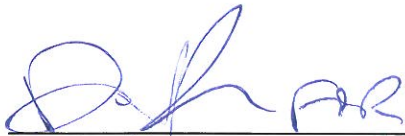


**Chevron Environmental
Management Company**

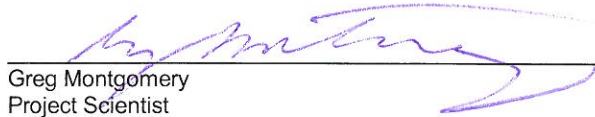
**Annual 2011 Groundwater
Monitoring Report**

Former Chevron Facility 301726
Lot 5A, Block 10, West Ramp
Fairbanks International Airport
Fairbanks, Alaska
Alaska File No. 100.38.066

January 24, 2012



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Scientist II



Greg Montgomery
Project Scientist

**Annual 2011 Groundwater
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January 24, 2012

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1.0 Introduction

On behalf of Chevron Environmental Management Company (Chevron), ARCADIS US, Inc. (ARCADIS), has prepared this report to document the annual 2011 groundwater sampling event for former Chevron facility 301726 (the site) located at Lot 5A, Block 10, West Ramp, Airport Industrial Rd., Fairbanks, Alaska. The site and surrounding area are shown on **Figure 1**. This report summarizes the groundwater gauging conducted by ARCADIS during 2011 and the annual sampling event conducted on August 21, 2011. Work was conducted under the direction of a “qualified person” as defined in 18 Alaska Administrative Code (AAC) 75.990 (100), and 18 AAC 78.995 (118).

2.0 Groundwater Monitoring

2.1 Groundwater Gauging Methods

Groundwater gauging was conducted on January 4, February 7, April 14, May 5, June 11, and during the annual 2011 groundwater monitoring event conducted on August 21, 2011. Site monitoring wells were gauged with an oil/water interface probe to determine depth to water and to ascertain if light non-aqueous phase liquids (LNAPL) are present.

The wells were gauged in order from lowest historical concentrations of petroleum constituents to highest in order to prevent cross contamination. Non-disposable groundwater gauging equipment was decontaminated prior to and after each use with a detergent solution and rinsed in potable water. Field notes taken during the annual groundwater monitoring event and 2011 gauging activities are included as **Appendix A**.

2.2 Groundwater Elevation and Flow Direction

On August 21, 2011, groundwater monitoring wells MW-1 through MW-6 were gauged to determine groundwater elevations and the presence of LNAPL. LNAPL was not present in any of the monitoring wells gauged during this event. During the August 2011 gauging event, depth to groundwater ranged between 7.52 feet below top of casing (btoc) in monitoring well MW-2 to 7.95 feet btoc in monitoring well MW-3. Groundwater elevations ranged from 419.03 feet above sea level (asl) to 419.21 feet asl in monitoring wells MW-1 and MW-2/MW-3, respectively. Water table elevation data indicate groundwater flow direction is toward the south. The historical

groundwater flow direction has seasonally fluctuated from the east toward the southwest. Current and historical groundwater elevation data are included in **Table 1**. The horizontal hydraulic gradient present on site during the August 2011 event was approximately 0.0015 ft/ft. The Groundwater Elevation Contour Map for the August 21, 2011 monitoring well gauging data is included as **Figure 2**.

2.3 Monthly LNAPL Gauging

LNAPL was first observed in monitoring well MW-1 in October 2009. LNAPL has also been observed in monitoring well MW-1 on May 25, 2010 at 0.32 feet and February 7, 2011 at 0.03 feet. Historical LNAPL and groundwater elevations are presented in **Table 1**. A plot of historical groundwater elevation data and LNAPL thickness in monitoring well MW-1 is included as **Figure 3**.

2.4 Groundwater Sampling Methods

The annual 2011 groundwater monitoring event was conducted on August 21, 2011. Groundwater samples were collected from monitoring wells MW-1 through MW-6, using no-purge bailer sampling procedures in accordance with ADEC *Draft Field Sampling Guidance* (ADEC, 2010) and ARCADIS *Bailer-Grab Groundwater Sampling* (ARCADIS, 2009). A disposable Teflon[®] bailer was used to collect the samples. The bailer will be lowered slowly into the water column within the monitoring well to a depth of approximately three to four feet below the groundwater surface. The bailer will then be slowly retrieved to limit the amount of possible aeration of the water column. The groundwater sample will be collected from the bottom of the bailer using a disposable sampling tip. This technique will minimize the disturbance and aeration of the groundwater within the bailer. The samples were then collected in the appropriate laboratory bottle, labeled, stored in a cooler packed with ice, and submitted to Lancaster Laboratories (Lancaster) in Lancaster, Pennsylvania, under proper chain-of-custody procedures. Groundwater samples were submitted to the analytical laboratory for one or more of the following analyses:

- Gasoline range organics (GRO) by method AK101
- Diesel range organics (DRO) by method AK102
- Residual Range Organics (RRO) by AK 103
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX), by Environmental Protection Agency (EPA) method 8021B

A duplicate groundwater sample BD-1 was collected from MW-1 and submitted blind to the laboratory for GRO and BTEX analysis. The August 21, 2011 groundwater analytical results are included on the site plan included as **Figure 4**.

2.5 Groundwater Analytical Results

During the August 2011 annual groundwater monitoring event, groundwater sampled from monitoring well MW-1 contained concentrations of GRO greater than the ADEC groundwater cleanup level (GCL) (2,200 micrograms per liter [$\mu\text{g/L}$]), with concentrations of 10,000 $\mu\text{g/L}$. GRO was not detected above the ADEC GCL in the other monitoring well groundwater samples collected during the 2011 annual groundwater monitoring event. A plot of historical groundwater elevation data and GRO concentration in monitoring well MW-1 is included as **Figure 5**.

Groundwater samples collected from monitoring wells MW-1 contained concentrations of DRO greater than the ADEC GCL (1,500 $\mu\text{g/L}$) with concentrations of 57,000 $\mu\text{g/L}$. DRO was not detected above the ADEC GCL in the other monitoring well groundwater samples collected during the 2011 annual event. A plot of historical groundwater elevation data and DRO concentration in monitoring well MW-1 is included as **Figure 6**.

RRO was not detected above the ADEC GCL in any of the monitoring well groundwater samples collected during the 2011 annual event.

Groundwater samples collected from monitoring well MW-1 contained concentrations of benzene greater than the ADEC GCL (5 $\mu\text{g/L}$) at 180 $\mu\text{g/L}$ (USEPA Method 8260). Concentrations of toluene, ethylbenzene, and total xylenes were not detected above the respective ADEC GCLs in the groundwater sample collected from well MW-1. Concentrations of BTEX constituents were below the respective ADEC GCLs for the remaining monitoring wells sampled during the event. Analytical results for petroleum hydrocarbons are presented in **Table 2** and on **Figure 4**.

3.0 Laboratory Data Quality Assurance Summary

As required by ADEC (Technical Memorandum dated March 2009), ARCADIS completed laboratory data review checklists for the Pace and Lancaster laboratories report during the annual 2011 reporting period. The laboratory reports are included in **Appendix B** and data review checklists are included in **Appendix C**. The following

quality assurance (QA) summary describes six parameters related to the quality and usability of the data presented in this report.

3.1 Precision

The data meet precision objectives for laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) relative percent differences (RPDs).

3.2 Accuracy

The groundwater sample collected from monitoring well MW-1 (BD-1) was below the limits for LCSD for TPH GRO. This is not expected to affect the quality or usability of the data.

All remaining data meet accuracy objectives as indicated by the laboratory quality control samples, which were within method/laboratory limits. Analytes were not detected in the trip blanks submitted with the groundwater samples. The LCS recoveries were within respective limits.

3.3 Representativeness

The data appear to be representative of site conditions and are generally consistent with historical groundwater monitoring results and expected impacts to groundwater.

3.4 Comparability

The laboratory results are presented in the same units as previous reports to allow comparison.

3.5 Completeness

The results appear to be valid and usable, and thus, the laboratory results have 100% completeness.

3.6 Sensitivity

The sensitivity of the analyses was adequate for the samples as the detection limits were less than the ADEC GCLs for compounds which were not detected.

4.0 Conclusions and Recommendations

The groundwater elevation data collected during the 2011 annual monitoring event indicate groundwater flow direction and horizontal hydraulic gradient to be generally consistent with historical data. Concentrations of the constituents of concern in the groundwater samples collected during the 2011 annual event are generally consistent with historical data.

Annual 2012 groundwater sampling is scheduled to be conducted in July 2012 by ARCADIS. If you have any questions or would like to discuss this further, please contact ARCADIS at 206.726.4742.

5.0 References

ADEC. *Draft Field Sampling Guidance*. January, 2010

ADEC Technical Memorandum, March, 2009. *Environmental Laboratory Data and Quality Assurance Requirements*. ADEC, Division of Spill Prevention and Response Contaminated Sites Program.

ASTM Standard E1943-98, 2004. *Standard Guide for Remediation of Ground Water by Natural Attenuation at Petroleum Release Sites*. ASTM International, West Conshohocken, PA. DOI:10.1520/E1943-98R04.

