

200360

2100.26.30
L69.47



Hart Crowser, Inc.
2550 Denali Street, Suite 705
Anchorage, Alaska 99503-2737
Fax 907.276.2104
Tel 907.276.7475

Earth and Environmental Technologies

A-8397-08

November 23, 1998

Mr. Jon Clark
Municipality of Anchorage
Department of Property and Facility Management
3640 East Tudor Road
Anchorage, Alaska 99519-6650

RECEIVED
FEB 3 1999

Dept. of Environmental Conservation
Underground Storage Tanks — FAP

Re: Groundwater Monitoring
Anchorage Fire Department Station No. 4
ADEC Release No. 94-2-1-00-245-03

Dear Mr. Clark:

This letter report presents a summary of the October 1998 groundwater sampling activities at the Municipality of Anchorage (MOA) Fire Department Station No. 4 (AFD-4). AFD-4 is located at 4350 MacInnes Street in Anchorage, Alaska.

In January 1995, two recovery wells were installed at the site to collect floating hydrocarbons (Figure 1) using Petro-trap passive hydrocarbon pumps. Work was conducted in accordance with the Corrective Action Plan for this site dated October 19, 1994. This plan was approved by the Alaska Department of Environmental Conservation in a January 13, 1995 meeting with the MOA - Department of Property and Facility Management and Hart Crowser.

WORK PERFORMED BY HART CROWSER

On October 7, 1998, a product thickness measurement was taken in MW-1, and groundwater elevation measurements were taken in monitoring wells MW-2 through MW-4 (Appendix A - Field Methods). Monitoring wells MW-2, MW-3, and MW-4 were then purged and sampled. Samples were submitted to MultiChem Analytical Services (MAS) for analyses of benzene, toluene, ethylbenzene, and xylenes (BTEX; EPA Method 8021) and diesel range organics (DRO; EPA Method 8100M).





Mr. Jon Clark
November 23, 1998

A-8397-08
Page 2

WATER TABLE CONDITIONS

Over the monitoring period, the groundwater elevations in the monitoring wells have declined by an average of 1.2 feet since May 1998 (Figures 2 and 3). The inferred groundwater contours for this site for October 7, 1998 are presented on Figure 1. The groundwater flow direction is inferred to the northeast with an average hydraulic gradient of 0.01 feet/foot. The groundwater flow direction and hydraulic gradient were consistent with previously observed conditions.

HYDROCARBON THICKNESS AND RECOVERY

The hydrocarbon thickness in MW-1 is presented in Table 1, and a comparison between hydrocarbon thickness and groundwater elevation is presented on Figure 3. On October 7, 1998, hydrocarbon thickness was 0.75 feet. This is less than the thickness observed of 1.12 feet observed in May 1998.

PURGE WATER OBSERVATIONS

No odor or sheen was observed in the purge water from MW-2, MW-3, or MW-4.

LABORATORY ANALYSES RESULTS

The results of benzene and total BTEX laboratory analyses are summarized in Tables 2a and 2b. No BTEX analytes or DRO concentrations were detected in the sampled monitoring wells. All laboratory reports are presented in Appendix B along with a review of data quality.

Data Validation

Review of Laboratory Quality Control Data provided by MAS on groundwater samples collected at AFD-4 indicated that reported results met the data quality objectives outlined in the Hart Crowser Quality Assurance Program Plan; all data are accepted. Any deviations are discussed in Appendix B.





Mr. Jon Clark
November 23, 1998

A-8397-08
Page 3

CONCLUSIONS

Groundwater sampling results continue to suggest that hydrocarbon impacts at the site are restricted to the area on the former underground storage tank excavation. We continue to recommend that a soil vapor extraction (SVE) test be conducted during this summer to allow for design of a soil remediation system. If the pilot test shows that the site is suitable for SVE, the system will be designed to operate first as an SVE system (negative pressure) to remove the residual volatile hydrocarbons from the soils. After the residual volatile fraction of the hydrocarbons has been removed, the system air flow would then be reversed to allow for bioventing of any remaining diesel-range fuel components from the subsurface.

INFORMATION LIMITATIONS

Work for this project was performed, and this letter report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same and similar localities at the time the work was performed. It is intended for the exclusive use of the MOA-DPFM. This letter report is not meant to represent a legal opinion, and no other warranty, express or implied, is made.

We trust that this report meets your needs. Any questions regarding the field work and this letter report, the presentation of the information, and the interpretation of the data are welcome and should be referred to Nino Muniz at (907) 276-7475.

Sincerely,

HART CROWSER, INC.

HERMINIO R. MUNIZ
Associate Hydrogeologist

HRM/mm

Ref: \PROJECT\839708\AFD4-1098.DOC





Mr. Jon Clark
November 23, 1998

A-8397-08
Page 4

- Attachments:
- | | |
|------------|--|
| Table 1 | Groundwater Elevations and Hydrocarbon Thickness in MW-1 |
| Table 2a | Groundwater Laboratory Analyses Results - Benzene |
| Table 2b | Groundwater Laboratory Analyses Results - Total BTEX |
| Table 2c | Groundwater Laboratory Analyses Results - DRO |
| Figure 1 | Site Plan and Water Table Elevations on May 28, 1998 |
| Figure 2 | Monitoring Well Hydrographs |
| Figure 3 | Hydrocarbon Thickness and Groundwater Elevation in MW-1 |
| Appendix A | Field Methods |
| Appendix B | Laboratory Reports |

