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Alameda County
Environmental Health

August 17, 2007

GROUNDWATER MONITORING REPORT
3rd Quarter, 2007

3635 13th Avenue
Oakland, California

AEI Project No. 270852

Prepared For

Mr. John Williamson
3906 Laguna Avenue
Oakland, CA 94602

Prepared By

AEI Consultants
2500 Camino Diablo, Suite 200
Walnut Creek, CA 94597
(925) 283-6000

AEI



August 13, 2007

Mr. John Williamson
3906 Laguna Avenue
Oakland, CA 94602

**Subject: Groundwater Monitoring Report
3rd Quarter, 2007**
3635 13th Avenue
Oakland, California
AEI Project No. 270852
ACHCSA Case No. RO0000159

Dear Mr. Williamson:

AEI Consultants (AEI) has prepared this report on your behalf to document the required ongoing groundwater investigation at the above referenced property (Figure 1: Site Location Map). The investigation is being performed at the request of the Alameda County Health Care Services Agency (ACHCSA). The purpose of the groundwater monitoring and sampling activities is to further evaluate the release of petroleum hydrocarbons that occurred from the former underground storage tank (UST) and fuel dispensing system on the property. This report documents the monitoring and sampling event performed during the 3rd Quarter 2007, which occurred on July 2, 2007.

I Background

The subject property (hereinafter referred to as the “site” or “property”) is located in a residential area of the City of Oakland, on the west corner of 13th Avenue and Excelsior Street. The site is approximately 4,000 square feet in size and is currently vacant and unimproved. The site is surrounded by fencing. The site was previously developed with a gasoline service station.

In December 1992, three underground storage tanks (USTs), one 250-gallon waste oil UST, one 500-gallon gasoline UST, and one 1,000-gallon gasoline UST were removed by Aqua Science Engineers, Inc. of San Ramon. Refer to Figure 2 for the former locations of the USTs. Soil samples collected beneath the former waste oil UST revealed concentrations of 8,200 mg/kg Total Oil and Grease (TOG), 290 mg/kg Total Petroleum Hydrocarbons (TPH) as gasoline (TPH-g), and 225 mg/kg total lead. Soil samples collected from beneath the 1,000-gallon gasoline UST indicated maximum concentrations of 27 mg/kg TPH-g and 5.5 mg/kg benzene. Only minor concentrations of TPH as gasoline and benzene, toluene, ethylbenzene, and total xylenes (BTEX) were found in samples collected beneath the 500-gallon gasoline UST⁽¹⁾.

In September 1993, AEI removed and disposed of approximately 360 cubic yards of contaminated soil from near the former waste oil UST. Sidewall samples collected from this

excavation indicated that only minor contaminant concentrations remained in the soil. Following this project, the former 250-gallon waste oil UST was concluded to not pose a significant threat to the groundwater ⁽²⁾.

Three monitoring wells (MW-1 through MW-3) were installed in March 1994 ⁽³⁾. Soil samples analyzed during the well installations contained only minor concentration of petroleum hydrocarbons. The wells were monitored on a quarterly basis from November 1994 to August 1995, when the ACHCSA approved a change in monitoring frequency to a biannual schedule. Historical water elevations and groundwater sample analytical data is presented in Table 1.

On November 16, 1995, AEI advanced a soil boring at each end of the former dispenser island to depths of 4.5 feet below ground surface (bgs) on the west end, and 10 feet bgs on the east. Soil samples were collected beneath the former dispensers at the request of the ACHCSA. Analysis of soil samples collected from the two borings indicated that concentrations of TPH-g and BTEX were below laboratory detection limits ⁽⁴⁾.

At the request of the ACHCSA, AEI prepared a workplan outlining a scope of work to further define the extent of impacted soil and groundwater beneath the site ⁽⁵⁾. This investigation was performed between August 1997 and January 1998. Nine soil borings (SB1 through SB9) were advanced on the property and down-gradient of the former gasoline USTs ⁽⁶⁾. The investigation revealed significant concentrations of contaminants in soil and groundwater and that the release had spread off-site in a southerly direction.

An additional workplan was prepared, outlining the installation of two additional groundwater monitoring wells ⁽⁷⁾. However, due to the City of Oakland's requirement for liability insurance provided by the property owner for the wells, off-site monitoring wells could not be installed. A letter addendum to the workplan was prepared and approved to investigate the offsite extent of the release with temporary soil borings ⁽⁸⁾. Soil and groundwater samples were collected from six additional soil borings (SB-10 to SB-15) between August and October 2003, the results of which were presented in the *Soil and Groundwater Investigation Report*, dated October 30, 2003. Locations of the former USTs, soil borings, and wells are shown on Figure 2.

Additional site characterization, including soil borings completed in April 2007 and additional monitoring wells to be installed shortly, is underway.

II Summary of Activities

AEI measured depth to groundwater in the three monitoring wells (MW-1 to MW-3) on July 2, 2007. The depth from the top of the well casings was measured with an electric water level indicator prior to sampling. The wells were purged with a submersible pump. Temperature, pH, specific conductivity, and oxidation-reduction potential (ORP) were measured during the purging of the wells. Turbidity was visually noted. The wells were purged of at least 3 well volumes and allowed to recharge prior to sample collection. Once water levels recharged to at least 90% of their original levels, a water sample was collected from each well.

Water samples were collected with new, disposable bailers into 40-ml volatile organic analysis (VOA) vials and 1-liter amber bottles and capped so that no headspace or air bubbles were visible within the sample containers. Samples were delivered on ice under chain of custody protocol to McCampbell Analytical, Inc. of Pittsburgh, California (Department of Health Services Certification #1644).

The three groundwater samples were submitted for chemical analysis for the following:

- Total Petroleum Hydrocarbons (TPH) as gasoline (TPH-g) by EPA method 8015Cm
- TPH as diesel (TPH-d) by EPA method 8015C
- Benzene, toluene, ethyl benzene, and xylenes (BTEX) and methyl tertiary butyl ether (MTBE) by EPA method 8021
- Fuel additives, including EDB and DCA by EPA method 8260B

III Field Results

No sheen or free product was encountered during monitoring activities. Groundwater levels for the current monitoring episode ranged from 181.47 to 184.48 feet above Mean Sea Level (MSL). Based on these water level measurements, groundwater was calculated to flow in a south-southeasterly direction, with a gradient of 0.03 ft/ft. This groundwater flow direction and gradient are similar to previous groundwater sampling episodes.