ARCADIS

Tables

**Table 1
Groundwater Elevation Data**

Former Chevron Facility #301726
Lot 5A, Block 10, West Ramp
Airport Industrial Rd,
Fairbanks, Alaska

Monitoring Well ID	Date Sampled	TOC (feet-amsl)	DTW (feet)	LNAPL Thickness (feet)	GWE (feet-amsl)		
MW-1	08/19/04	426.84	6.37	--	420.47		
	03/30/05		10.09	--	416.75		
	09/19/05		8.12	--	418.72		
	09/11/08		8.63	--	418.21		
	05/10/09		8.56	--	418.28		
	10/04/09		10.55	0.01	416.30		
	05/25/10		11.55	0.32	415.55		
	06/18/10		9.45	--	417.39		
	07/19/10		7.60	--	419.24		
	08/16/10		7.25	--	419.59		
	09/27/10		8.99	--	417.85		
	10/27/10		11.09	--	415.75		
	12/15/10 ²		--	--	--		
	01/04/11		10.64	--	416.20		
	02/07/11		12.05	0.03	414.81		
	04/14/11		11.3	--	415.54		
	05/05/11		9.75	--	417.09		
06/11/11	9.64	--	417.20				
08/21/11	7.81	--	419.03				
MW-2	08/19/04	426.73	6.29	--	420.44		
	03/30/05		9.98	--	416.75		
	09/19/05		8.02	--	418.71		
	09/11/08		8.52	--	418.21		
	05/10/09		8.43	--	418.30		
	10/04/09		10.48	--	416.25		
	07/19/10		7.90	--	418.83		
	05/05/11		9.63	--	417.10		
	06/11/11		9.53	--	417.20		
	08/21/11		7.52	--	419.21		
	MW-3		08/19/04	427.16	6.73	--	420.43
			03/30/05		10.42	--	416.74
09/19/05		8.47	--		418.69		
09/11/08		8.96	--		418.20		
5/10/09 ¹		--	--		--		
10/04/09		10.90	--		416.26		
07/19/10		7.46	--		419.70		
05/05/11		8.12	--		419.04		
06/11/11		9.96	--		417.20		
08/21/11		7.95	--		419.21		

**Table 1
Groundwater Elevation Data**

Former Chevron Facility #301726
Lot 5A, Block 10, West Ramp
Airport Industrial Rd,
Fairbanks, Alaska

Monitoring Well ID	Date Sampled	TOC (feet-amsl)	DTW (feet)	LNAPL Thickness (feet)	GWE (feet-amsl)
MW-4	08/19/04	427.02	6.59	--	420.43
	03/30/05		10.29	--	416.73
	09/19/05		8.34	--	418.68
	09/11/08		8.71	--	418.31
	05/10/09		8.71	--	418.31
	10/04/09		10.78	--	416.24
	07/19/10		7.56	--	419.46
	05/05/11		9.96	--	417.06
	06/11/11		9.84	--	417.18
	08/21/11		7.83	--	419.19
MW-5	08/19/04	426.89	6.44	--	420.45
	03/30/05		10.16	--	416.73
	09/19/05		8.19	--	418.70
	09/11/08		8.70	--	418.19
	5/10/09 ¹		--	--	--
	10/04/09		10.65	--	416.24
	07/19/10		7.65	--	419.24
	05/05/11		9.86	--	417.03
	06/11/11		9.75	--	417.14
	08/21/11		7.73	--	419.16
MW-6	08/19/04	426.82	6.36	--	420.46
	03/30/05		10.08	--	416.74
	09/19/05		8.12	--	418.70
	09/11/08		8.66	--	418.16
	05/10/09		8.55	--	418.27
	10/04/09		10.63	--	416.19
	07/19/10		7.69	--	419.13
	06/11/11		9.75	--	417.07
	08/21/11		7.72	--	419.10

Notes:

¹Monitoring well was not gauged due to well obstruction.

²Monitoring well was not gauged due extremely cold outdoor temperatures.

feet-amsl = feet above sea level

"--" = Indicates no depth measurement was taken, no LNAPL was present, and no groundwater elevation data is available.

Data associated with current monitoring event in **bold**.

TOC = Top of casing

DTW = Depth to water

GWE = Groundwater elevation

LNAPL = Light Non-Aqueous Phase Liquids

**Table 2
Groundwater Analytical Results**

Former Chevron Facility #301726
Lot 5A, Block 10, West Ramp
Airport Industrial Rd,
Fairbanks, Alaska

Monitoring Well ID	Date Sampled	DRO ¹ (µg/L)	RRO ² (µg/L)	GRO ³ (µg/L)	BTEX ⁴				EDB (Methylene bromide) (ug/l)	Lead (ug/l)
					Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)		
ADEC GCLs⁵ (µg/L)		1,500	1,100	2,200	5.0	1,000	700	10,000	470	15
MW-1	08/19/04	33,400	<480	27,200	1,770	3,790	261	3,750	--	--
	03/30/05	436	<388	9,000	729	343	186	936	--	--
	09/19/05	8,660	<397	<2,500	153	150	<25	116	--	--
	09/11/08	12,000	<708	6,680	357	413	124	815	--	--
	05/10/09	980	<420	3,960	28	75.7	72.7	392	--	--
	10/04/09	Not Sampled-LNAPL Detected								
	07/20/10	4,700	79,000	<6,600	100	240	65	440	0.0097	9.8
	08/21/11	10,000	57,000	<3,300	180	270	170	1400	--	--
	8/21/2011 ^D	6,500	--	--	130	140	190	1,000	--	--
MW-2	08/19/04	--	--	<50.0	<0.200	<0.500	<0.500	<1.00	--	--
	03/30/05	4,040	427	<50.0	<0.500	<0.500	<0.500	<1.50	--	--
	09/19/05	<417	<417	<50.0	<0.500	<0.500	<0.500	<1.50	--	--
	09/11/08	<94.3	<708	<50.0	<0.200	<0.500	<0.500	<1.00	--	--
	09/11/08 ^D	<95.2	<714	<50.0	<0.200	<0.500	<0.500	<1.00	--	--
	05/10/09	<403	<403	<50.0	0.333	<0.500	<0.500	<1.00	--	--
	10/04/09	<391	<391	<50.0	<0.500	<1.00	<1.00	<3.00	--	--
	07/19/10	22	1,800	210	0.8	<0.5	0.70	<1.5	--	2.0
	08/21/11	<10	120	130	<0.5	<0.5	<0.5	<1.5	--	--
MW-3	08/19/04	1,190	<480	89	0.774	<0.500	5.83	3.18	--	--
	03/30/05	<391	<391	181	0.979	<0.500	24.1	6.94	--	--
	09/19/05	6,730	2,120	<50.0	0.556	<0.500	1.73	<1.50	--	--
	09/11/08	12,000	<708	60.3	0.448	<0.500	0.653	1.96	--	--
	10/04/09	1,290	438	<50.0	<0.500	<1.00	<1.00	<3.00	--	--
	10/04/09	2,640	459	<50.0	<0.500	<1.00	<1.00	<3.00	--	--
	07/19/10	<10	88.00	160	<0.5	<0.5	<0.5	<1.5	0.0097	12.9
	08/21/11	<10	170.00	370	<0.5	<0.5	<0.5	<1.5	--	--
MW-4	08/19/04	<400	<480	<50.0	0.3	<0.500	<0.500	<1.00	--	--
	03/30/05	<385	<385	<50.0	<0.500	<0.500	<0.500	<1.50	--	--
	09/19/05	1,310	815	<50.0	<0.500	<0.500	<0.500	<1.50	--	--
	09/11/08	<94.3	<708	<50.0	<0.200	<0.500	<0.500	<1.00	--	--
	05/10/09	<403	<403	<50.0	<0.200	<0.500	<0.500	<1.00	--	--
	05/10/09 ^D	<427	<427	<50.0	<0.200	<0.500	<0.500	<1.00	--	--
	10/04/09	<385	<385	<50.0	<0.500	<1.00	<1.00	<3.00	--	--
	07/19/10	<10	210	460	<0.5	<0.5	<0.5	<1.5	--	15.5
	08/21/11	<10	200	590	<0.5	<0.5	<0.5	<1.5	--	--
MW-5	08/19/04	<400	<480	<50.0	<0.2	<0.500	<0.500	<1.00	--	--
	03/30/05	3,310	435	<50.0	<0.500	<0.500	<0.500	<1.50	--	--
	09/19/05	<431	782	<50.0	<0.5	<0.500	<0.500	<1.50	--	--
	09/11/08	150	<708	<50.0	<0.2	<0.500	<0.500	<1.00	--	--
	10/04/09	559	<403	<50.0	<0.500	<1.00	<1.00	<3.00	--	--
	07/20/10	<10	110	180	<0.5	<0.5	<0.5	<1.5	0.0097	20.8
	08/21/11	<10	120	350	<0.5	<0.5	<0.5	<1.5	--	--
MW-6	08/19/04	<400	<480	<50.0	<0.351	<0.500	<0.500	<1.00	--	--
	03/30/05	<388	<388	<50.0	<0.5	<0.500	<0.500	<1.50	--	--
	09/19/05	<403	<403	<50.0	<0.5	<0.500	<0.500	<1.50	--	--
	09/11/08	<100	<750	<50.0	<0.2	<0.500	<0.500	<1.0	--	--
	05/10/09	<427	<427	<50.0	<0.200	<0.500	<0.500	<1.00	--	--
	10/04/09	<385	<385	<50.0	<0.500	<1.00	<1.00	<3.00	--	--
	07/19/10	<10	74	110	<0.5	<0.5	<0.5	<1.5	--	0.95
	08/21/11	<10	150	210	<0.5	<0.5	<0.5	<1.5	--	--

Notes:

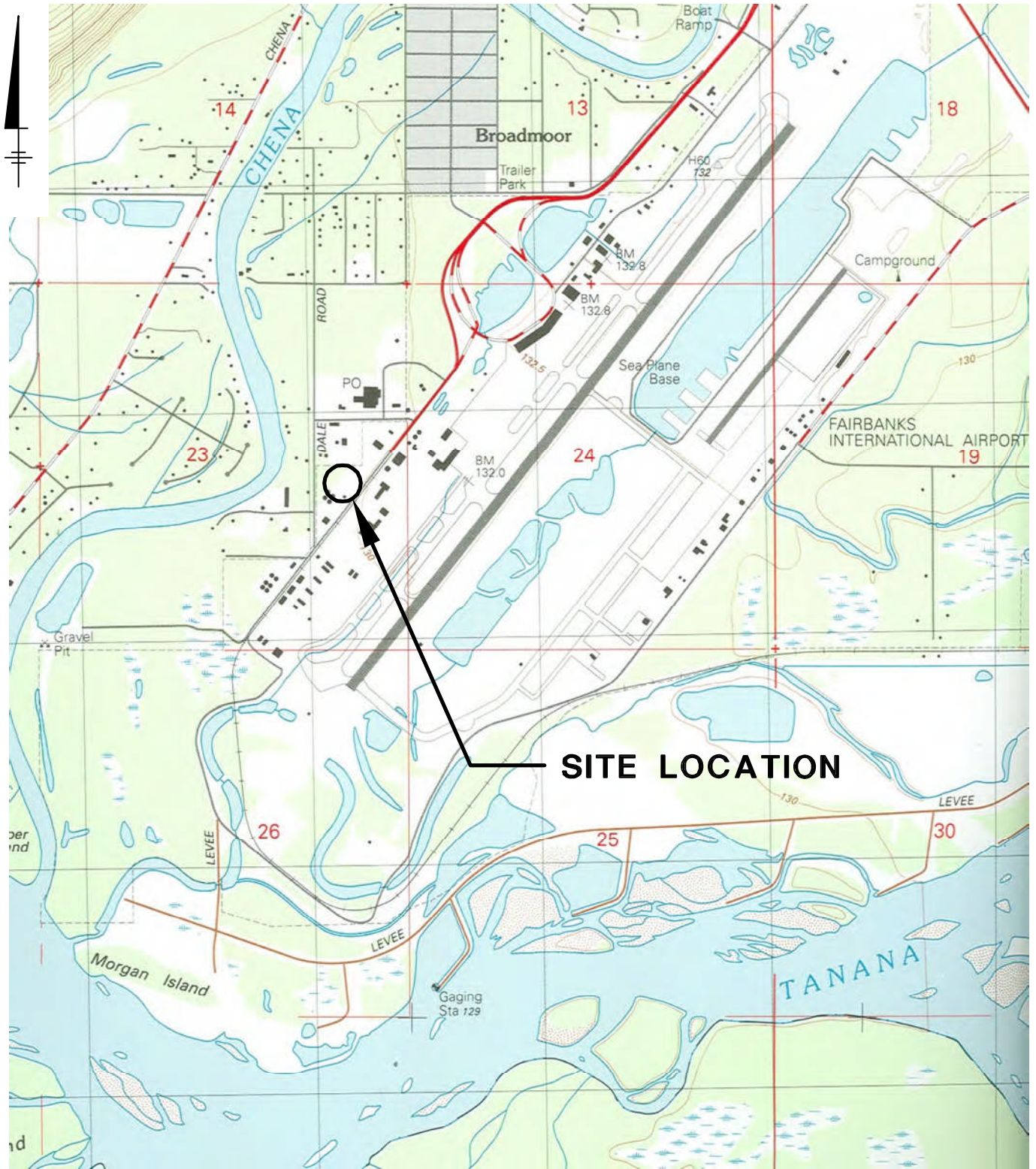
Diesel range organics (DRO) was analyzed by AK Method 102.
Residual range organics (RRO) was analyzed by AK Method 103.
Gasoline range organics (GRO) was analyzed by AK Method 101.
Benzene, toluene, ethylbenzene, and total xylenes (BTEX) were analyzed by EPA Method 8021B.
ADEC Groundwater Cleanup Levels (GCLs) per 18 AAC 75.345, Table C, Register 188, January 2009.

µg/L = micrograms per liter
"--" = Indicates analyte was not sampled or analyzed
Highlighted cell indicates concentration exceeds groundwater cleanup level
"<" = Indicates analyte not detected greater than laboratory reporting limit indicated.
^D = Indicates sample is a duplicate
Data associated with current monitoring event in **bold**.
ADEC= Alaska Department of Environmental Conservation
EDB - Dibromomethane

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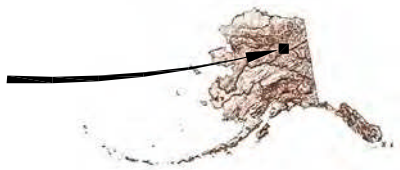
Figures

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SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE: FAIRBANKS (D-2) SW, AK., 1992, FAIRBANKS NORTH STAR BOROUGH, SECTION: 24, TOWNSHIP: 15S, RANGE: 2W

SITE LOCATION



APPROXIMATE GRAPHIC SCALE

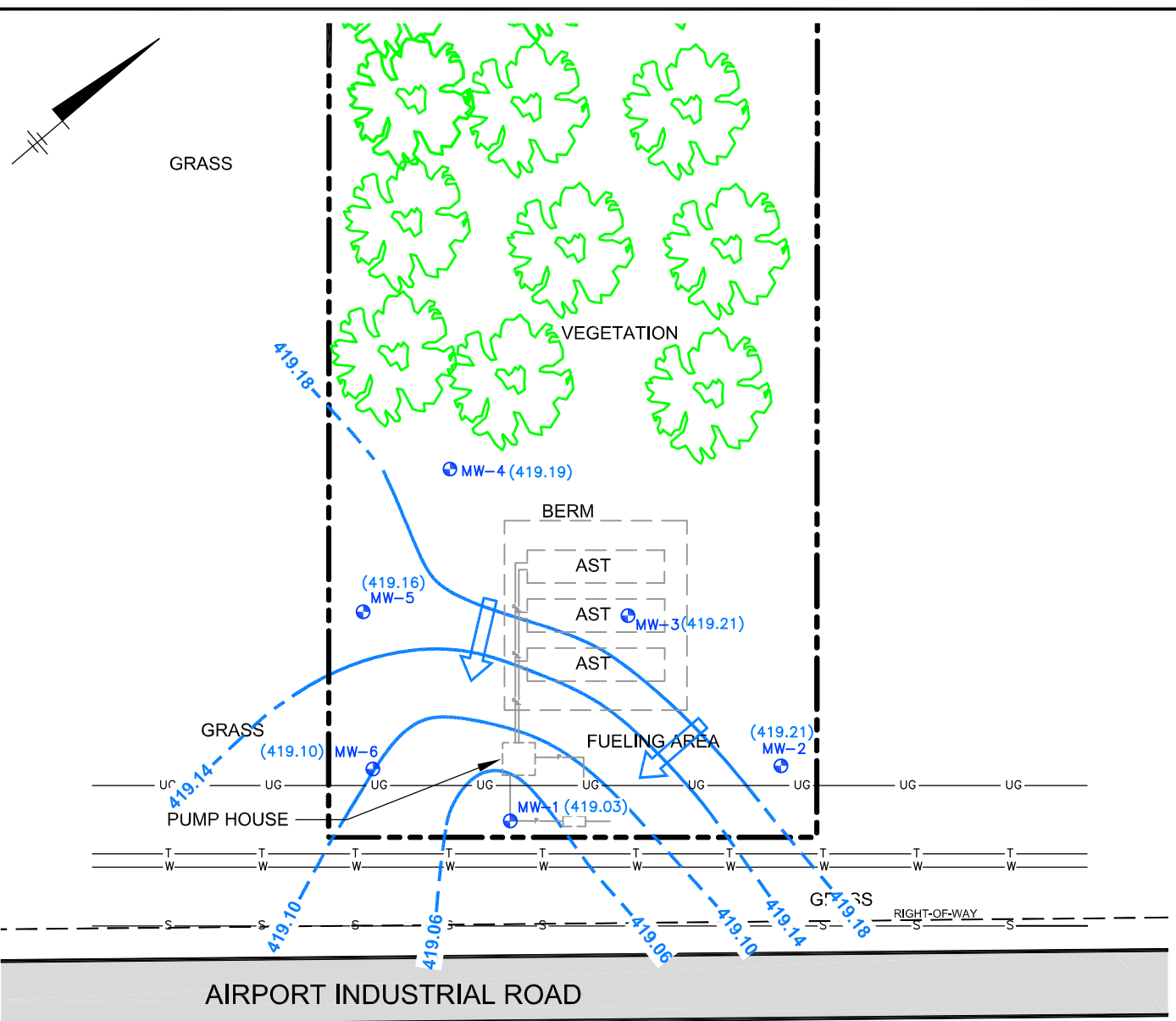
FORMER CHEVRON FACILITY NO. 301726
 FAIRBANKS INT. AIRPORT, FAIRBANKS, ALASKA
 ANNUAL GROUNDWATER MONITORING REPORT 2011

SITE LOCATION MAP

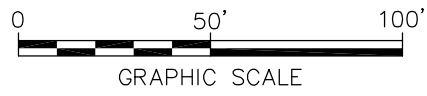


FIGURE
1

CITY:TAMPA DIV:GROUPE85 DB:JAR LD:(Opt) PIC:(Opt) PIM:(Recd) TM:(Opt) Lyr:(Opt)Off=REF G:ENV/CAD/Tampa-BAC/180046269 3017260003000012SA GMR 2011/08/04/6269B01.dwg LAYOUT: 2 SAVED: 10/31/2011 2:29 PM ACADVER: 16.06 (LMS TECH) PAGES: 10/31/2011 2:29 PM BY: RICHARDS, JIM



- LEGEND**
- MONITORING WELL
 - BOUNDARY LINE
 - TEMPORARY MONITORING WELL
 - GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED) CONTOUR INTERVAL = 0.04 FEET
 - (419.21) GROUNDWATER ELEVATION (FEET)
 - APPARENT DIRECTION OF GROUNDWATER FLOW
 - * GROUNDWATER ELEVATION ADJUSTED FOR THE PRESENCE OF LNAPL (LIGHT NON-AQUEOUS PHASE LIQUID)



