	0.8	0.7	1.6	2.9	0.9
Ethyl Benzene:	0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Total Xylenes:	3.3	ND<1.5	ND<1.5	ND<1.5	ND<1.5

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

### -- Surrogate Recoveries --

4-BFB % Recovery: 110% 96% 98% 83% 67%

Laboratory Number: 90196- 6 90196- 7 90196- 8 90196- 9 90196-10

Gasoline:	ND<50	ND<50	ND<50	ND<50	90
Benzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	2.9
Toluene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Ethyl Benzene:	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
Total Xylenes:	ND<1.5	ND<1.5	ND<1.5	ND<1.5	3.7

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

### -- Surrogate Recoveries --

4-BFB % Recovery: 99% 102% 90% 96% 110%



VOLATILE PETROLEUM HYDROCARBONS  
Quality Assurance and Control Data - Water

Laboratory Number 90196

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
Gasoline:	ND<50	50	100%	70-130	0%
Benzene:	ND<0.5	0.5	103%	70-130	3%
Toluene:	ND<0.5	0.5	106%	70-130	2%
Ethyl Benzene:	ND<0.5	0.5	107%	70-130	2%
Total Xylenes:	ND<1.5	1.5	97%	70-130	2%

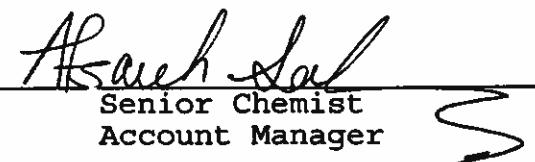
Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 90196

RPD = Relative Percent Difference

  
Asael Sal  
Senior Chemist  
Account Manager



# Superior Precision Analytical, Inc.

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Environmental Management, Inc  
Attn: STAN DOLLOFF

Project 1224  
Reported 11-October-1993

DIESEL RANGE ORGANICS by EPA Method 8100 Modified.

Diesel range quantified as all compounds from C10 to C28.

Chronology		Laboratory Number 90196				
Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
6179-01	09/30/93	10/04/93	10/08/93	10/11/93		1
6179-02	09/30/93	10/04/93	10/08/93	10/08/93		2
6179-03	09/30/93	10/04/93	10/08/93	10/08/93		3
6179-04	09/30/93	10/04/93	10/08/93	10/08/93		4
6179-05	09/30/93	10/04/93	10/08/93	10/08/93		5
6179-06	09/30/93	10/04/93	10/08/93	10/08/93		6
6179-07	09/30/93	10/04/93	10/08/93	10/08/93		7
6179-08	09/30/93	10/04/93	10/08/93	10/08/93		8
6179-09	09/30/93	10/04/93	10/08/93	10/08/93		9
6179-10	09/30/93	10/04/93	10/08/93	10/11/93		10



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Project 1224  
Reported 11-October-1993

## DIESEL RANGE ORGANICS by EPA Method 8100 Modified.

Laboratory Number	Sample Identification	Matrix
90196- 1	6179-01	Water
90196- 2	6179-02	Water
90196- 3	6179-03	Water
90196- 4	6179-04	Water
90196- 5	6179-05	Water
90196- 6	6179-06	Water
90196- 7	6179-07	Water
90196- 8	6179-08	Water
90196- 9	6179-09	Water
90196-10	6179-10	Water

### RESULTS OF ANALYSIS

Laboratory Number: 90196- 1 90196- 2 90196- 3 90196- 4 90196- 5

Diesel: ND<100 ND<100 ND<100 ND<100 ND<100 ND<100

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

-- Surrogate Recoveries --

Tetracosane Recovery: 130% 110% 120% 120% 110%

Laboratory Number: 90196- 6 90196- 7 90196- 8 90196- 9 90196-10

Diesel: ND<100 ND<100 ND<100 320 420

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

-- Surrogate Recoveries --

Tetracosane Recovery: 120% 110% 120% 94% 110%



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## DIESEL RANGE ORGANICS by EPA Method 8100 Modified. Quality Assurance and Control Data - Water

Laboratory Number 90196

Compound	Method Blank (ug/L)	PQL (ug/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
Diesel:	ND<100	100	114%	75-125	22%

### Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 90196

RPD = Relative Percent Difference

  
\_\_\_\_\_  
Senior Chemist

Account Manager



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Environmental Management, Inc  
Attn: STAN DOLLOFF

Project 1224  
Reported 11-October-1993

## TOTAL RECOVERABLE HYDROCARBONS by EPA Method 418.1

### Chronology

Laboratory Number 90196

Identification	Sampled	Received	Extracted	Analyzed	Run #	Lab #
6179-03	09/30/93	10/04/93	10/08/93	10/08/93		3
6179-04	09/30/93	10/04/93	10/08/93	10/08/93		4
6179-05	09/30/93	10/04/93	10/08/93	10/08/93		5
6179-09	09/30/93	10/04/93	10/08/93	10/08/93		9
6179-10	09/30/93	10/04/93	10/08/93	10/08/93		10



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Environmental Management, Inc  
Attn: STAN DOLLOFF

Project 1224  
Reported 11-October-1993

## TOTAL RECOVERABLE HYDROCARBONS by EPA Method 418.1

Laboratory Number	Sample Identification	Matrix
90196- 3	6179-03	Water
90196- 4	6179-04	Water
90196- 5	6179-05	Water
90196- 9	6179-09	Water
90196-10	6179-10	Water