Groundwater elevation data is summarized in Table 1. The groundwater elevation contours and the groundwater flow direction are shown in Figure 3. Refer to Appendix A for the Groundwater Monitoring Well Field Sampling Forms.

IV Groundwater Quality

TPH-g and TPH-d were detected in MW-2 at 5,100 µg/L and 750 µg/L, respectively. Also, Benzene and MTBE were detected in this well at 260 µg/L and 88 µg/L. Concentrations of TPH-g and TPH-d were detected in MW-1 at 150 µg/L and 79 µg/L but were non-detect in MW-3. BTEX was detected in MW-2 at concentrations of 260 µg/L, 21 µg/L, 320 µg/L, and 370 µg/L, respectively. BTEX was non-detectable at laboratory reporting limits in MW-1 and MW-3. TBA concentration in MW-2 increased from 100 µg/L to 150 µg/L, since the previous event.

A summary of groundwater quality data is presented in Tables 1 and 2. Laboratory results and chain of custody documents are included in Appendix B.

V Conclusion and Recommendations

Quarterly monitoring is scheduled to continue in accordance with ACHCSA. Samples collected during the next event will be analyzed for the same constituents as analyzed during the 3rd Quarter event. The next event is tentatively scheduled to occur in early October 2007.

Additional site characterization is currently underway in accordance with a letter dated October 6, 2006 from the ACHCSA. Additional well installation is expected to occur in early September 2007. All wells, including the newly installed wells, will be sampled during the upcoming October 2007 monitoring event. The results of the October 2007 monitoring event will be included in the forthcoming report.

VI References

1. *Underground Storage Tank Removal Final Report*, January 20, 1993 – Aqua Science Engineers, Inc.
2. *Contaminated Soil Over-excavation Final Report*, November 18, 1999 – All Environmental, Inc.
3. *Soil Boring and Monitoring Well Installation Report*, December 14, 1994 – All Environmental, Inc.
4. *Phase II Limited Subsurface Investigation*, December 11, 1995 – All Environmental, Inc.
5. *Phase II Subsurface Investigation Workplan*, June 5, 1997 – All Environmental, Inc.
6. *Phase II Subsurface Investigation Report*, January 20, 1999 – All Environmental, Inc.
7. *Workplan*, December 3, 1999 – AEI Consultants
8. Letter to Amir Gholami of the ACHCSA, September 9, 2002 – AEI Consultants
9. *Soil and Groundwater Investigation Report*, October 30, 2003 – AEI Consultants
10. *Remedial Investigation and Corrective Action Plan*, July 19, 2004 – AEI Consultants


VII Report Limitation

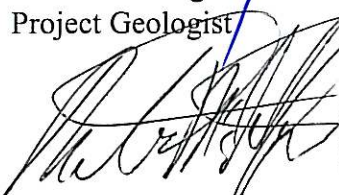
This report presents a summary of work completed by AEI Consultants. The completed work includes observations and descriptions of site conditions encountered. Where appropriate, it includes analytical results for samples taken during the course of the work. The number and location of samples are chosen to provide the required information, but it cannot be assumed that they are representative of areas not sampled. All conclusions and/or recommendations are based on these analyses and observations, and the governing regulations. Conclusions beyond those stated and reported herein should not be inferred from this document.

These services were performed in accordance with generally accepted practices, in the environmental engineering and construction field, which existed at the time and location of the work.

If you have any questions regarding our investigation, please do not hesitate to contact me at (925)944-2899, extension 143.

Sincerely,
AEI Consultants


Adrian M. Angel
Project Geologist


Peter McIntyre, FG, REA
Senior Project Manager




Harmony TomSun
Staff Geologist

Figures

- Figure 1: Site Location Map*
- Figure 2: Site Plan*
- Figure 3: Water Table Contours 7/2/07*
- Figure 4: Groundwater Sample Analytical Data 7/2/07*