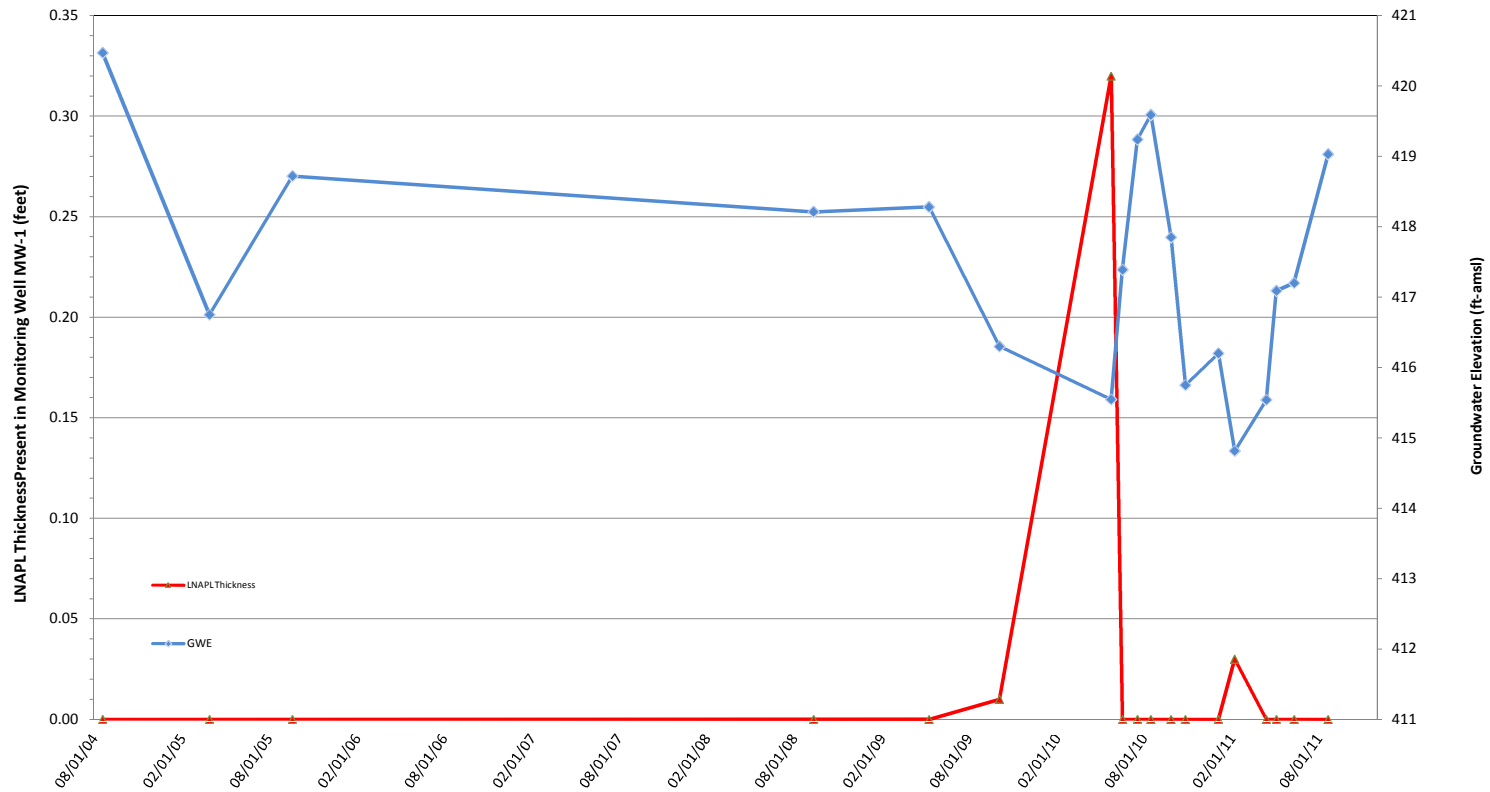
FORMER CHEVRON FACILITY NO. 301726
FAIRBANKS INT. AIRPORT, FAIRBANKS, ALASKA
ANNUAL GROUNDWATER MONITORING REPORT 2011

**GROUNDWATER ELEVATION CONTOUR
MAP - AUGUST 21, 2011**



FIGURE
2

SOURCE: Base map digitized from "SAIC", Date 10/19/05, Scale 1"=30'



LEGEND:
 GWE = Groundwater elevation
 LNAPL = Light non-aqueous phase liquid
 ft-amsl = Feet above mean sea level
 Data gaps = wells were inaccessible and not gauged

FORMER UNOCAL FACILITY 301726
 Lot 5A, Block 10, Airport Industrial Rd, FAIRBANKS, ALASKA
Annual Groundwater Monitoring Report 2011

Monitoring Well MW-1 Historical Groundwater Elevation and LNAPL Thickness


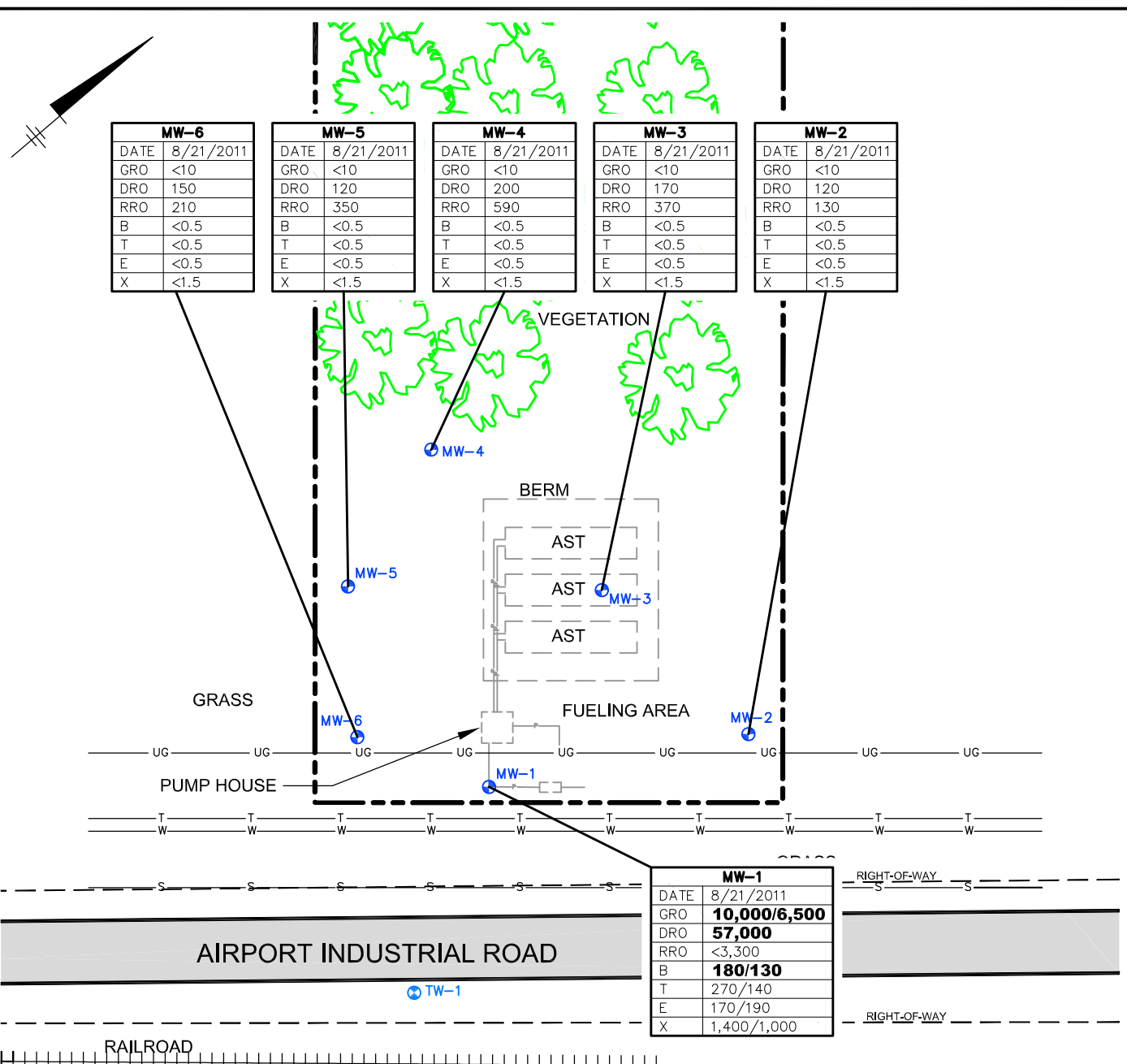


FIGURE
3

CITY:TAMPA DIV:GROU/P:85 DB:JAR LD:(Opt) PIC:(Opt) P/M:(Read) TM:(Opt) LYR:(Opt)OFF=REF
 G:ENV/CAD/Tampa-BKAC/B0046269 3017260003000012SA GMR 2011/08/04/6269B01.dwg LAYOUT: 4 SAVED: 10/31/2011 2:29 PM ACADVER: 16.08 (LMS TECH) PAGES: 10/31/2011 2:30 PM BY: RICHARDS, JIM



MW-6	
DATE	8/21/2011
GRO	<10
DRO	150
RRO	210
B	<0.5
T	<0.5
E	<0.5
X	<1.5

MW-5	
DATE	8/21/2011
GRO	<10
DRO	120
RRO	350
B	<0.5
T	<0.5
E	<0.5
X	<1.5

MW-4	
DATE	8/21/2011
GRO	<10
DRO	200
RRO	590
B	<0.5
T	<0.5
E	<0.5
X	<1.5

MW-3	
DATE	8/21/2011
GRO	<10
DRO	170
RRO	370
B	<0.5
T	<0.5
E	<0.5
X	<1.5

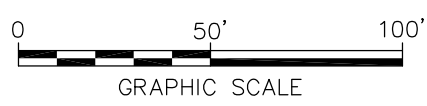
MW-2	
DATE	8/21/2011
GRO	<10
DRO	120
RRO	130
B	<0.5
T	<0.5
E	<0.5
X	<1.5

MW-1	
DATE	8/21/2011
GRO	10,000/6,500
DRO	57,000
RRO	<3,300
B	180/130
T	270/140
E	170/190
X	1,400/1,000

- LEGEND
- MONITORING WELL
 - BOUNDARY LINE
 - TEMPORARY MONITORING WELL

SAMPLE LOCATION	
DATE	Sample Date
GRO	Gasoline Range Organics
DRO	Diesel Range Organics
RRO	Residual Range Organics
B	Benzene
T	Toluene
E	Ethylbenzene
X	Total Xylenes

RESULTS REPORTED IN MICROGRAMS PER LITER ($\mu\text{g/L}$)
 BOLD INDICATES CONCENTRATION EXCEEDS RESPECTIVE
 GROUNDWATER CLEANUP LEVEL
 * = BENZENE CONCENTRATION DETECTED IN USEPA METHOD
 8260
 ADEC = ALASKA DEPARTMENT OF ENVIRONMENTAL
 CONSERVATION
 NS = NOT SAMPLED
 <1.00/<1.00 = DUPLICATE SAMPLE COLLECTED