**Table 1: Groundwater Elevations and Hydrocarbon Thickness in MW-1
AFD - 4
Anchorage, Alaska**

Date	Depth to Hydrocarbon (Feet)	Depth to Groundwater (Feet)	Corrected Groundwater Elev. (Feet) {1} {2}	Hydrocarbon Thickness (Feet)
8/1/94	Not Observed	10.30	89.07	0.00
8/10/94	9.73	10.58	89.50	0.85
9/8/94	9.99	11.86	89.08	1.87
1/24/95	10.69	13.43	88.24	2.74
1/27/95	10.77	13.33	88.19	2.56
2/3/95	10.99	12.19	88.19	1.20
2/10/95	10.97	12.15	88.21	1.18
2/15/95	10.85	11.97	88.34	1.12
2/24/95	10.88	12.09	88.30	1.21
3/9/95	11.03	12.33	88.13	1.30
3/27/95	11.20	12.56	87.95	1.36
4/21/95	9.34	9.92	89.94	0.58
5/22/95	7.86	8.19	91.46	0.33
6/12/95	8.29	8.60	91.03	0.31
7/7/95	8.83	9.19	90.48	0.36
7/17/95	9.02	9.35	90.30	0.33
7/27/95	8.57	8.96	90.74	0.39
8/3/95	8.08	8.44	91.23	0.36
8/29/95	8.60	8.95	90.71	0.35
9/28/95	8.43	8.81	90.88	0.38
10/25/95	8.68	9.05	90.63	0.37
11/21/95	9.11	9.51	90.20	0.40
12/22/95	9.74	10.47	89.51	0.73
1/24/96	10.15	10.85	89.11	0.70
4/18/96	9.56	10.35	89.68	0.79
5/10/96	8.90	9.27	90.41	0.37
7/3/96	7.92	8.18	91.41	0.26
7/31/96	7.54	7.84	91.78	0.30
8/6/96	7.46	7.75	91.86	0.29
11/20/96	7.50	7.82	91.82	0.32
2/19/97	7.65	7.91	91.68	0.26
4/10/97	7.00	7.23	92.33	0.23
7/11/97	7.50	7.75	91.83	0.25
5/28/98	8.64	9.76	90.55	1.12
10/7/98	9.80	10.55	89.45	0.75

Notes:

levels.xls-prod/vl

{1} Vertical Survey conducted on 7/2/94; elevation of 100.00 feet assumed at northeast corner of concrete flagpole footin
MW-1 measuring point elevation = 99.37 feet.

{2} Groundwater elevation corrected using measured hydrocarbon specific gravity of 0.84, as determined by laboratory.

Table 2a: Groundwater Laboratory Analysis Results - Benzene
AFD-4
Anchorage, Alaska

Monitoring Well	Benzene (mg/L) - EPA 5030/8020									
	8/1/94	1/25/95	4/21/95	7/27/95	10/26/95	1/24/96	5/10/96	8/6/96	11/20/96	
MW-1 Field Duplicate	2.3 2.2	N/S [2]	N/S [2]	N/S [2]	N/S [2]	N/S [2]	N/S [2]	N/S [2]	N/S [2]	N/S [2]
MW-2 Field Duplicate	ND(0.0005) [1]	N/S [3]	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)
MW-3 Field Duplicate	ND(0.0005)	ND(0.0005) ND(0.0005)	N/S [4]	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
MW-4	0.0005	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Trip Blank	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.0005)
Monitoring Well	2/19/97	7/11/97	5/28/98	10/7/98						
MW-1 Field Duplicate	N/S [2]	N/S [2]	N/S [2]	N/S [2]						
MW-2 Field Duplicate	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.0005) ND(0.0005)	ND(0.001) ND(0.001)						
MW-3 Field Duplicate	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.001)						
MW-4	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.001)						
Trip Blank	ND(0.0005)	ND(0.0005)	ND(0.0005)	ND(0.001)						

NOTES: (1) ND(0.0005) - Not Detected (Detection Limit)

(2) N/S - Not sampled due to floating hydrocarbons in well.

(3) N/S - Not sampled due to large snowpile over well.

(4) N/S - Not sampled due to ice blockage in well riser.

h:\zchem.xls-benzene

000366

Table 2b: Groundwater Laboratory Analysis Results - Total BTEX
AFD-4
Anchorage, Alaska

Monitoring Well	Total BTEX (mg/L) - EPA 5030/8020									
	8/1/94	1/25/95	4/21/95	7/27/95	10/26/95	1/24/96	5/10/96	8/6/96	11/20/96	
MW-1 field Duplicate	40 38	N/S[2]	N/S[2]	N/S[2]	N/S[2]	N/S[2]	N/S[2]	N/S[2]	N/S[2]	N/S[2]
MW-2 field Duplicate	0.003	N/S[3]	ND ND	ND ND	ND ND	0.0006 ND	ND ND	ND ND	ND ND	ND ND
MW-3 field Duplicate	0.006	ND ND	N/S[4]	ND	ND	ND	ND	ND	ND	ND
MW-4	0.004	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trip Blank	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Monitoring Well	2/19/97	7/11/97	5/28/98	10/7/98						
MW-1 field Duplicate	N/S[2]	N/S[2]	N/S[2]	N/S[2]						
MW-2 field Duplicate	ND ND	ND ND	ND ND	ND ND						
MW-3 field Duplicate	ND	0.001	ND	ND						
MW-4	ND	ND	ND	0.0018						
Trip Blank	ND	ND	ND	ND						

NOTES: [1] ND(0.0005) - Not Detected (Detection Limit)

[2] N/S - Not sampled due to floating hydrocarbons in well.

[3] N/S - Not sampled due to large snowpile over well.

[4] N/S - Not sampled due to ice blockage in well riser.

Table 2c: Groundwater Laboratory Analysis Results - DRO
AFD-4
Anchorage, Alaska

		DRO (mg/L) - EPA 3510/8100M							
Monitoring Well		4/21/95	7/27/95	10/26/95	1/24/96	5/10/96	8/6/96	11/20/96	
MW-1		N/S {1}	N/S {1}	N/S {1}	N/S {1}	N/S {1}	N/S {1}	N/S {1}	N/S {1}
MW-2		ND(0.25)	0.17	0.14	0.30	ND(0.25)	0.15	0.12	
Field Duplicate		ND(0.25)	0.17	0.16	0.17	0.47	0.12	ND(0.10)	
MW-3		N/S {2}	0.27	0.16	0.16	ND(0.25)	0.21	ND(0.10)	
MW-4		ND(0.25)	0.16	0.13	0.14	ND(0.25)	0.11	0.11	
<hr/>									
Monitoring Well		2/19/97	7/11/97	5/28/98	10/7/98				
MW-1		N/S {1}	N/S {1}	N/S {1}	N/S {1}				
MW-2		0.14	ND(0.25)	ND(0.25)	ND(0.25)				
Field Duplicate		0.14	ND(0.25)	ND(0.25)	ND(0.25)				
MW-3		0.15	ND(0.25)	ND(0.26)	ND(0.25)				
MW-4		0.20	ND(0.25)	ND(0.26)	ND(0.25)				

NOTES:

ND(0.0005) - Not Detected (Detection Limit)