Tables

- Table 1: Groundwater Monitoring Data*
- Table 2: Fuel Additive Analyses*

Attachments

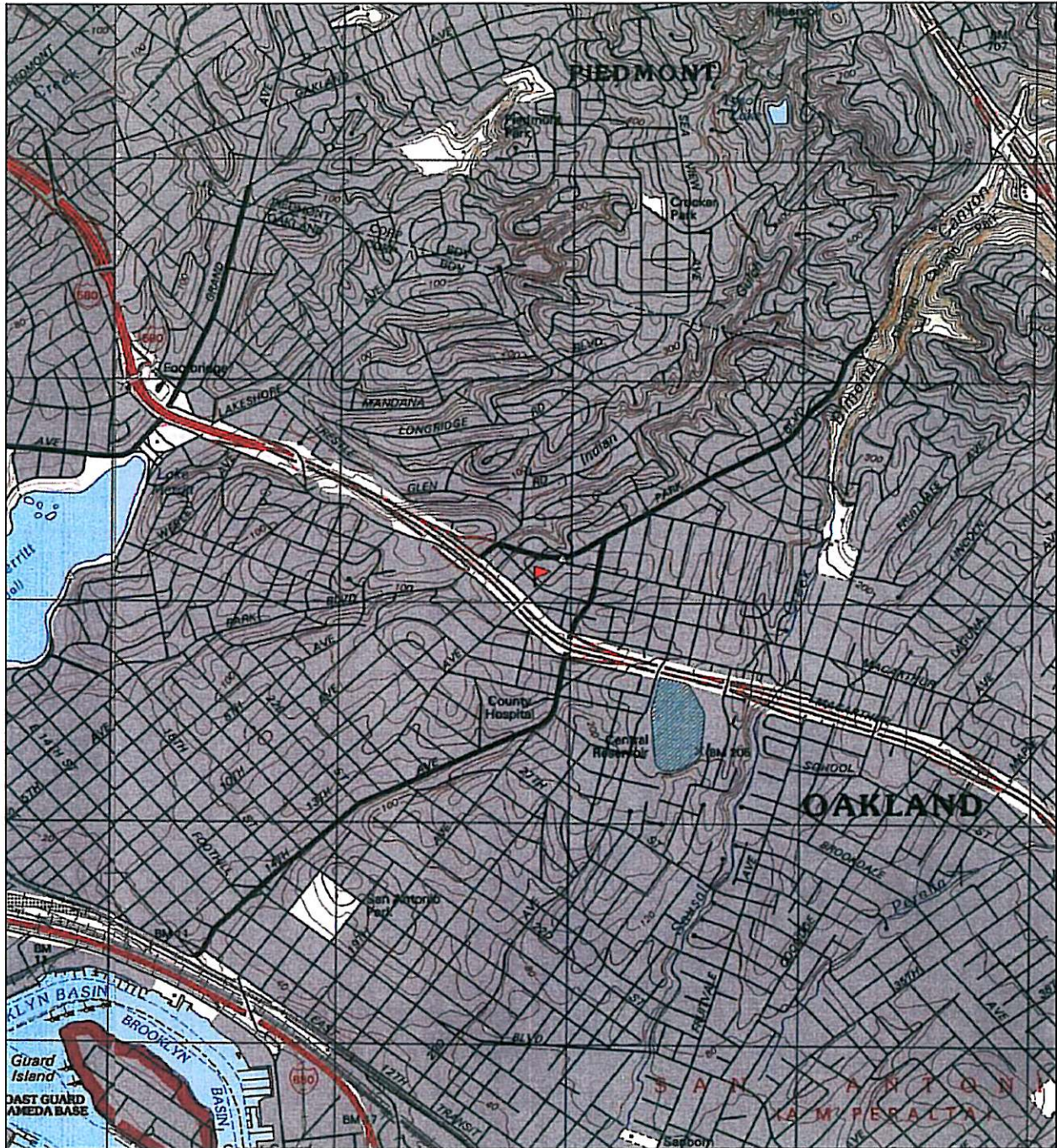
- Appendix A: Groundwater Monitoring Well Field Sampling Forms*
- Appendix B: Laboratory Analyses With Chain of Custody Documentation*

Distribution: Mr. John Williamson
3906 Laguna Avenue, Oakland, CA 94602

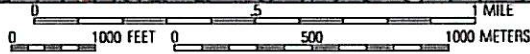
Mr. Steven Plunkett, ACHCSA
1131 Harbor Bay Parkway, Suite 250, Alameda, CA 94502

FIGURES





TN 15°



Map created with TOPOI® ©2003 National Geographic (www.nationalgeographic.com/topo)



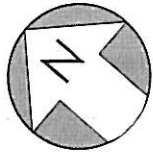
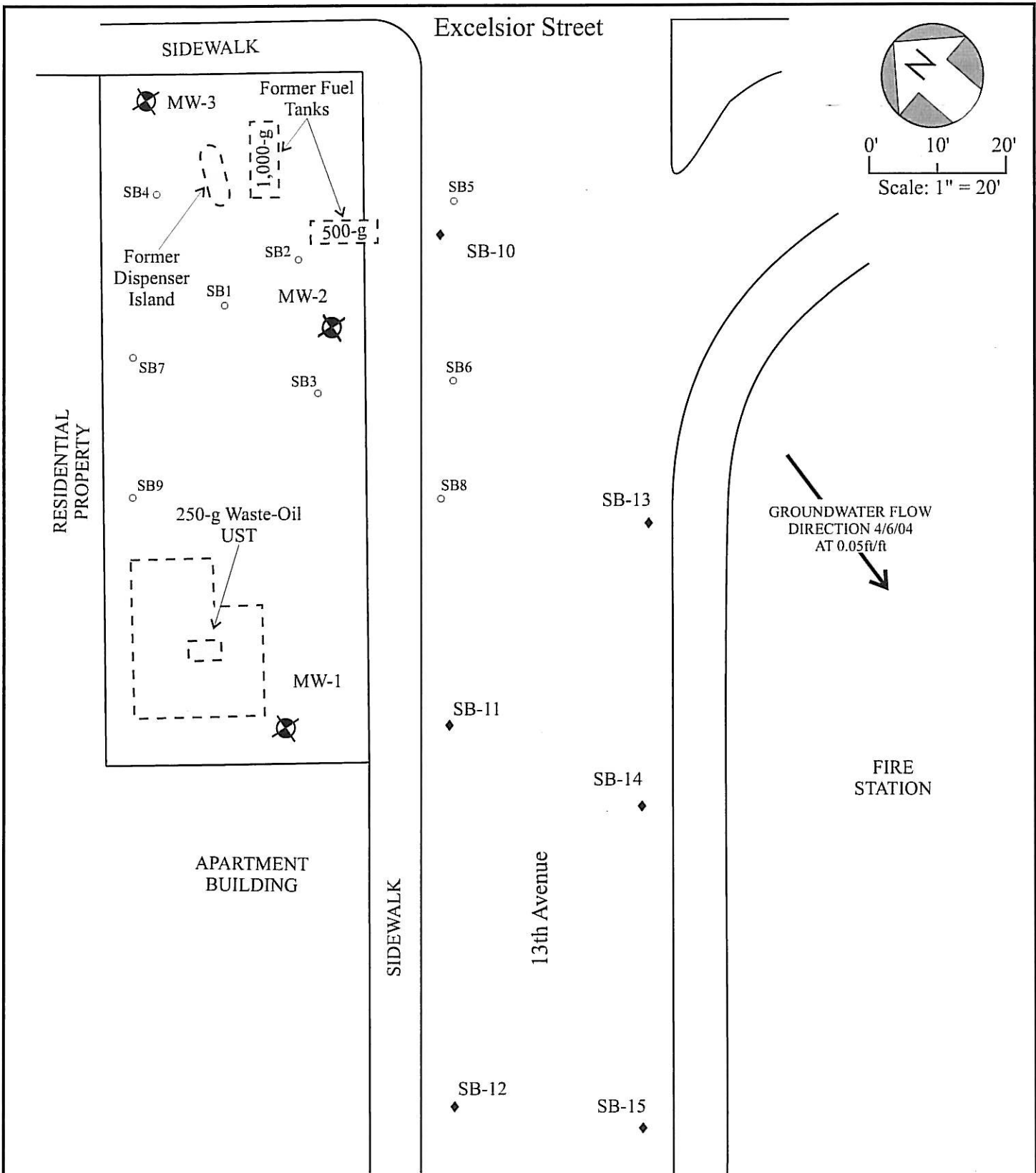
USGS TOPOGRAPHIC MAP
OAKLAND EAST, CA. QUADRANGLE
Created 1997