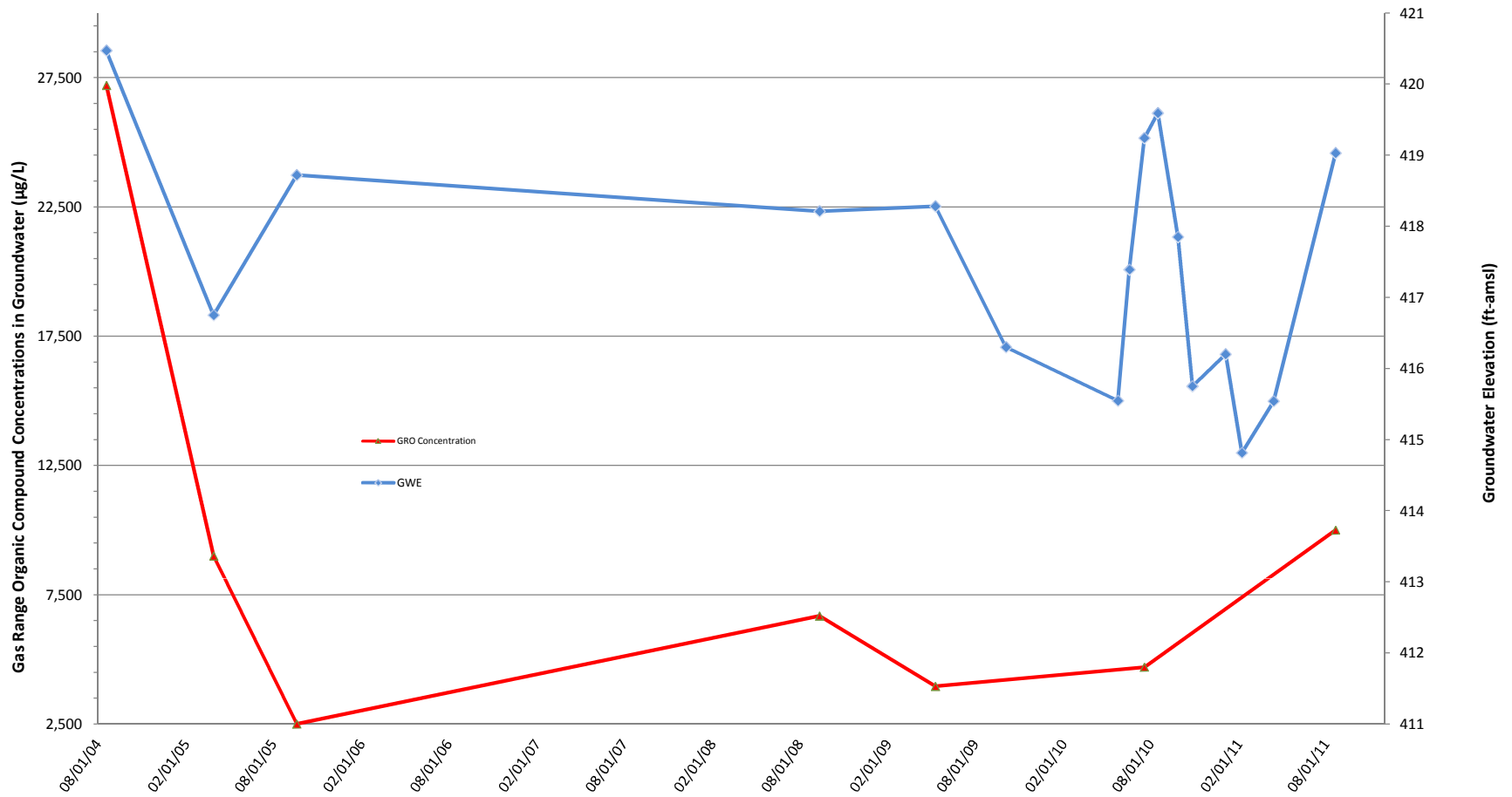
FORMER CHEVRON FACILITY NO. 301726
 FAIRBANKS INT. AIRPORT, FAIRBANKS, ALASKA
ANNUAL GROUNDWATER MONITORING REPORT 2011

**GROUNDWATER ANALYTICAL RESULTS
 PETROLEUM HYDROCARBONS
 AUGUST 21, 2011**




FIGURE
4

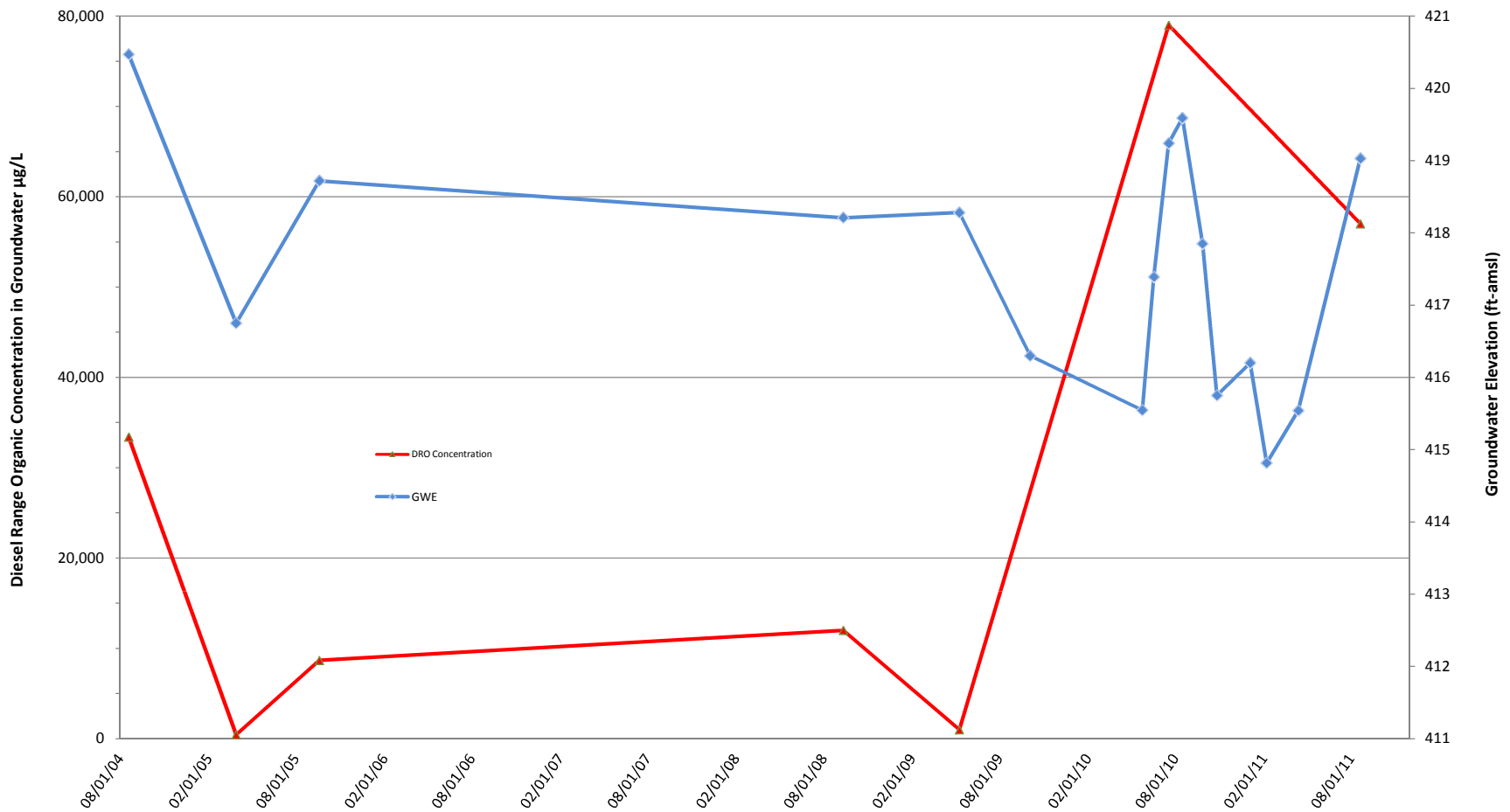
SOURCE: Base map digitized from "SAIC", Date 10/19/05, Scale 1"=30'



LEGEND:

GWE = Groundwater elevation
 GRO= Gas Range Organic Compounds
 ft-amsl = Feet above mean sea level

FORMER UNOCAL FACILITY 301726 Lot 5A, Block 10, Airport Industrial Rd, FAIRBANKS, ALASKA	
Annual Groundwater Monitoring Report 2011	
Monitoring Well MW-1 Historical Groundwater Elevation and GRO Concentration	
	FIGURE 5



LEGEND:

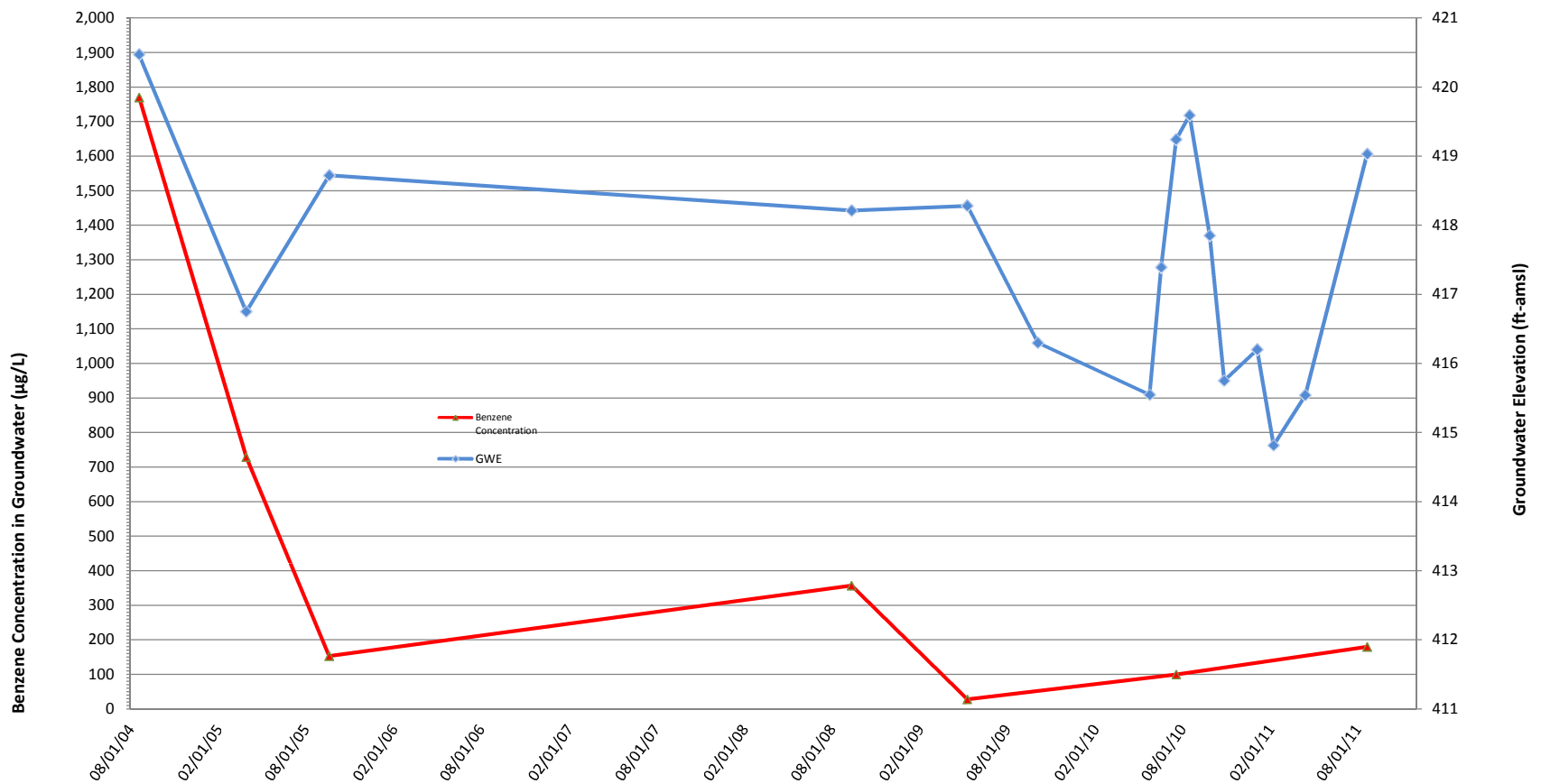
GWE = Groundwater elevation
 DRO= Diesel Range Organic Compounds
 ft-amsl = Feet above mean sea level

FORMER UNOCAL FACILITY 301726
 Lot 5A, Block 10, Airport Industrial Rd, FAIRBANKS, ALASKA

Annual Groundwater Monitoring Report 2011

**Monitoring Well MW-1 Historical
 Groundwater Elevation and DRO**





LEGEND:

GWE = Groundwater elevation
 ft-amsl = Feet above mean sea level

FORMER UNOCAL FACILITY 301726
 Lot 5A, Block 10, Airport Industrial Rd, FAIRBANKS, ALASKA

Annual Groundwater Monitoring Report 2011

**Monitoring Well MW-1 Historical
 Groundwater Elevation and Benzene**



FIGURE

7

ARCADIS

Appendix A

Field Notes

ARCADIS

Appendix B

Laboratory Analytical Reports

ANALYTICAL RESULTS

Prepared by:

Lancaster Laboratories
2425 New Holland Pike
Lancaster, PA 17605-2425

Prepared for:

Chevron
6001 Bollinger Canyon Rd L4310
San Ramon CA 94583

September 15, 2011

Project: 301726

Submittal Date: 08/26/2011

Group Number: 1263785

SDG: LST52

PO Number: 0015074818

Release Number: CARRIER

State of Sample Origin: AK

Client Sample DescriptionMW-1 Grab Water Sample
MW-2 Grab Water Sample
MW-3 Grab Water Sample
MW-4 Grab Water Sample
MW-5 Grab Water Sample
MW-6 Grab Water Sample
BD-1 Grab Water Sample
Trip_Blank Water SampleLancaster Labs (LLD) #6389285
6389286
6389287
6389288
6389289
6389290
6389291
6389292

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

ELECTRONIC COPY TO
Arcadis

Attn: David Beaudoin

ELECTRONIC COPY TO
Arcadis

Attn: Greg Montgomery

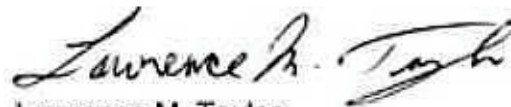
ELECTRONIC COPY TO
Arcadis

Attn: Russ Greisler

1 COPY TO
Data Package Group

Questions? Contact your Client Services Representative
Elizabeth A Leonhardt at (510) 232-8894

Respectfully Submitted,



Lawrence M. Taylor
Senior Specialist

Sample Description: MW-1 Grab Water Sample
Facility# 301726
Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389285
LLI Group # 1263785
Account # 11964

Project Name: 301726

Collected: 08/21/2011 18:55 by DB

Chevron

6001 Bollinger Canyon Rd L4310
 San Ramon CA 94583

Submitted: 08/26/2011 09:05

Reported: 09/15/2011 12:38

5AF-1 SDG#: LST52-01

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101			mg/l	mg/l	
01440	TPH-GRO AK water C6-C10	n.a.	10	0.050	5
GC Volatiles SW-846 8021B			mg/l	mg/l	
02102	Benzene	71-43-2	0.18	0.010	20
02102	Ethylbenzene	100-41-4	0.17	0.010	20
02102	Toluene	108-88-3	0.27	0.010	20
02102	Total Xylenes	1330-20-7	1.4	0.030	20
GC Petroleum AK 102/103 4/08/02 modified			mg/l	mg/l	
02923	C10-<C25 DRO	n.a.	57	2.4	50
02923	C25-C36 RRO	n.a.	N.D.	3.3	50

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11243A53A	09/02/2011 05:47	Laura M Krieger	5
02102	Method 8021 Water Master	SW-846 8021B	1	11243A53A	09/02/2011 12:11	Laura M Krieger	20
01146	GC VOA Water Prep	SW-846 5030B	1	11243A53A	09/02/2011 05:47	Laura M Krieger	5
01146	GC VOA Water Prep	SW-846 5030B	2	11243A53A	09/02/2011 12:11	Laura M Krieger	20
02923	TPH-DRO/RRO (AK) water	AK 102/103 4/08/02 modified	1	112420030A	09/05/2011 15:48	Heather E Williams	50
11185	AK DRO/ORO Waters Extraction	AK 102/AK 103 04/08/02	1	112420030A	08/31/2011 08:00	Cynthia J Salvatori	1

Sample Description: MW-2 Grab Water Sample
Facility# 301726
Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389286
LLI Group # 1263785
Account # 11964

Project Name: 301726

Collected: 08/21/2011 19:15 by DB

Chevron

6001 Bollinger Canyon Rd L4310
 San Ramon CA 94583

Submitted: 08/26/2011 09:05

Reported: 09/15/2011 12:38

5AF-2 SDG#: LST52-02

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101					
01440	TPH-GRO AK water C6-C10	n.a.	N.D.	0.010	1
GC Volatiles SW-846 8021B					
02102	Benzene	71-43-2	N.D.	0.0005	1
02102	Ethylbenzene	100-41-4	N.D.	0.0005	1
02102	Toluene	108-88-3	N.D.	0.0005	1
02102	Total Xylenes	1330-20-7	N.D.	0.0015	1
GC Petroleum AK 102/103 4/08/02 modified					
02923	C10-<C25 DRO	n.a.	0.12	0.048	1
02923	C25-C36 RRO	n.a.	0.13	0.067	1

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11243A53A	09/02/2011 02:13	Laura M Krieger	1
02102	Method 8021 Water Master	SW-846 8021B	1	11243A53A	09/02/2011 02:13	Laura M Krieger	1
01146	GC VOA Water Prep	SW-846 5030B	1	11243A53A	09/02/2011 02:13	Laura M Krieger	1
02923	TPH-DRO/RRO (AK) water	AK 102/103 4/08/02 modified	1	112420030A	09/02/2011 19:52	Heather E Williams	1
11185	AK DRO/ORO Waters Extraction	AK 102/AK 103 04/08/02	1	112420030A	08/31/2011 08:00	Cynthia J Salvatori	1

Sample Description: MW-3 Grab Water Sample
Facility# 301726
Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389287
LLI Group # 1263785
Account # 11964

Project Name: 301726

Collected: 08/21/2011 19:35 by DB

Chevron

6001 Bollinger Canyon Rd L4310
 San Ramon CA 94583

Submitted: 08/26/2011 09:05

Reported: 09/15/2011 12:38

5AF-3 SDG#: LST52-03

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101			mg/l	mg/l	
01440	TPH-GRO AK water C6-C10	n.a.	N.D.	0.010	1
GC Volatiles SW-846 8021B			mg/l	mg/l	
02102	Benzene	71-43-2	N.D.	0.0005	1
02102	Ethylbenzene	100-41-4	N.D.	0.0005	1
02102	Toluene	108-88-3	N.D.	0.0005	1
02102	Total Xylenes	1330-20-7	N.D.	0.0015	1
GC Petroleum AK 102/103 4/08/02 modified			mg/l	mg/l	
02923	C10-<C25 DRO	n.a.	1.7	0.049	1
02923	C25-C36 RRO	n.a.	0.37	0.068	1

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11243A53A	09/01/2011 20:52	Laura M Krieger	1
02102	Method 8021 Water Master	SW-846 8021B	1	11243A53A	09/01/2011 20:52	Laura M Krieger	1
01146	GC VOA Water Prep	SW-846 5030B	1	11243A53A	09/01/2011 20:52	Laura M Krieger	1
02923	TPH-DRO/RRO (AK) water	AK 102/103 4/08/02 modified	1	112420030A	09/02/2011 20:19	Heather E Williams	1
11185	AK DRO/ORO Waters Extraction	AK 102/AK 103 04/08/02	1	112420030A	08/31/2011 08:00	Cynthia J Salvatori	1