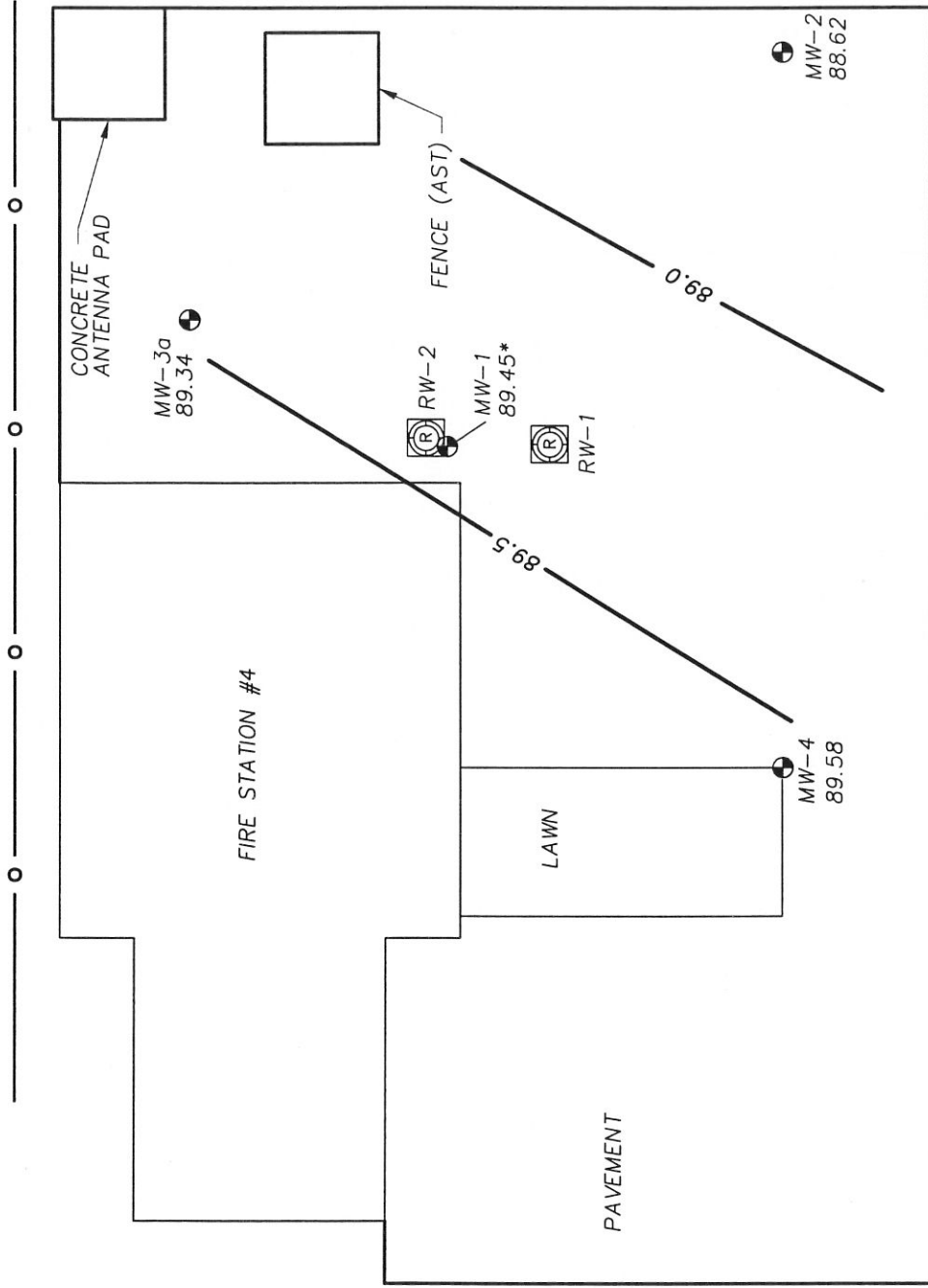
{1} N/S - Not sampled due to floating hydrocarbon in well.

{2} N/S - Not sampled due to ice blockage in well riser.

Site Plan and Water Table Elevations on October 7, 1998

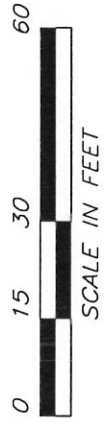
AFD-4

Anchorage, Alaska



LEGEND

- MW-1 Monitoring Well
- 89.58 Water Table Elevation
- (R) Recovery Well
- 89 Inferred Groundwater Contour in feet
- o - Chain Link Fence



MACINNES STREET



HARTCROWSER

A-8397-08 11/98

Figure 1

*Corrected for 0.75 feet of free-phase hydrocarbon.