### RESULTS OF ANALYSIS

Laboratory Number: 90196- 3 90196- 4 90196- 5 90196- 9 90196-10

PETROLEUM HYDROCARBONS:ND<1 ND<1 ND<1 ND<1 ND<1

Concentration: 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

## TOTAL RECOVERABLE HYDROCARBONS by EPA Method 418.1 Quality Assurance and Control Data - Water

Laboratory Number 90196

Compound	Method Blank (mg/L)	PQL (mg/L)	Average Spike Recovery (%)	Limits (%)	RPD (%)
PETROLEUM HYDROCARBONS:	ND<1	1	97%	75-125	1%

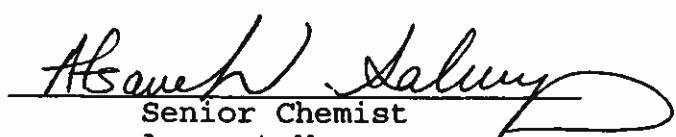
### Definitions:

ND = Not Detected

PQL = Practical Quantitation Limit

QC File No. 90196

RPD = Relative Percent Difference

  
Alvaro W. Salazar  
Senior Chemist  
Account Manager

Page 3 of 3

# ALASKA Chain of Custody and Analysis Request

Page 1 of 1

Company: Environmental Management, Inc.  
 Address: 907 E. Dowling Rd., Suite A21  
 State: AK Zip: 99518  
 City : Anchorage  
 Phone: (907) 562-2580 Fax: 562-1561  
 Project Manager: Stan Doherty  
 Alternate Contact: Bill Peterson  
 Project No.: 1224 P.O. No.

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

Superior Precision Analytical Inc.  
 P.O. Box 1545  
 Martinez, California 94553  
 Martinez I: (510) 229-1512  
 Martinez II: (510) 229-0166  
 San Francisco: (415) 647-2081

## Section II: Analysis Request

Sample Identification	Regulatory Agency:	Sampler:		Sampling Remarks
		Date Sampled	Time Sampled	
1 6179-01	W X	X	9:30	4 yes I will call
2 6179-02	W X	X	9:30	4 yes new and give
3 6179-03	W X	X	10:30am	10 yes you a spot.
4 6179-04	W X	X	10:30am	10 yes
5 6179-05	W X	X	11:30am	10 yes
6 6179-06	W X	X	11:30am	10 yes
7 6179-07	W X	X	12:30pm	4 yes
8 6179-08	W X	X	12:30pm	4 yes
9 6179-09	W X	X	12:30pm	10 yes ✓
10 6179-10	W X	X	12:30pm	10 yes ✓
11				
12				
Relinquished By: Stan Doherty Organization: ENP	Date/Time 9:30 3:30pm Date/Time	Received By: Organization:	Date/Time	Lab: Please initial the following:
Relinquished By: Organization:		Received By: Organization:	Date/Time	Samples Stored in Ice:
Relinquished By: Organization:		Received By: Organization:	Date/Time	Appropriate Containers:
Relinquished By: Organization:		Received By: Laboratory:	Date/Time	Samples Preserved:
				VOAs without headspace:
				Comments:

**SUPERIOR PRECISION ANALYTICAL INC.**  
**REFERENCE SHEET FOR ALASKA PROJECTS**

**If an analysis you require does not appear on this sheet, please contact our customer service representatives at (800) 521-6109 for information.**

METHOD	TYPE OF ANALYSIS	PQL	SAMPLE CONTAINERS
EPA Method 8100 (AK 102) (Soil)	Diesel	S: 10 ppm	S: Brass tube; 8 oz. glass jar
EPA Method 8100 (AK 102) (Water)	Diesel	W: 50 ppb	W: 1 ltr. amber
EPA Method 8015M/8020 (AK 101/8020)	Gas/BTXE	S: 1 ppm/0.003 ppm W: 50 ppb/0.3 ppb	S: Brass tube; 8 oz. glass jar W: 3 pres. VOAs
EPA Method 8015M (AK 101)	Gasoline	S: 1 or 10 ppm W: 50 ppb	S: Brass tube; 8 oz. glass jar W: 3 pres. VOAs
EPA Method 8020	BTXE (Volatile Aromatics)	S: 0.003 ppm W: 0.3 ppb	S: Brass tube; 8 oz. glass jar W: 3 pres. VOAs
EPA Method 8010	Chlorinated Hydrocarbons	S: 0.005-0.01 ppm W: 0.5-4 ppb	S: Brass tube; 8 oz. glass jar W: 3 pres. VOAs
EPA Method 8240	VOC's by Mass Spectrometry	S: 15-100 ppb W: 3-20 ppb	S: Brass tube; 8 oz. glass jar W: 3 pres. VOAs
EPA Method 8260	VOC's (Mass Spectrometry)	S: 15-100 ppb W: 3-20 ppb	S: Brass tube; 8 oz. glass jar W: 3 pres. VOAs
EPA Method 418.1	Total Petroleum Hydrocarbons	S: 10 ppm W: 1 ppm	S: 8 oz. glass jar W: 1 ltr. amber
EPA Method 6010 - TTLC Lead			S: 8 oz. glass jar W: 500 ml. HNO <sub>3</sub> preserved plastic bottle
DHS-LUFT Organic Lead	Organic Lead	S: 4 ppm W: 2 ppm	S: 8 oz. glass jar W: 1 ltr. amber

All containers for metals analyses utilize 8 oz. jar for soils and 500 ml. HNO<sub>3</sub> plastic container for water.

\*\* For dissolved metals, filter before preservation \*\*