SITE LOCATION MAP

3635 13th Avenue
Oakland, California 94610

FIGURE 1
Job No: 270852

AEI



0' 10' 20'
Scale: 1" = 20'




AEI CONSULTANTS
2500 CAMINO DIABLO, # 200 WALNUT CREEK, CA

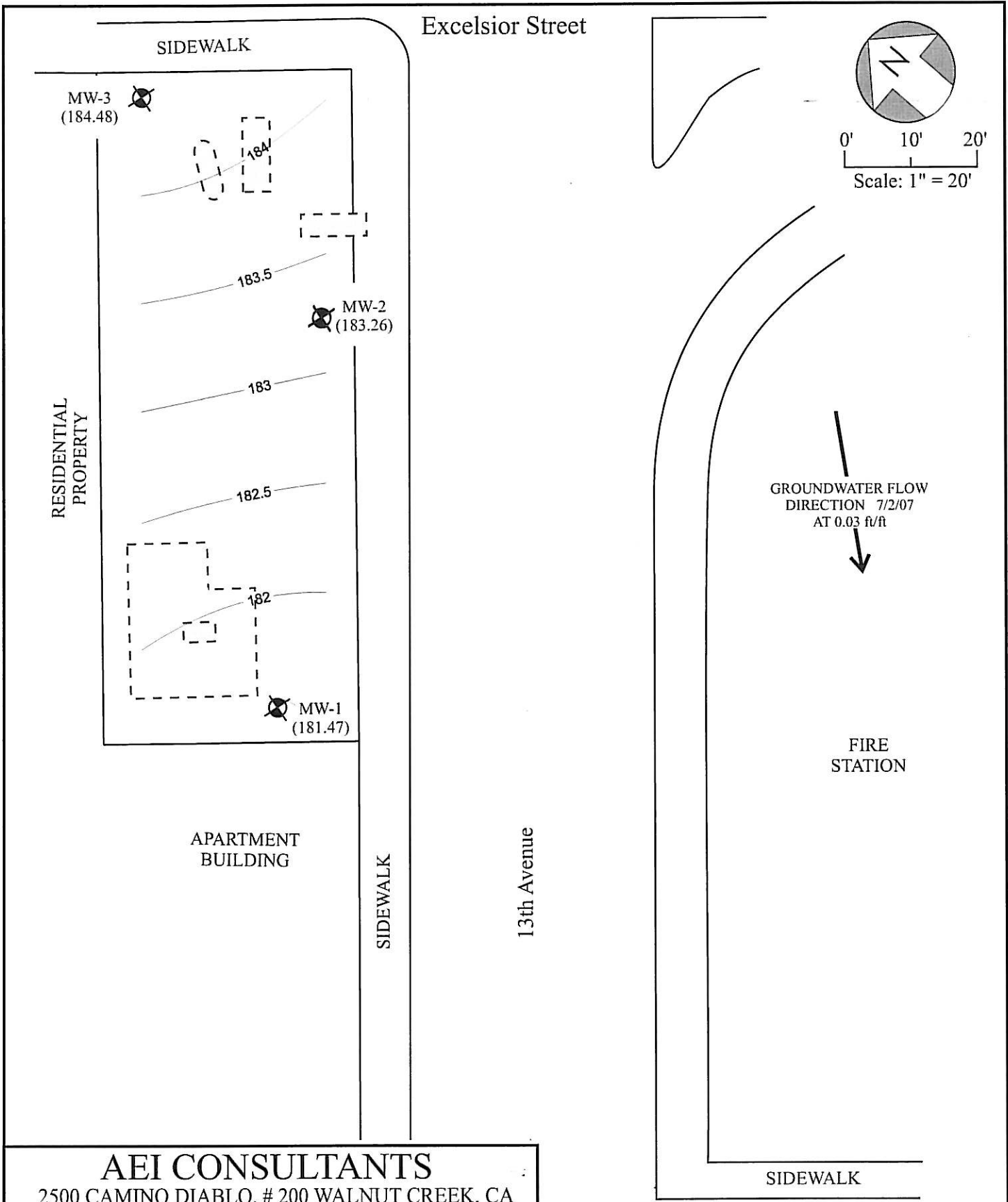
SITE PLAN

3635 13th Avenue
Oakland, California

FIGURE 2
AEI Project # 8499

LEGEND (REV. 6/04)

-  Monitoring Well
-  Soil Boring 11/97 & 1/98
-  Soil Boring 8/21 & 10/9-10 2003