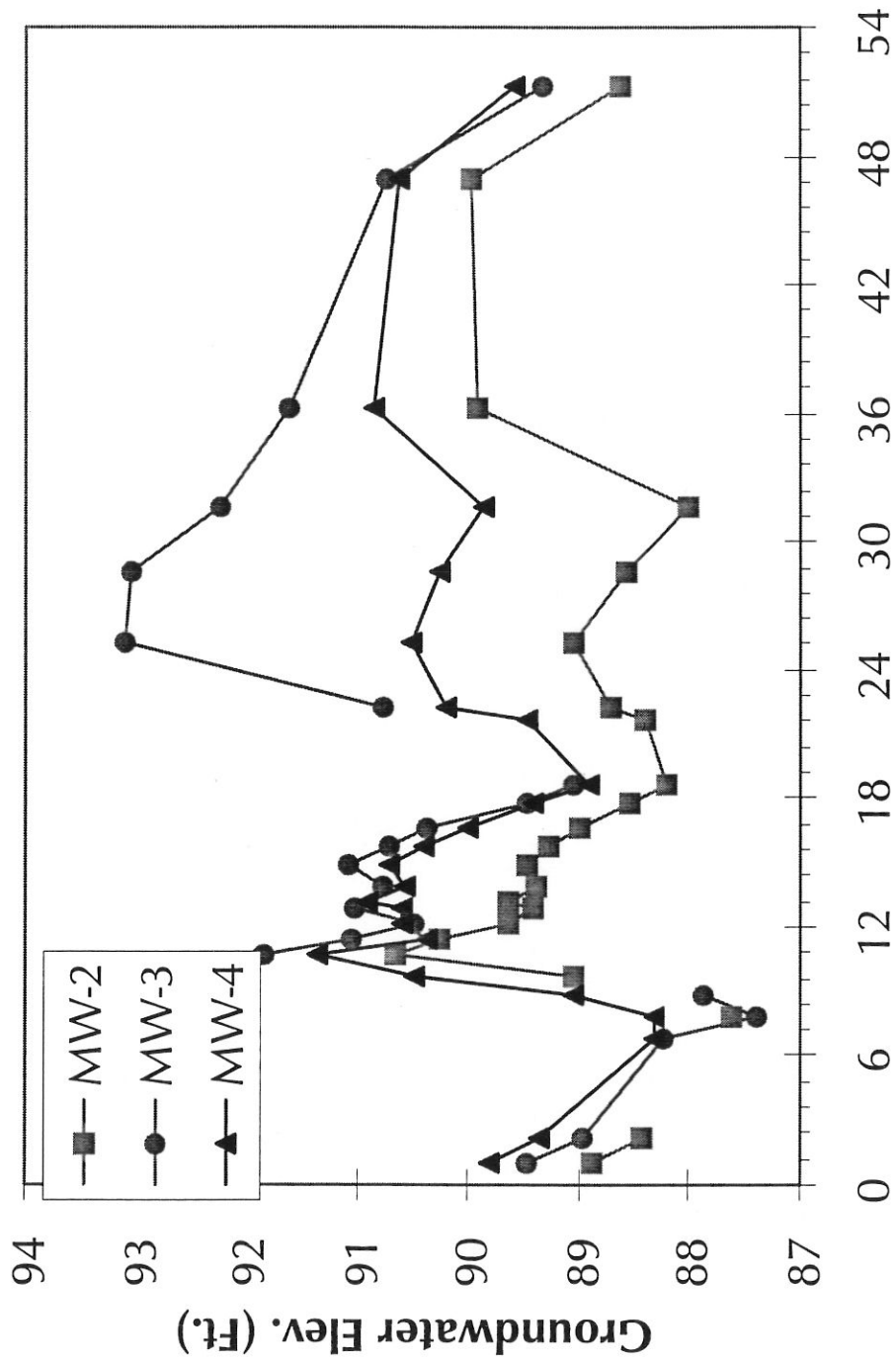
000370

FJ

Monitoring Well Hydrographs

AFD-4

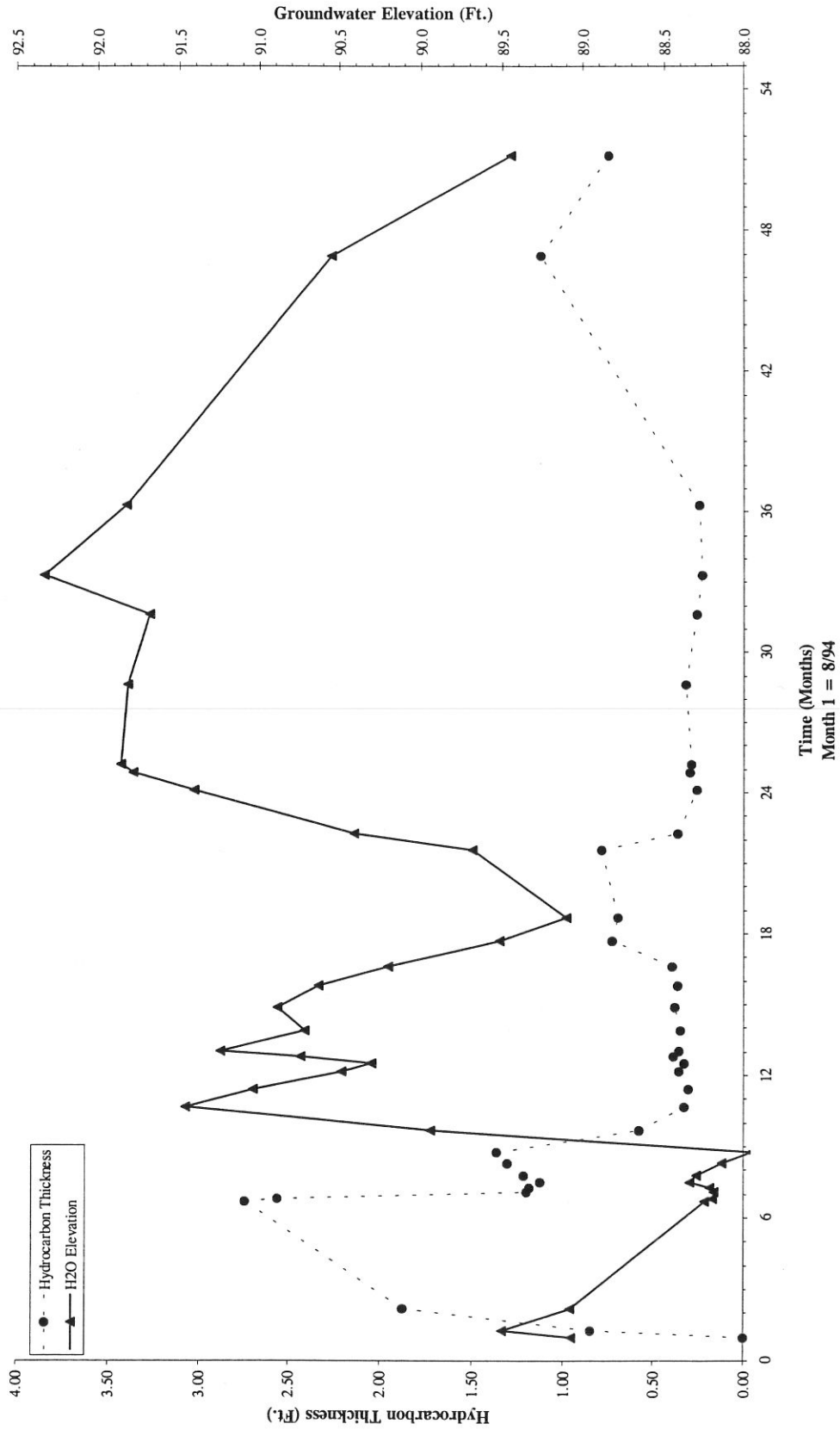
Anchorage, Alaska



Time (Months)
Month 1 = 8/94

000371

Hydrocarbon Thickness and Groundwater Elevation in MW-1 AFD-4 Anchorage, Alaska



HARTCROWSER
 A-8397-08 11/98

Figure 3

500372

200374

**APPENDIX A
FIELD METHODS**

APPENDIX A FIELD METHODS

This appendix documents the field methods used by Hart Crowser in determining the nature of the conditions underlying the project site addressed by this report. The discussion includes information on the following subjects:

- ▶ *Water/Floating Hydrocarbon Level Measurements*
- ▶ *Water Quality Sampling*
- ▶ *Decontamination of Field Equipment*

Water/Floating Hydrocarbon Level Measurements

The water level and floating hydrocarbon in each well was measured from a reference point or "measuring point" marked on the PVC casing. A Flexi-dip electronic oil/water interface well sounder was used to make the measurements, which were recorded to an accuracy of ± 0.01 feet.