Sample Description: MW-4 Grab Water Sample
Facility# 301726
Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389288
LLI Group # 1263785
Account # 11964

Project Name: 301726

Collected: 08/21/2011 19:50 by DB

Chevron

6001 Bollinger Canyon Rd L4310
 San Ramon CA 94583

Submitted: 08/26/2011 09:05

Reported: 09/15/2011 12:38

5AF-4 SDG#: LST52-04

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101					
01440	TPH-GRO AK water C6-C10	n.a.	N.D.	0.010	1
GC Volatiles SW-846 8021B					
02102	Benzene	71-43-2	N.D.	0.0005	1
02102	Ethylbenzene	100-41-4	N.D.	0.0005	1
02102	Toluene	108-88-3	N.D.	0.0005	1
02102	Total Xylenes	1330-20-7	N.D.	0.0015	1
GC Petroleum AK 102/103 4/08/02 modified					
02923	C10-<C25 DRO	n.a.	0.20	0.049	1
02923	C25-C36 RRO	n.a.	0.59	0.068	1

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11243A53A	09/02/2011 02:40	Laura M Krieger	1
02102	Method 8021 Water Master	SW-846 8021B	1	11243A53A	09/02/2011 02:40	Laura M Krieger	1
01146	GC VOA Water Prep	SW-846 5030B	1	11243A53A	09/02/2011 02:40	Laura M Krieger	1
02923	TPH-DRO/RRO (AK) water	AK 102/103 4/08/02 modified	1	112420030A	09/02/2011 23:29	Heather E Williams	1
11185	AK DRO/ORO Waters Extraction	AK 102/AK 103 04/08/02	1	112420030A	08/31/2011 08:00	Cynthia J Salvatori	1

Sample Description: MW-5 Grab Water Sample
Facility# 301726
Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389289
LLI Group # 1263785
Account # 11964

Project Name: 301726

Collected: 08/21/2011 20:10 by DB

Chevron

6001 Bollinger Canyon Rd L4310
 San Ramon CA 94583

Submitted: 08/26/2011 09:05

Reported: 09/15/2011 12:38

5AF-5 SDG#: LST52-05

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101					
01440	TPH-GRO AK water C6-C10	n.a.	N.D.	0.010	1
GC Volatiles SW-846 8021B					
02102	Benzene	71-43-2	N.D.	0.0005	1
02102	Ethylbenzene	100-41-4	N.D.	0.0005	1
02102	Toluene	108-88-3	N.D.	0.0005	1
02102	Total Xylenes	1330-20-7	N.D.	0.0015	1
GC Petroleum AK 102/103 4/08/02 modified					
02923	C10-<C25 DRO	n.a.	0.12	0.047	1
02923	C25-C36 RRO	n.a.	0.35	0.066	1

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11244A53A	09/02/2011 22:13	Catherine J Schwarz	1
02102	Method 8021 Water Master	SW-846 8021B	1	11244A53A	09/02/2011 22:13	Catherine J Schwarz	1
01146	GC VOA Water Prep	SW-846 5030B	1	11244A53A	09/02/2011 22:13	Catherine J Schwarz	1
02923	TPH-DRO/RRO (AK) water	AK 102/103 4/08/02 modified	1	112420030A	09/02/2011 23:56	Heather E Williams	1
11185	AK DRO/ORO Waters Extraction	AK 102/AK 103 04/08/02	1	112420030A	08/31/2011 08:00	Cynthia J Salvatori	1

Sample Description: MW-6 Grab Water Sample
Facility# 301726
Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389290
LLI Group # 1263785
Account # 11964

Project Name: 301726

Collected: 08/21/2011 20:40 by DB

Chevron

6001 Bollinger Canyon Rd L4310
 San Ramon CA 94583

Submitted: 08/26/2011 09:05

Reported: 09/15/2011 12:38

5AF-6 SDG#: LST52-06

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101					
01440	TPH-GRO AK water C6-C10	n.a.	N.D.	0.010	1
GC Volatiles SW-846 8021B					
02102	Benzene	71-43-2	N.D.	0.0005	1
02102	Ethylbenzene	100-41-4	N.D.	0.0005	1
02102	Toluene	108-88-3	N.D.	0.0005	1
02102	Total Xylenes	1330-20-7	N.D.	0.0015	1
GC Petroleum AK 102/103 4/08/02 modified					
02923	C10-<C25 DRO	n.a.	0.15	0.048	1
02923	C25-C36 RRO	n.a.	0.21	0.068	1

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11244A53A	09/02/2011 23:33	Catherine J Schwarz	1
02102	Method 8021 Water Master	SW-846 8021B	1	11244A53A	09/02/2011 23:33	Catherine J Schwarz	1
01146	GC VOA Water Prep	SW-846 5030B	1	11244A53A	09/02/2011 23:33	Catherine J Schwarz	1
02923	TPH-DRO/RRO (AK) water	AK 102/103 4/08/02 modified	1	112420030A	09/02/2011 20:46	Heather E Williams	1
11185	AK DRO/ORO Waters Extraction	AK 102/AK 103 04/08/02	1	112420030A	08/31/2011 08:00	Cynthia J Salvatori	1

Sample Description: BD-1 Grab Water Sample
Facility# 301726
Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389291
LLI Group # 1263785
Account # 11964

Project Name: 301726

Collected: 08/21/2011 by DB

Chevron

6001 Bollinger Canyon Rd L4310
 San Ramon CA 94583

Submitted: 08/26/2011 09:05

Reported: 09/15/2011 12:38

5AFD1 SDG#: LST52-07FD

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101			mg/l	mg/l	
01440	TPH-GRO AK water C6-C10	n.a.	6.5	0.050	5
GC Volatiles SW-846 8021B			mg/l	mg/l	
02102	Benzene	71-43-2	0.13	0.0025	5
02102	Ethylbenzene	100-41-4	0.14	0.0025	5
02102	Toluene	108-88-3	0.19	0.0025	5
02102	Total Xylenes	1330-20-7	1.0	0.0075	5

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11244A53B	09/04/2011 15:54	Catherine J Schwarz	5
02102	Method 8021 Water Master	SW-846 8021B	1	11244A53B	09/04/2011 15:54	Catherine J Schwarz	5
01146	GC VOA Water Prep	SW-846 5030B	1	11244A53B	09/04/2011 15:54	Catherine J Schwarz	5

Sample Description: Trip_Blank Water Sample
 Facility# 301726
 Block 10, Lot 5A - Fairbanks, AK

LLI Sample # WW 6389292
 LLI Group # 1263785
 Account # 11964

Project Name: 301726

Collected: 08/21/2011

Chevron

Submitted: 08/26/2011 09:05

6001 Bollinger Canyon Rd L4310

Reported: 09/15/2011 12:38

San Ramon CA 94583

5AFT1 SDG#: LST52-08TB*

CAT No.	Analysis Name	CAS Number	As Received Result	As Received Method Detection Limit	Dilution Factor
GC Volatiles AK 101			mg/l	mg/l	
01440	TPH-GRO AK water C6-C10	n.a.	N.D.	0.010	1
GC Volatiles SW-846 8021B			mg/l	mg/l	
02102	Benzene	71-43-2	N.D.	0.0005	1
02102	Ethylbenzene	100-41-4	N.D.	0.0005	1
02102	Toluene	108-88-3	N.D.	0.0005	1
02102	Total Xylenes	1330-20-7	N.D.	0.0015	1

General Sample Comments

State of Alaska Lab Certification No. UST-061

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
01440	TPH-GRO AK water C6-C10	AK 101	1	11244A53A	09/02/2011 18:12	Catherine J Schwarz	1
02102	Method 8021 Water Master	SW-846 8021B	1	11244A53A	09/02/2011 18:12	Catherine J Schwarz	1
01146	GC VOA Water Prep	SW-846 5030B	1	11244A53A	09/02/2011 18:12	Catherine J Schwarz	1

Quality Control Summary

Client Name: Chevron

Group Number: 1263785

Reported: 09/15/11 at 12:38 PM

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Laboratory Compliance Quality Control

<u>Analysis Name</u>	<u>Blank Result</u>	<u>Blank MDL</u>	<u>Report Units</u>	<u>LCS %REC</u>	<u>LCSD %REC</u>	<u>LCS/LCSD Limits</u>	<u>RPD</u>	<u>RPD Max</u>
Batch number: 11243A53A	Sample number(s): 6389285-6389288							
Benzene	N.D.	0.0002	mg/l	110	115	80-120	4	30
Ethylbenzene	N.D.	0.0002	mg/l	110	110	80-120	0	30
Toluene	N.D.	0.0002	mg/l	110	115	80-120	4	30
TPH-GRO AK water C6-C10	N.D.	0.010	mg/l	100	91	60-120	10	20
Total Xylenes	N.D.	0.0006	mg/l	112	115	80-120	3	30
Batch number: 11244A53A	Sample number(s): 6389289-6389290,6389292							
Benzene	N.D.	0.0002	mg/l	110	110	80-120	0	30
Ethylbenzene	N.D.	0.0002	mg/l	110	110	80-120	0	30
Toluene	N.D.	0.0002	mg/l	110	110	80-120	0	30
TPH-GRO AK water C6-C10	N.D.	0.010	mg/l	91	91	60-120	0	20
Total Xylenes	N.D.	0.0006	mg/l	113	112	80-120	1	30
Batch number: 11244A53B	Sample number(s): 6389291							
Benzene	N.D.	0.0002	mg/l	110	110	80-120	0	30
Ethylbenzene	N.D.	0.0002	mg/l	110	110	80-120	0	30
Toluene	N.D.	0.0002	mg/l	110	110	80-120	0	30
TPH-GRO AK water C6-C10	N.D.	0.010	mg/l	91	91	60-120	0	20
Total Xylenes	N.D.	0.0006	mg/l	113	112	80-120	1	30
Batch number: 112420030A	Sample number(s): 6389285-6389290							
C10-<C25 DRO	N.D.	0.050	mg/l	87	99	75-125	12	20
C25-C36 RRO	N.D.	0.070	mg/l	92	92	60-120	0	20