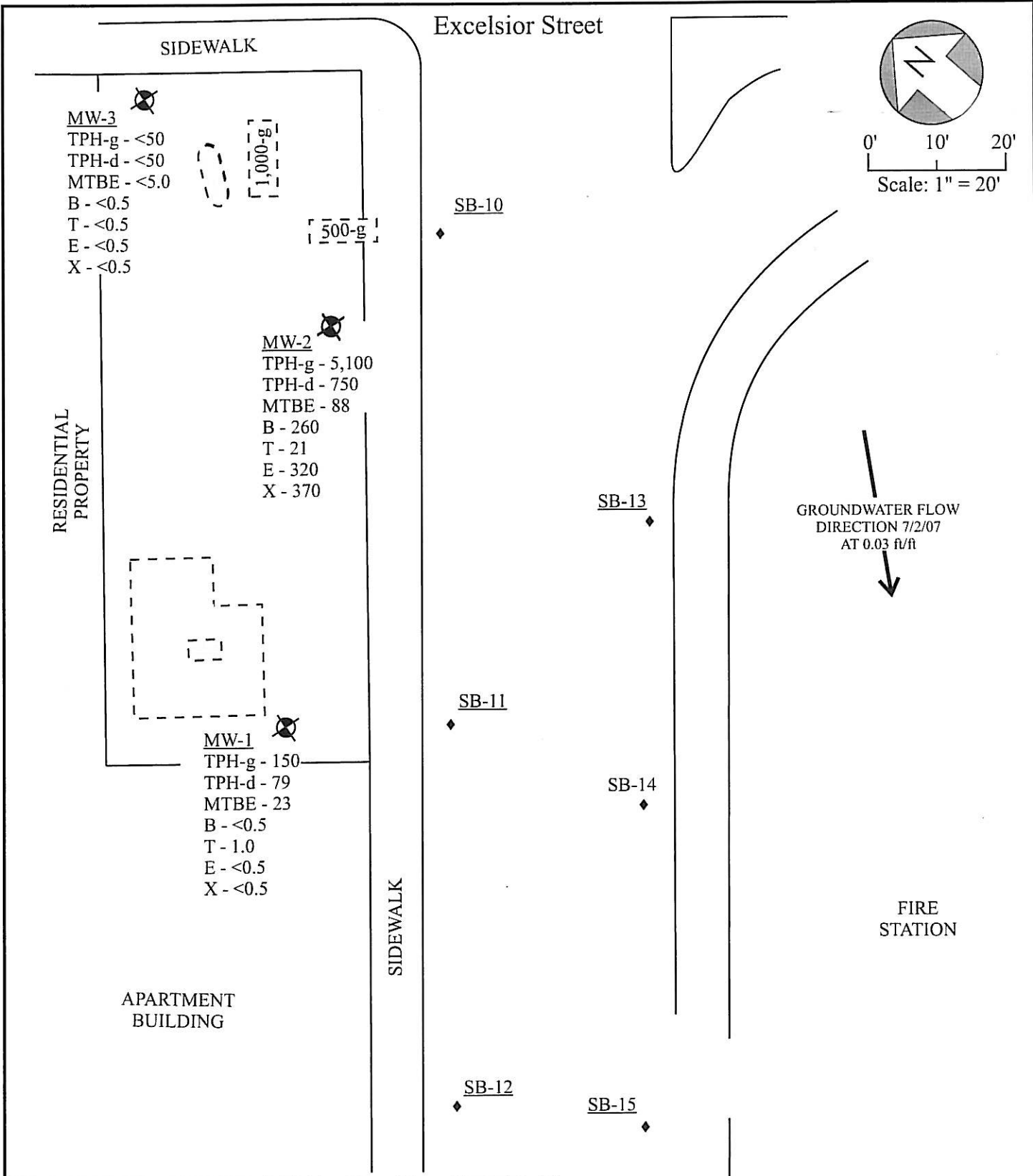
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 2500 CAMINO DIABLO, # 200 WALNUT CREEK, CA

WATER TABLE CONTOURS 7/2/07

3635 13th Avenue
 Oakland, California

FIGURE 3
 AEI Project # 270852

LEGEND		(REV. 08/07)
	Monitoring Well, with water table elevation in ft above msl (7/2/07)	
	Water table contours in ft above msl Interval = 0.5 ft	



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 2500 CAMINO DIABLO, # 200 WALNUT CREEK, CA

RECENT GROUNDWATER SAMPLE ANALYTICAL DATA

3635 13th Avenue
 Oakland, California

FIGURE 4
 AEI Project # 270852

LEGEND (REV. 08/07)

- ⊕ Monitoring Well (data from 7/2/07 event)
- ◆ Soil Boring (data from 8/21 & 10/9-10/03)
 All data in µg/l
 See Tables 1 & 3 for details