Water Quality Sampling

Monitoring wells were purged immediately prior to sampling until a minimum of three casing volumes of water were removed. All purge water was containerized. Purging and sampling were performed by lowering a factory-decontaminated disposable bailer into the well with single-use polypropylene rope. Samples were collected in 40-ml clear-glass, VOA vials, fitted with TEFLON septa, and 1-Liter brown bottles provided by the laboratory. A duplicate sample was collected for each well sampling event. Immediately after collection, the samples were labeled and placed in a cooler with "blue-ice" for shipment to the laboratory under chain-of-custody procedures.

Equipment Decontamination

The Flexi-dip interface probe was cleaned prior to and in between sampling attempts using an anionic detergent wash (Alconox) followed by two potable water rinses.

Ref:J:\PROJECT\839708\11AFD4-APA.DOC

200377

**APPENDIX B
LABORATORY REPORTS**

**APPENDIX B
QUALITY CONTROL NARRATIVE**

All field and laboratory quality control criteria regarding the groundwater samples collected and analyzed for this project meet the quality control/quality assurance objectives as stated in Hart Crowser's Standard Quality Assurance Program Plan, dated September 7, 1994. All data is accepted for the purposes of this report.

Ref:J:\PROJECT\839708\11AFD4APB.DOC

200379



MultiChem
ANALYTICAL SERVICES

RECEIVED

NOV 16 1998

HART - CROWSER, INC.

MAS I.D. # 810003
UST 010

November 14, 1998

Hart Crowser, Inc.
Attn: Nino Muniz
2550 Denali Street, Suite 705
Anchorage, AK 99503

Project Name: AFD #4

Project Number: A- 8397-08


Dear Mr. Muniz:

On October 7, 1998, MultiChem Analytical Services, LLC of Alaska received five samples for analysis in conjunction with the above listed project. The requested analyses were performed using EPA or equivalent methods. The reports of analyses are enclosed. Below is an outline of the laboratories that participated in this project.

MAS-AK Analysis Performed: BETX (8021m), GRO (8015M), DRO (8100M)

Please do not hesitate to contact us at (907) 248-8273, if you have any questions or comments.

Sincerely,
MultiChem Analytical Services


Susan Snyder
Laboratory Manager

Sample ID. Cross Reference Sheet

Client: Hart Crowser, Inc.
Project #: 8397-08
Project Name: AFD#4

MAS I.D.: 810003

MAS ID #	Client Description	MAS ID #	Client Description
810003 1	MW-2		
810003 2	MW-3a		
810003 3	MW-4		
810003 4	MW-5		
810003 5	Trip Blank		

MAS STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

MultiChem Analytical Services, LLC

Anchorage, AK

SAMPLE LOG-IN CHECKLIST

ACCESSION #: 810003 SUBCONTRACT WORK? YES / NO
 CLIENT NAME: Hart Crosser TO LAB (circle): MAS-R / OTHER: _____
 LOGGED-IN BY (print): Kim Baldwin (sign): [Signature]
 Date received: 10/7/98 Client's Cooler # (if any): _____
 Is the project for: ACOE? YES / NO NAVY? YES / NO

1.	Did cooler arrive with shipping document?	(Hand delivery) <input checked="" type="radio"/> N/A	<input checked="" type="radio"/> YES	<input type="radio"/> NO
2.	Are Custody seals present on cooler? YES / <input checked="" type="radio"/> NO	How many?	Where?	
	Seal date:	Seal name:	Intact?	<input checked="" type="radio"/> N/A
				<input type="radio"/> YES <input type="radio"/> NO
3.	Are Custody seals present on sample containers?		<input type="radio"/> YES	<input checked="" type="radio"/> NO
	If "YES", intact?		<input checked="" type="radio"/> N/A	<input type="radio"/> YES <input type="radio"/> NO
4.	Is the Chain of Custody (C-O-C) sealed in plastic bag? YES / <input checked="" type="radio"/> NO	Taped to cooler lid?	<input type="radio"/> YES	<input checked="" type="radio"/> NO
5.	Is the C-O-C complete? * Relinquished by client: <input checked="" type="radio"/> YES / NO	Analyses marked off:	<input checked="" type="radio"/> YES	<input type="radio"/> NO
	* C-O-C or other representative documents, letters, and/or shipping memos.	Signed/received by lab:	<input checked="" type="radio"/> YES	<input type="radio"/> NO
6.	Is the C-O-C in agreement with samples received?			
	Sample ID's: <input checked="" type="radio"/> YES / NO	Matrix: <u>Water</u>	<input checked="" type="radio"/> YES	<input type="radio"/> NO
	Date sampled: <input checked="" type="radio"/> YES / NO	# Containers: <u>18</u>	<input checked="" type="radio"/> YES	<input type="radio"/> NO
7.	Has the main logbook been filled out properly?		<input checked="" type="radio"/> YES	<input type="radio"/> NO
8.	If samples are RUSH has notice been given?	<input checked="" type="radio"/> N/A	<input type="radio"/> YES	<input type="radio"/> NO
9.	Is proper preservation indicated on label(s)?	<input checked="" type="radio"/> N/A	<input checked="" type="radio"/> YES	<input type="radio"/> NO
10.	Did pH check verify preservative indicated?	(Volatiles) <input checked="" type="radio"/> N/A	<input checked="" type="radio"/> YES	<input type="radio"/> NO
11.	Is there sufficient sample volume for analyses?		<input checked="" type="radio"/> YES	<input type="radio"/> NO
12.	Are samples in proper containers? (see reference chart)		<input checked="" type="radio"/> YES	<input type="radio"/> NO
13.	Are all samples within holding times for requested analysis?		<input checked="" type="radio"/> YES	<input type="radio"/> NO
14.	Are all sample containers intact? (i.e. not broken, leaking...)		<input checked="" type="radio"/> YES	<input type="radio"/> NO
15.	Are samples individually bagged?		<input type="radio"/> YES	<input checked="" type="radio"/> NO
16.	Are all volatile samples headspace-free (< pea-size for waters)?	<input checked="" type="radio"/> N/A	<input type="radio"/> YES	<input checked="" type="radio"/> NO
17.	Shipping container (circle one):	<input checked="" type="radio"/> Cooler	<input type="radio"/> Box	<input type="radio"/> Other:
18.	Type of packing material used (circle one):	<input checked="" type="radio"/> Bubble Wrap	<input type="radio"/> Styrofoam Peanuts	<input type="radio"/> Vermiculite / None
19.	Refrigerant (circle one):	<input checked="" type="radio"/> Gel Ice	<input type="radio"/> Loose Ice	<input type="radio"/> Other: / None
20.	Was refrigerant frozen upon receipt?		<input checked="" type="radio"/> YES	<input type="radio"/> NO
21.	Cooler temperature(s):	#1: <u>6.2</u> °C	#2: <u>6</u> °C	

Sample tagging check for QC:
 Sample ID's issued in order of appearance on C-O-C: YES NO
 Tags placed in appropriate areas of sample containers: YES NO

Initials of reviewer: KMF
 Describe any "NO" items from checklist above: Tripblanks had headspace

Was client contacted: YES / NO / N/A Date: _____ Name of person contacted: _____
 Describe client instructions or actions taken: _____

MultiChem Analytical Services, Alaska.