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: TPH-GRO AK water C6-C10

Batch number: 11243A53A

	Trifluorotoluene-F	Trifluorotoluene-P
6389285	68	69
6389286	68	73
6389287	67	73
6389288	66	73
Blank	66	73
LCS	84	72

*- Outside of specification

- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

Quality Control Summary

Client Name: Chevron
Reported: 09/15/11 at 12:38 PM

Group Number: 1263785

Surrogate Quality Control

LCSD	84	73
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Limits:	60-120	58-146
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Analysis Name: TPH-GRO AK water C6-C10

Batch number: 11244A53A

	Trifluorotoluene-F	Trifluorotoluene-P
6389289	67	74
6389290	66	73
6389292	65	73
Blank	67	72
LCS	84	73
LCSD	84	72

Limits:	60-120	58-146
---------	--------	--------

Analysis Name: TPH-GRO AK water C6-C10

Batch number: 11244A53B

	Trifluorotoluene-F	Trifluorotoluene-P
6389291	69	55*
Blank	67	72
LCS	84	73
LCSD	84	72

Limits:	60-120	58-146
---------	--------	--------

Analysis Name: TPH-DRO/RRO (AK) water

Batch number: 112420030A

	Orthoterphenyl	n-Triacontane-d62
6389285	117	85
6389286	98	77
6389287	78	72
6389288	96	74
6389289	96	75
6389290	106	79
Blank	82	66
LCS	84	61
LCSD	94	69

Limits:	50-150	50-150
---------	--------	--------

*- Outside of specification

- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

Chevron Generic Analysis Request/Chain of Custody



G# 1263785 015193
 For Lancaster Laboratories use only
 Acct. #: 11964 Sample #: 6389285-92 SCR#: _____

Facility #: <u>301726</u> Site Address: <u>Lot 5A, Block 19, West Ramp, Fairbanks, AK</u> Chevron PM: <u>Don Currier</u> Lead Consultant: <u>ARCADIS</u> Consultant/Office: <u>2200 Eastlake Ave E #200 Seattle, WA 98102</u> Consultant Prj. Mgr.: <u>Greg Montgomerie</u> Consultant Phone #: <u>206 726-4742</u> Fax #: _____ Sampler: <u>Dave Beardsley</u> Service Order #: <u>NWTRB-0301726</u> <input type="checkbox"/> Non SAR: _____				Analyses Requested Preservation Codes H <input checked="" type="checkbox"/> T <input type="checkbox"/> N <input type="checkbox"/> B <input type="checkbox"/> S <input type="checkbox"/> O <input type="checkbox"/>			Preservative Codes H = HCl T = Thiosulfate N = HNO ₃ B = NaOH S = H ₂ SO ₄ O = Other							
				Matrix Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Water <input type="checkbox"/> Air <input type="checkbox"/>			Total Number of Containers BTEX + MTBE <input type="checkbox"/> 8021 <input type="checkbox"/> 8260 <input type="checkbox"/> Naphthalene <input type="checkbox"/>		<input type="checkbox"/> J value reporting needed <input type="checkbox"/> Must meet lowest detection limits possible for 8260 compounds 8021 MTBE Confirmation <input type="checkbox"/> Confirm MTBE + Naphthalene <input type="checkbox"/> Confirm highest hit by 8260 <input type="checkbox"/> Confirm all hits by 8260 <input type="checkbox"/> Run ___ oxy's on highest hit <input type="checkbox"/> Run ___ oxy's on all hits					
				Soil <input type="checkbox"/> Water <input type="checkbox"/> Oil <input type="checkbox"/> Air <input type="checkbox"/>										
Sample Identification		Date Collected	Time Collected	Grab	Composite									
MW-1		8-21-11	18:55	X		X	X	X	X	X	X	X	Comments / Remarks	
MW-2		8-21-11	19:15	X		X	X	X	X	X	X	X		
MW-3		8-21-11	19:35	X		X	X	X	X	X	X	X		
MW-4		8-21-11	19:50	X		X	X	X	X	X	X	X		
MW-5		8-21-11	20:10	X		X	X	X	X	X	X	X		
MW-6		8-21-11	20:40	X		X	X	X	X	X	X	X		
BD-1 Trip Blank		8-21-11	—	X		X	X	X	X	X	X	X		
						1	X	X	X	X	X	X		

10A1

Turnaround Time Requested (TAT) (please circle)

24 hour 72 hour 48 hour
 4 day 5 day

Data Package Options (please circle if required)

QC Summary Type I - Full
 Type VI (Raw Data) Disk / EDD
 WIP (RWQCB) Standard Format
 Disk Type III Other: _____

Relinquished by: <u>[Signature]</u> Relinquished by: _____	Date 8-25-11	Time 8:00	Received by: _____	Date _____	Time _____
Relinquished by Commercial Carrier: _____					
UPS <input checked="" type="radio"/> FedEx Other: _____	Date _____		Time _____	Received by: <u>[Signature]</u>	Date 8/26/11
Temperature Upon Receipt: <u>20-28</u> °C			Custody Seals Intact? <input checked="" type="radio"/> Yes <input type="radio"/> No		

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

RL	Reporting Limit	BMQL	Below Minimum Quantitation Level
N.D.	none detected	MPN	Most Probable Number
TNTC	Too Numerous To Count	CP Units	cobalt-chloroplatinate units
IU	International Units	NTU	nephelometric turbidity units
umhos/cm	micromhos/cm	ng	nanogram(s)
C	degrees Celsius	F	degrees Fahrenheit
meq	milliequivalents	lb.	pound(s)
g	gram(s)	kg	kilogram(s)
µg	microgram(s)	mg	milligram(s)
mL	milliliter(s)	L	liter(s)
m³	cubic meter(s)	µL	microliter(s)
		pg/L	picogram/liter
<	less than - The number following the sign is the <u>limit of quantitation</u> , the smallest amount of analyte which can be reliably determined using this specific test.		
>	greater than		
J	estimated value – The result is \geq the Method Detection Limit (MDL) and $<$ the Limit of Quantitation (LOQ).		
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg), or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter of gas per liter of gas.		
ppb	parts per billion		
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

U.S. EPA CLP Data Qualifiers:

Organic Qualifiers	Inorganic Qualifiers
A TIC is a possible aldol-condensation product	B Value is $<$ CRDL, but \geq IDL
B Analyte was also detected in the blank	E Estimated due to interference
C Pesticide result confirmed by GC/MS	M Duplicate injection precision not met
D Compound quantitated on a diluted sample	N Spike sample not within control limits
E Concentration exceeds the calibration range of the instrument	S Method of standard additions (MSA) used for calculation
N Presumptive evidence of a compound (TICs only)	U Compound was not detected
P Concentration difference between primary and confirmation columns $>$ 25%	W Post digestion spike out of control limits
U Compound was not detected	* Duplicate analysis not within control limits
X,Y,Z Defined in case narrative	+ Correlation coefficient for MSA $<$ 0.995

Analytical test results meet all requirements of NELAC unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff. This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR part 136 Table II as “analyze immediately” are not performed within 15 minutes.

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ARCADIS

Appendix C

ADEC Data Review Checklists

Laboratory Data Review Checklist

Completed by:

Title: Date:

CS Report Name: Report Date:

Consultant Firm:

Laboratory Name: Laboratory Report Number:

ADEC File Number: ADEC RecKey Number:

1. Laboratory

- a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?
Yes No NA (Please explain.) Comments:

- b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?
Yes No NA (Please explain.) Comments:

2. Chain of Custody (COC)

- a. COC information completed, signed, and dated (including released/received by)?
Yes No NA (Please explain.) Comments:

- c. Correct analyses requested?
Yes No NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?
Yes No NA (Please explain.) Comments:

- b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain.) Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain.) Comments:

Condition was fine.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes No NA (Please explain.) Comments:

No discrepancies

e. Data quality or usability affected? (Please explain.)

Comments:

Not affected

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain.) Comments:

Yes

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain.) Comments:

BD-1 TPH-GRO below LCSD limit

c. Were all corrective actions documented?

Yes No NA (Please explain.) Comments:

Yes

d. What is the effect on data quality/usability according to the case narrative?

Comments:

No effect.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain.) Comments:

Yes

b. All applicable holding times met?

Yes

Yes No NA (Please explain.) Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain.) Comments:

NA

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain.) Comments:

Yes

e. Data quality or usability affected?

Comments:

No

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.) Comments:

Yes

ii. All method blank results less than PQL?

Yes No NA (Please explain.) Comments:

Yes

iii. If above PQL, what samples are affected?

Comments:

None

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

Yes

v. Data quality or usability affected? (Please explain.)

Comments:

No

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain.) Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.) Comments:

NA

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

Yes

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

Yes

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

None

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

NA (no affected samples)

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

No

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes No NA (Please explain.) Comments:

Yes

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain.) Comments:

All except BD-1 for TPH-GRO

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

Yes

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

No

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples? (If not, enter explanation below.)

Yes No NA (Please explain.) Comments:

Yes

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC? (If not, a comment explaining why must be entered below)

Yes No NA (Please explain.) Comments:

Yes

iii. All results less than PQL?

Yes No NA (Please explain.) Comments:

Yes

iv. If above PQL, what samples are affected?

Comments:

None

v. Data quality or usability affected? (Please explain.)

Comments:

No

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.) Comments:

Yes

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

Yes

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes No NA (Please explain.)

Comments:

Yes

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

No

f. Decontamination or Equipment Blank (If not used explain why).

Yes No NA (Please explain.)

Comments:

NA – disposable bailer used for purging and sampling – new bailer on each well sampled.

i. All results less than PQL?

Yes No NA (Please explain.)

Comments:

NA – no decon blank submitted

ii. If above PQL, what samples are affected?

Comments:

None

iii. Data quality or usability affected? (Please explain.)

Comments:

NA

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain.)

Comments:

Yes