TABLES



Table 1
Groundwater Monitoring Data

Well ID	Date	Well Elevation	Depth to Water	Water Table Elevation	TPH-g	TPH-d	TOG	MTBE	Benzene	Toluene	E-benzene	Xylenes	
					(ug/L) EPA 8015M	(ug/L)	(ug/L) EPA 5520	(ug/L)	(ug/L)	(ug/L) EPA 8020 / 8021	(ug/L)	(ug/L)	
MW - 1	11/22/1994	194.75	10.92	183.83	210	<50	<0.5	-	<0.5	<0.5	<0.5	2.3	
	2/23/1995	194.75	10.58	184.17	140	<50	1.2	-	<0.5	<0.5	0.6	1.5	
	5/24/1995	194.75	10.94	183.81	<50	<50	<0.5	-	<0.5	<0.5	<0.5	<0.5	
	8/18/1995	194.75	14.52	180.23	2800	<50	<0.5	-	25	6.2	22	30	
	2/7/1996	194.75	4.43	190.32	<50	<50	<0.5	-	<0.5	<0.5	<0.5	<0.5	
	9/6/1996	194.75	13.60	181.15	<50	<50	<5.0	<5.0	<0.5	<0.5	<0.5	<0.5	
	6/19/1997	194.75	13.07	181.68	630	400	<5.0	15	25	9.7	100	14	
	1/24/2002	194.75	9.53	185.22	60	<50	-	<5.0	3.3	2.8	2.0	6.0	
	7/15/2003	194.75	12.85	181.90	87	<50	-	<5.0	15	4.9	3.3	9.2	
	10/10/2003	194.75	14.58	180.17	81	110	-	<5.0	<0.5	0.62	0.57	0.5	
	4/6/2004	194.75	10.92	183.83	<50	<50	-	<5.0	<0.5	<0.5	<0.5	<0.5	
	7/9/2004	194.75	14.34	180.41	130	80	-	<35	<0.5	<0.5	2.8	0.78	
	10/8/2004	194.75	15.30	179.45	260	120	-	24	3.0	2.9	8.3	10	
	4/2/2007	194.75	12.19	182.56	<50	<50	-	<5.0	<0.5	<0.5	<0.5	<0.5	
	7/2/2007	194.75	13.28	181.47	150	79	-	<25	<0.5	1.0	<0.5	<0.5	
	MW - 2	11/22/1994	196.44	12.54	183.90	11,000	<50	<0.5	-	35	21	7	50
		2/23/1995	196.44	12.35	184.09	4,000	<50	2	-	<0.5	<0.5	3	6
		5/24/1995	196.44	12.11	184.33	8,600	<50	<0.5	-	95	37	37	70
8/18/1995		196.44	16.25	180.19	7,200	<50	<0.5	-	43	21	21	71	
2/7/1996		196.44	9.34	187.10	11,000	<50	1	-	17	9	9	25	
9/6/1996		196.44	15.22	181.22	15,000	1,900	<5.0	ND	4,300	920	460	1,600	
6/19/1997		196.44	13.33	183.11	26,000	2,900	<5.0	<200	5,300	1,500	910	3,200	
1/24/2002		196.44	9.72	186.72	34,000	5,300	-	<200	3,100	1,100	1,100	2,900	
7/15/2003		196.44	12.42	184.02	18,000	6,600	-	<1000	2,300	310	690	1,600	
10/10/2003		196.44	13.79	182.65	19,000	1,800	-	<500	2,700	460	850	1,800	
4/6/2004		196.44	10.55	185.89	6,900	1,300	-	<200	1,100	100	380	780	
7/9/2004		196.44	13.78	182.66	17,000	4,400	-	<450	2,800	240	710	1,300	
10/8/2004		196.44	14.78	181.66	6,900	890	-	<150	1,500	240	340	670	
4/2/2007		196.44	11.32	185.12	21,000	4,300	-	<450	2,000	300	1,000	1,700	
7/2/2007		196.44	13.18	183.26	5,100	750	-	<180	260	21	320	370	
MW - 3	11/22/1994	198.93	11.53	187.40	200	<50	3	-	<0.5	<0.5	<0.5	2	
	2/23/1995	198.93	11.89	187.04	1500	<50	0.9	-	6.6	6.4	4.2	13	
	5/24/1995	198.93	12.71	186.22	710	<50	<0.5	-	2.5	3.2	3.1	16	
	8/18/1995	198.93	16.14	182.79	310	<50	<0.5	-	3.1	2.1	2.2	11	
	2/7/1996	198.93	6.22	192.71	400	<50	2.2	-	1.4	2.5	2.2	7	
	9/6/1996	198.93	13.51	185.42	<50	<50	<5.0	<5.0	<0.5	<0.5	<0.5	<0.5	
	6/19/1997	198.93	12.46	186.47	<50	<50	<5.0	<5.0	<0.5	<0.5	<0.5	<0.5	
	1/24/2002	198.93	10.08	188.85	58	<50	-	<5.0	4	2.7	2.3	6.7	
	7/15/2003	198.93	12.45	186.48	<50	<50	-	<5.0	<0.5	<0.5	<0.5	<0.5	
	10/10/2003	198.93	14.00	184.93	350	75	-	<5.0	14	16	23	60	
	4/6/2004	198.93	10.78	188.15	<50	<50	-	<5.0	<0.5	1.7	<0.5	1.7	
	7/9/2004	198.93	14.14	184.79	260	<50	-	<5.0	12	13	14	36	
	10/8/2004	198.93	14.99	183.94	450	76	-	<5.0	21	22	30	86	
	4/2/2007	198.93	11.87	187.06	<50	<50	-	<5.0	<0.5	<0.5	<0.5	<0.5	
	7/2/2007	198.93	14.45	184.48	<50	<50	-	<5.0	<0.5	<0.5	<0.5	<0.5	

Well Elevation in feet above mean sea level (msl)
 Depth to water in feet below the tops of the well casings
 Water Table Elevations in feet above msl
 TPH-g - Total petroleum hydrocarbons (TPH) as gasoline

TOG - Total oil and grease
 MTBE - Methyl tertiary butyl ether
 E-benzene: Ethyl-benzene
 TPH-d - TPH as diesel

mg/L - milligrams per liter
 ug/L - micrograms per liter
 - = sample not analyzed by this method
 ND = non detect (detection limit not known)

Table 2
Fuel Additive Analyses

Well ID	Date	TAME	TBA	EDB	1,2-DCA	DIPE	Ethanol	ETBE	Methanol	MTBE
		(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)	(ug/L)
EPA method 8260										
MW - 1	4/6/2004	<0.5	<5.0	<0.5	<0.5	<0.5	<50	<0.5	<500	<0.5
	7/9/2004	-	-	-	-	-	-	-	-	-
	10/8/2004	-	-	-	-	-	-	-	-	-
	4/2/2007	<0.5	<5.0	<0.5	<0.5	<0.5	<50	<0.5	<500	<0.5
	7/2/2007	<0.5	<5.0	<0.5	<0.5	<0.5	<50	<0.5	<500	23
MW - 2	4/6/2004	<5.0	110	<5.0	<5.0	<5.0	<500	<5.0	<5000	87
	7/9/2004	-	98	-	-	-	-	-	-	120
	10/8/2004	-	230	-	-	-	-	-	-	84
	4/2/2007	<5.0	100	<5.0	<5.0	<5.0	<500	<5.0	<5000	81
	7/2/2007	<5.0	150	<5.0	<5.0	<5.0	<500	<5.0	<5000	88
MW-3	4/6/2004	<0.5	<5.0	<0.5	<0.5	<0.5	<50	<0.5	<500	<0.5
	7/9/2004	-	-	-	-	-	-	-	-	-
	10/8/2004	-	-	-	-	-	-	-	-	-
	4/2/2007	<0.5	<5.0	<0.5	<0.5	<0.5	<50	<0.5	<500	<0.5
	7/2/2007	<0.5	<5.0	<0.5	<0.5	<0.5	<50	<0.5	<500	<0.5