GC-Fuels QC Evaluation Summary

Date:10/31/98

Client: Hart Crowser, Inc.
Method: 8015M/8021M
Criteria: ADEC
MAS-Alaska #: 810003
Client Project #: AFD #4 / 8397-08
Matrix: Water
Number of Samples: 5

Dates Extracted:

Dates Analyzed: 10/14/98
10/15/98

Table with 3 columns: QC Parameter, Method Criteria Acceptance, Comments/Actions. Rows include Holding Times, Extraction Dates, Analysis Dates, Continuing Calibration, Method Blanks, QC Spike Samples, MS/MSD, Calculations, Surrogate Recoveries, and Retention Times.

Hydrocarbon Match: Sample 810003-3 contained Xylenes. All other samples were below method reporting limits.

Laboratory QA:

Data meets guidelines established within the SOP for the MAS-Alaska Data Reporting Level 3, and State of Alaska Standard Quality Assurance Program Plan, 18AAC78 Underground Storage Tanks, as amended through Nov. 3, 1995.

Data Reviewed by: [Signature] Approved by: [Signature]

MultiChem Analytical Services, Alaska.

GC-Fuels QC Evaluation Summary

Date:11/13/98

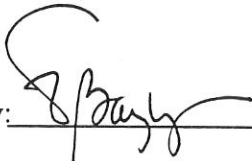
Client:	Hart Crowser, Inc.	Dates Extracted:	10/08/98
Method:	8100M		
Criteria:	ADEC		
MAS-Alaska #:	810003	Dates Analyzed:	11/06/98
Client Project #:	AFD #4/8397-08		11/07/98
Matrix:	Water		
Number of Samples:	4		


QC Parameter	Method Criteria Acceptance	Comments/Actions
Holding Times	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Extraction Dates	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Analysis Dates	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Continuing Calibration	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Method Blanks	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
QC Spike Samples	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
MS/MSD	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Calculations	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Surrogate Recoveries	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	
Retention Times	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail	

Hydrocarbon Match: Samples were below the method reporting limit.

Laboratory QA:

Data meets guidelines established within the SOP for the MAS-Alaska Data Reporting Level 3, and State of Alaska Standard Quality Assurance Program Plan, 18AAC78 Underground Storage Tanks, as amended through Nov. 3, 1995.

Data Reviewed by: 

Approved by: 

SUMMARY REPORT of ANALYSIS

Client: **Hart Crowser, Inc.**

Lab Accession: **810003**

Date Received: 10/7/98

Soil Units: mg/Kg

Water GRO/BETX Units: µg/L

Water DRO Units: mg/L

Project Name: AFD#4

Project Number: 8397-08

Project Manager: Nino Muniz

Reviewed By: *N. Muniz*

Client Sample	Lab Accession #	Date Collected	% Moisture	Conc. Benzene	Conc. Toluene	Conc. Ethyl-Benzene	Conc. Total Xylene	Conc. GRO as Gasoline	Conc. DRO as Diesel	Conc. RRO as 30w Oil
MW-2	810003 -1	10/7/98	N/A	<1.0	<1.0	<1.0	<1.0	<100	<0.25	
MW-3a	810003 -2	10/7/98	N/A	<1.0	<1.0	<1.0	<1.0	<100	<0.25	
MW-4	810003 -3	10/7/98	N/A	<1.0	<1.0	<1.0	1.8	<100	<0.25	
MW-5	810003 -4	10/7/98	N/A	<1.0	<1.0	<1.0	<1.0	<100	<0.25	
Trip Blank	810003 -5	10/7/98	N/A	<1.0	<1.0	<1.0	<1.0	<100		

Methods:
 BETX = 8021M
 GRO = 8015M
 DRO = 8100M

MAS I.D. # 810003

BETX - GASOLINE RANGE ORGANICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 8397-08	DATE RECEIVED	: N/A
PROJECT NAME	: AFD#4	DATE EXTRACTED	: N/A
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 10/14/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
METHOD	: GRO/BETX (8015/8021M)	DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<1.0
ETHYLBENZENE	<1.0
TOLUENE	<1.0
TOTAL XYLENES	<1.0
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	C6 - C10
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY

LIMITS

A,A,A-TRIFLUOROTOLUENE	94	82-121
BROMOFLUOROBENZENE	99	89-124
1-CHLOROOCCTANE	100	60-120

Analyst BD Date 11-5-98
 Reviewer MEH Date 11-5-98

MAS I.D. # 810003

BETX - GASOLINE RANGE ORGANICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 8397-08	DATE RECEIVED	: N/A
PROJECT NAME	: AFD#4	DATE EXTRACTED	: N/A
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 10/15/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
METHOD	: GRO/BETX (8015/8021M)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<1.0
ETHYLBENZENE	<1.0
TOLUENE	<1.0
TOTAL XYLENES	<1.0
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	C6 - C10
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY

LIMITS

A, A, A-TRIFLUOROTOLUENE	97	82-121
BROMOFLUOROBENZENE	101	89-124
1-CHLOROOCANE	101	60-120

Analyst RB Date 10-31-98
 Reviewer [Signature] Date 11/4/98

MAS I.D. # 810003-1

BETX - GASOLINE RANGE ORGANICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-2	DATE ANALYZED	: 10/14/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
METHOD	: GRO/BETX (8015/8021M)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<1.0
ETHYLBENZENE	<1.0
TOLUENE	<1.0
TOTAL XYLENES	<1.0
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	C6 - C10
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
A, A, A-TRIFLUOROTOLUENE	102	82-121
BROMOFLUOROBENZENE	99	89-124
1-CHLOROOCCTANE	107	60-120

Analyst [Signature] Date 10-31-98
 Reviewer [Signature] Date 11/4/98

MAS I.D. # 810003-2

BETX - GASOLINE RANGE ORGANICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3A	DATE ANALYZED	: 10/15/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
METHOD	: GRO/BETX (8015/8021M)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<1.0
ETHYLBENZENE	<1.0
TOLUENE	<1.0
TOTAL XYLENES	<1.0
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	C6 - C10
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY

LIMITS

A, A, A-TRIFLUOROTOLUENE	91	82-121
BROMOFLUOROBENZENE	98	89-124
1-CHLOROOCCTANE	98	60-120

Analyst FB Date 10-31-98
 Reviewer [Signature] Date 11/4/98

MultiChem
 ANALYTICAL SERVICES

MAS I.D. # 810003-3

 BETX - GASOLINE RANGE ORGANICS
 DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4	DATE ANALYZED	: 10/14/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
METHOD	: GRO/BETX (8015/8021M)	DILUTION FACTOR	: 1

 COMPOUNDS
RESULTS

BENZENE	<1.0
ETHYLBENZENE	<1.0
TOLUENE	<1.0
TOTAL XYLENES	1.8
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	C6 - C10
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY

LIMITS

A, A, A-TRIFLUOROTOLUENE	101	82-121
BROMOFLUOROBENZENE	99	89-124
1-CHLOROOCCTANE	101	60-120

 Analyst RB Date 10-31-98
 Reviewer Z.J. Date 11/4/98

Page 1

Sample File : 98D07193.D

MAS I.D. # 810003-4

BETX - GASOLINE RANGE ORGANICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-5	DATE ANALYZED	: 10/14/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
METHOD	: GRO/BETX (8015/8021M)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<1.0
ETHYLBENZENE	<1.0
TOLUENE	<1.0
TOTAL XYLENES	<1.0
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	C6 - C10
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY		LIMITS
A, A, A-TRIFLUOROTOLUENE	99	82-121
BROMOFLUOROBENZENE	102	89-124
1-CHLOROOCCTANE	103	60-120

Analyst [Signature] Date 10.31.98
 Reviewer [Signature] Date 11/4/98

MAS I.D. # 810003-5

BETX - GASOLINE RANGE ORGANICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 10/15/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
METHOD	: GRO/BETX (8015/8021M)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	<1.0
ETHYLBENZENE	<1.0
TOLUENE	<1.0
TOTAL XYLENES	<1.0
FUEL HYDROCARBONS	<100
HYDROCARBON RANGE	C6 - C10
HYDROCARBON QUANTITATION USING	GASOLINE

SURROGATE PERCENT RECOVERY

LIMITS

A,A,A-TRIFLUOROTOLUENE	97	82-121
BROMOFLUOROBENZENE	101	89-124
1-CHLOROOCANE	102	60-120

Analyst *B* Date 10-31-98
 Reviewer *JAC* Date 11/4/98

MultiChem
ANALYTICAL SERVICES

MAS I.D. # 810003

BETX - GASOLINE RANGE ORGANICS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: BLANK
PROJECT #	: 8397-08	DATE EXTRACTED	: N/A
PROJECT NAME	: AFD#4	DATE ANALYZED	: 10/14/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: GRO/BETX (8015/8021M)		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<1.00	26.1	27.9	107	26.1	100	7
ETHYLBENZENE	<1.00	35.6	40.5	114	38.4	108	5
TOLUENE	<1.00	159	172	108	154	97	11
TOTAL XYLENES	<1.00	187	221	118	191	102	15
GASOLINE	<100	2200	2240	102	2080	95	7

CONTROL LIMITS

	% REC.	RPD
BENZENE	87 - 124	20
ETHYLBENZENE	85 - 115	20
TOLUENE	81 - 115	20
TOTAL XYLENES	86 - 118	20
GASOLINE	73 - 109	20

SURROGATE RECOVERIES

	SPIKE	DUP. SPIKE	LIMITS
A, A, A-TRIFLUOROTOLUENE	114	105	82 - 121
BROMOFLUOROBENZENE	102	103	89 - 124
1-CHLOROOCCTANE	103	102	60 - 120

Analyst B Date 10.31.98
 Reviewer S.J. Date 11/4/98

MAS I.D. # 810003

BETX - GASOLINE RANGE ORGANICS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: BLANK
PROJECT #	: 8397-08	DATE EXTRACTED	: N/A
PROJECT NAME	: AFD#4	DATE ANALYZED	: 10/15/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: GRO/BETX (8015/8021M)		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<1.00	26.1	27.4	105	27.2	104	1
ETHYLBENZENE	<1.00	35.6	39.8	112	39.8	112	0
TOLUENE	<1.00	159	165	104	162	102	2
TOTAL XYLENES	<1.00	187	201	107	197	105	2
GASOLINE	<100	2200	2290	104	2260	103	1

CONTROL LIMITS

	% REC.	RPD
BENZENE	87 - 124	20
ETHYLBENZENE	85 - 115	20
TOLUENE	81 - 115	20
TOTAL XYLENES	86 - 118	20
GASOLINE	73 - 109	20

SURROGATE RECOVERIES

	SPIKE	DUP. SPIKE	LIMITS
A, A, A-TRIFLUOROTOLUENE	113	111	82 - 121
BROMOFLUOROBENZENE	104	101	89 - 124
1-CHLOROOCANE	100	100	60 - 120

Analyst BJ Date 10.31.98
 Reviewer S.A. Date 11/4/98

MultiChem
 ANALYTICAL SERVICES

MAS I.D. # 810003

 BETX - GASOLINE RANGE ORGANICS
 QUALITY CONTROL DATA

 CLIENT : HART CROWSER, INC.
 PROJECT # : 8397-08
 PROJECT NAME : AFD#4
 SAMPLE MATRIX : WATER
 EPA METHOD : GRO/BETX (8015/8021M)

 SAMPLE I.D. # : 821607-1
 DATE EXTRACTED : N/A
 DATE ANALYZED : 10/15/98
 UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	5.05	26.1	33.9	111	33.8	110	0
ETHYLBENZENE	5.60	35.6	47.6	118	46.4	115	3
TOLUENE	21.5	159	185	103	183	102	1
TOTAL XYLENES	47.5	187	244	105	238	102	2
GASOLINE	300	2200	2410	96	2360	94	2

CONTROL LIMITS

	% REC.	RPD
BENZENE	78 - 133	20
ETHYLBENZENE	70 - 137	20
TOLUENE	74 - 117	20
TOTAL XYLENES	70 - 122	20
GASOLINE	62 - 119	20

SURROGATE RECOVERIES

	SPIKE	DUP. SPIKE	LIMITS
A, A, A-TRIFLUOROTOLUENE	119	118	82 - 121
BROMOFLUOROBENZENE	106	107	89 - 124
1-CHLOROOCANE	101	102	60 - 120