TAME: tert amyle methyl ether

TBA: t-butyl alcohol

EDB: 1,2-Dibromoethane

1,2-DCA: 1,2-Dichloroethane

DIPE: DiIsopropyl ether

ETBE: Ethyl tert-butyl ether

MTBE: Methyl tert-butyl ether

ug/L: Micrograms per liter

- = sample not analyzed by this method

APPENDIX A

MONITORING WELL FIELD SAMPLING FORMS



AEI CONSULTANTS
GROUNDWATER MONITORING WELL FIELD SAMPLING FORM

Monitoring Well Number: MW-1

Project Name:	Williamson	Date of Sampling:	7/2/2007
Job Number:	270852	Name of Sampler:	R Bartlett
Project Address:	3635 13th Avenue, Oakland		

MONITORING WELL DATA

Well Casing Diameter (2"/4"/6")	2		
Wellhead Condition	OK		
Elevation of Top of Casing (feet above msl)	194.75		
Depth of Well	23.50		
Depth to Water (from top of casing)	13.28		
Water Elevation (feet above msl)	181.47		
Well Volumes Purged	3		
Calculated Gallons Purged: formula valid only for casing sizes of 2" (.16 gal/ft), 4" (.65 gal/ft), and 6" (1.44 gal/ft)	5.0		
Actual Volume Purged (gallons)	5.0		
Appearance of Purge Water	brown to light brown		
Free Product Present?	no	Thickness (ft):	

GROUNDWATER SAMPLES

Number of Samples/Container Size				3 VOAs & 1-liter			
Time	Vol Removed (gal)	Temperature (deg C)	pH	Conductivity (μS/cm)	DO (mg/L)	ORP (meV)	Comments
4:11	1	19.65	6.67	2300	4.01	167.0	light brown
	2	18.93	6.68	1917	3.47	154.3	clean
4:13	3	18.73	6.68	1922	4.15	143.6	clean
	4	18.77	6.73	2182	4.66	133.5	clean
4:15	5	18.66	6.75	2405	5.05	132.1	cloudy

COMMENTS (i.e., sample odor, well recharge time & percent, etc.)

Petroleum Hydrocarbon odors present from 0-1gallon. No petroleum hydrocarbon odors after 1 gallon.

AEI CONSULTANTS
GROUNDWATER MONITORING WELL FIELD SAMPLING FORM

Monitoring Well Number: MW-2

Project Name:	Williamson	Date of Sampling:	7/2/2007
Job Number:	270852	Name of Sampler:	R Bartlett
Project Address:	3635 13th Avenue, Oakland		

MONITORING WELL DATA

Well Casing Diameter (2"/4"/6")	2		
Wellhead Condition	OK		
Elevation of Top of Casing (feet above msl)	196.44		
Depth of Well	36.00		
Depth to Water (from top of casing)	13.18		
Water Elevation (feet above msl)	183.26		
Well Volumes Purged	3		
Gallons Purged: formula valid only for casing sizes of 2" (.16 gal/ft), 4" (.65 gal/ft), and 6" (1.44 gal/ft)	11.0		
Actual Volume Purged (gallons)	11.0		
Appearance of Purge Water	Gray, clears by 8.0 gallons.		
Free Product Present?	no	Thickness (ft):	

GROUNDWATER SAMPLES

Number of Samples/Container Size				3 VOAs & 1-liter			
Time	Vol Removed (gal)	Temperature (deg C)	pH	Conductivity (µS/cm)	DO (mg/L)	ORP (meV)	Comments
4:21	1	20.26	6.65	1393	4.71	-171.3	
	2	20.16	6.64	1393	4.82	-183.8	
	3	20.21	6.67	1373	5.70	-197.0	
4:25	4	20.14	6.65	1395	6.24	-187.1	
	5	20.12	6.64	1433	6.61	-183.1	
	7	20.20	6.60	1468	6.75	-168.4	
	11	20.4	6.66	1388	6.17	-180.2	

COMMENTS (i.e., sample odor, well recharge time & percent, etc.)

Strong petroleum hydrocarbon odor.
Light gray and clears quickly.

AEI CONSULTANTS
GROUNDWATER MONITORING WELL FIELD SAMPLING FORM

Monitoring Well Number: MW-3

Project Name:	Williamson	Date of Sampling:	7/2/2007
Job Number:	270852	Name of Sampler:	R Bartlett
Project Address:	3635 13th Avenue, Oakland		

MONITORING WELL DATA

Well Casing Diameter (2"/4"/6")	2		
Wellhead Condition	OK		
Elevation of Top of Casing (feet above msl)	198.93		
Depth of Well	35.50		
Depth to Water (from top of casing)	14.45		
Water Elevation (feet above msl)	184.48		
Well Volumes Purged	3		
Gallons Purged: formula valid only for casing sizes of 2" (.16 gal/ft), 4" (.65 gal/ft), and 6" (1.44 gal/ft)	10.0		
Actual Volume Purged (gallons)	10.0		
Appearance of Purge Water	Clear. Some sand present at 9.0 gallons.		
Free Product Present?	no	Thickness (ft):	

GROUNDWATER SAMPLES

Number of Samples/Container Size				3 VOAs & 1-liter			
Time	Vol Removed (gal)	Temperature (deg C)	pH	Conductivity (µS/cm)	DO (mg/L)	ORP (meV)	Comments
3:49	1	21.78	6.81	895	7.74	95.5	Yellow
	2	20.02	6.68	892	6.47	98.7	Yellow
	3	19.59	7.08	887	5.71	109.5	Clear
3:52	4	19.58	7.11	878	5.04	111.3	Clear
	5	19.50	7.10	876	4.50	113.2	Clear
	7	19.56	7.10	886	4.79	122.2	Clear
4:05	10	19.75	7.12	884	5.55	131.1	Clear

COMMENTS (i.e., sample odor, well recharge time & percent, etc.)

No petroleum hydrocarbon odors.

APPENDIX B

LABORATORY ANALYTICAL AND CHAIN OF CUSTODY DOCUMENTATION





McC Campbell Analytical, Inc.