 Analyst RB Date 10-31-98
 Reviewer _____ Date _____

Page 1

 Sample File : 98D07205
 MS File : 98D07206
 MSD File : 98D07207

MAS I.D. # 810003

BETX - GASOLINE RANGE ORGANICS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 810006-3
PROJECT #	: 8397-08	DATE EXTRACTED	: N/A
PROJECT NAME	: AFD#4	DATE ANALYZED	: 10/15/98
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: GRO/BETX (8015/8021M)		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	68.6	26.1	89.6	80	90.4	84	1
ETHYLBENZENE	4.43	35.6	44.7	113	45.1	114	1
TOLUENE	<1.00	159	163	103	162	102	1
TOTAL XYLENES	22.4	187	221	106	219	105	1
GASOLINE	442	2200	2730	104	2590	98	5

CONTROL LIMITS

	% REC.	RPD
BENZENE	78 - 133	20
ETHYLBENZENE	70 - 137	20
TOLUENE	74 - 117	20
TOTAL XYLENES	70 - 122	20
GASOLINE	62 - 119	20

SURROGATE RECOVERIES

	SPIKE	DUP. SPIKE	LIMITS
A, A, A-TRIFLUOROTOLUENE	116	113	82 - 121
BROMOFLUOROBENZENE	104	103	89 - 124
1-CHLOROOCCTANE	110	111	60 - 120

Analyst BP Date 10.31.98
Reviewer EL Date 11/4/98

MultiChem
ANALYTICAL SERVICES

MAS I.D. # 810003

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 8397-08	DATE RECEIVED	: N/A
PROJECT NAME	: AFD#4	DATE EXTRACTED	: 10/08/98
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 11/06/98
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: EPA 8100 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
FUEL HYDROCARBONS	<0.25
HYDROCARBON RANGE	C10 - C28
HYDROCARBON QUANTITATION USING	DIESEL

SURROGATE PERCENT RECOVERY	LIMITS
O-TERPHENYL	78 60-120

Analyst B Date 11-13-98
 Reviewer E.A. Date 11/13/98

MAS I.D. # 810003-1

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: 10/08/98
CLIENT I.D.	: MW-2	DATE ANALYZED	: 11/06/98
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: EPA 8100 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS

FUEL HYDROCARBONS	<0.25
HYDROCARBON RANGE	C10 - C28
HYDROCARBON QUANTITATION USING	DIESEL

	SURROGATE PERCENT RECOVERY	LIMITS
O-TERPHENYL	84	60-120

Analyst TB Date 11-13-98
 Reviewer Z.A. Date 11/13/98

MAS I.D. # 810003-2

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: 10/08/98
CLIENT I.D.	: MW-3A	DATE ANALYZED	: 11/07/98
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: EPA 8100 (MODIFIED)	DILUTION FACTOR	: 1

-----	-----
COMPOUNDS	RESULTS
-----	-----
FUEL HYDROCARBONS	<0.25
HYDROCARBON RANGE	C10 - C28
HYDROCARBON QUANTITATION USING	DIESEL

SURROGATE PERCENT RECOVERY	LIMITS
O-TERPHENYL	67 60-120

Analyst RB Date 11-13-98
 Reviewer [Signature] Date 11/13/98

MAS I.D. # 810003-3

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT : HART CROWSER, INC.
PROJECT # : 8397-08
PROJECT NAME : AFD#4
CLIENT I.D. : MW-4
SAMPLE MATRIX : WATER
METHOD : EPA 8100 (MODIFIED)

DATE SAMPLED : 10/07/98
DATE RECEIVED : 10/07/98
DATE EXTRACTED : 10/08/98
DATE ANALYZED : 11/07/98
UNITS : mg/L
DILUTION FACTOR : 1

COMPOUNDS

RESULTS

FUEL HYDROCARBONS
HYDROCARBON RANGE
HYDROCARBON QUANTITATION USING

<0.25
C10 - C28
DIESEL

SURROGATE PERCENT RECOVERY

LIMITS

O-TERPHENYL

69

60-120

Analyst B Date 11-13-98
Reviewer [Signature] Date 11/13/98

MAS I.D. # 810003-4

FUEL HYDROCARBONS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 10/07/98
PROJECT #	: 8397-08	DATE RECEIVED	: 10/07/98
PROJECT NAME	: AFD#4	DATE EXTRACTED	: 10/08/98
CLIENT I.D.	: MW-5	DATE ANALYZED	: 11/07/98
SAMPLE MATRIX	: WATER	UNITS	: mg/L
METHOD	: EPA 8100 (MODIFIED)	DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

FUEL HYDROCARBONS	<0.25
HYDROCARBON RANGE	C10 - C28
HYDROCARBON QUANTITATION USING	DIESEL

SURROGATE PERCENT RECOVERY

LIMITS

O-TERPHENYL	86	60-120
-------------	----	--------

Analyst *[Signature]* Date 11-3-98
 Reviewer *[Signature]* Date 11/3/98

MAS I.D. # 810003

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 8397-08
PROJECT NAME : AFD#4
SAMPLE MATRIX : WATER
METHOD : EPA 8100 (MODIFIED)

SAMPLE I.D. # : BLANK
DATE EXTRACTED : 10/08/98
DATE ANALYZED : 11/06/98
UNITS : mg/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<0.250	2.50	2.01	80	1.86	74	8
CONTROL LIMITS				% REC.			RPD
DIESEL				52 - 109			20
SURROGATE RECOVERIES		SPIKE		DUP. SPIKE		LIMITS	
O-TERPHENYL		91		84		60 - 120	

Analyst TD Date 11-13-98
Reviewer SL Date 11/13/98

MultiChem
ANALYTICAL SERVICES

MAS I.D. # 810003

FUEL HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 8397-08
PROJECT NAME : AFD#4
SAMPLE MATRIX : WATER
METHOD : EPA 8100 (MODIFIED)

SAMPLE I.D. # : 809014-1
DATE EXTRACTED : 10/08/98
DATE ANALYZED : 11/06/98
UNITS : mg/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
DIESEL	<0.250	2.45	1.96	80	1.97	80	1
CONTROL LIMITS				% REC.			RPD
DIESEL				60 - 120			20
SURROGATE RECOVERIES		SPIKE		DUP. SPIKE		LIMITS	
O-TERPHENYL		84		90		60 - 120	

Analyst B Date 11-13-98
Reviewer [Signature] Date 11/13/98