"When Quality Counts"

1534 Willow Pass Road, Pittsburg, CA 94565-1701
Web: www.mcccampbell.com E-mail: main@mcccampbell.com
Telephone: 877-252-9262 Fax: 925-252-9269

AEI Consultants 2500 Camino Diablo, Ste. #200 Walnut Creek, CA 94597	Client Project ID: #270852; Williamson	Date Sampled: 07/02/07
		Date Received: 07/03/07
	Client Contact: Adrian Angel	Date Reported: 07/10/07
	Client P.O.:	Date Completed: 07/10/07

WorkOrder: 0707028

July 10, 2007

Dear Adrian:

Enclosed are:

- 1). the results of 3 analyzed samples from your #270852; Williamson project,
- 2). a QC report for the above samples
- 3). a copy of the chain of custody, and
- 4). a bill for analytical services.

All analyses were completed satisfactorily and all QC samples were found to be within our control limits.

If you have any questions please contact me. McC Campbell Analytical Laboratories strives for excellence in quality, service and cost. Thank you for your business and I look forward to working with you again.

Best regards,

Angela Rydelius, Lab Manager

ACL

0707028

McCAMPBELL ANALYTICAL INC.

110 2nd AVENUE SOUTH #D7
PACHECO, CA 94553-5560

Telephone: (925) 798-1620

Fax: (925) 798-1622

CHAIN OF CUSTODY RECORD

TURN AROUND TIME

RUSH 24 HR 48 HR 72 HR 5 DAY

EDF Required? Yes No

Email PDF Report: YES

Report To: Adrian Angel Bill To: Same

Company: AEI Consultants
2500 Camino Diablo, Suite 200
Walnut Creek, CA 94597 E-Mail: aangel@aciconsultants.com

Tel: (925) 944-2899, extension 132 Fax: (925) 944-2895

Project #: 270852 Project Name: Williamson

Project Location: Oakland, CA

Sampler Signature: *[Signature]*

Analysis Request

Other

Comments

BTEX & TPH as Gas (602-8020 - 8015)EMURE																				
TPH as Diesel (8015)																				
Total Petroleum Oil & Grease (5520 E&F/B&F)																				
Total Petroleum Hydrocarbons (418.1)																				
HYOC's EPA 8260 (8010 list)																				
BTEX ONLY (EPA 602 / 8020)																				
Pesticides EPA 608 / 8080																				
PCBs EPA 608 / 8080																				
VOCs EPA 624 / 8260																				
EPA 625 / 8270																				
PAH's / PNA's by EPA 625 / 8270 / 8310																				
CAM-17 Metals																				
LUFT 5 Metals																				
Lead (7240/7421/239, 2/6010)																				
RCI																				
Nine fuel additives (including EDB, DCA)																				

SAMPLE ID (Field Point Name)	LOCATION	SAMPLING		# Containers	Type Containers	MATRIX					METHOD PRESERVED											
		Date	Time			Water	Soil	Air	Sludge	Other	Ice	HCl	HNO ₃	Other								
X MW-1		7/2/07	4:55	4	VOA																	
X MW-2		7/2/07	5:00	4	VOA																	
X MW-3		7/2/07	4:45	4	VOA	X					X	X										

Relinquished By: *[Signature]* Date: 7/3/07 Time: 9:00 AM Received By: *[Signature]*

Relinquished By: _____ Date: _____ Time: _____ Received By: _____

Relinquished By: _____ Date: _____ Time: _____ Received By: _____

ICE/IT# 206 ✓

GOOD CONDITION ✓

HEAD SPACE ABSENT _____

DECHLORINATED IN LAB _____

PRESERVATION APPROPRIATE ✓

CONTAINERS ✓

PERSERVED IN LAB _____

VOAS	O&G	METALS	OTHER
<u>✓</u>			

McC Campbell Analytical, Inc.



1534 Willow Pass Rd
Pittsburg, CA 94565-1701
(925) 252-9262

CHAIN-OF-CUSTODY RECORD

WorkOrder: 0707028

ClientID: AEL

EDF Excel Fax Email HardCopy ThirdParty

Report to:

Adrian Angel
AEI Consultants
2500 Camino Diablo, Ste. #200
Walnut Creek, CA 94597

Email: aangel@aeiconsultants.com
TEL: (925) 283-600 FAX: (925) 283-612
ProjectNo: #270852; Williamson
PO:

Bill to

Denise Mockel
AEI Consultants
2500 Camino Diablo, Ste. #200
Walnut Creek, CA 94597
dmockel@aeiconsultants.com

Requested TAT: 5 days

Date Received 07/03/2007

Date Printed: 07/06/2007

Sample ID	ClientSampID	Matrix	Collection Date	Hold	Requested Tests (See legend below)											
					1	2	3	4	5	6	7	8	9	10	11	12
0707028-001	MW-1	Water	07/02/07 4:55:00	<input type="checkbox"/>	B	A	A	C								
0707028-002	MW-2	Water	07/02/07 5:00:00	<input type="checkbox"/>	B	A		C								
0707028-003	MW-3	Water	07/02/07 4:45:00	<input type="checkbox"/>	B	A		C								

Test Legend:

1	9-OXYS W	2	G-MBTEX W	3	PREFD REPORT	4	TPH(D) W	5	
6		7		8		9		10	
11		12							

Prepared by: Elisa Venegas

Comments:

NOTE: Samples are discarded 60 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at client expense.



Sample Receipt Checklist

Client Name: **AEI Consultants** Date and Time Received: **07/03/07 9:38:31 AM**
 Project Name: **#270852; Williamson** Checklist completed and reviewed by: **Elisa Venegas**
 WorkOrder N°: **0707028** Matrix Carrier: Client Drop-In

Chain of Custody (COC) Information

Chain of custody present? Yes No
 Chain of custody signed when relinquished and received? Yes No
 Chain of custody agrees with sample labels? Yes No
 Sample IDs noted by Client on COC? Yes No
 Date and Time of collection noted by Client on COC? Yes No
 Sampler's name noted on COC? Yes No

Sample Receipt Information

Custody seals intact on shipping container/cooler? Yes No NA
 Shipping container/cooler in good condition? Yes No
 Samples in proper containers/bottles? Yes No
 Sample containers intact? Yes No
 Sufficient sample volume for indicated test? Yes No

Sample Preservation and Hold Time (HT) Information

All samples received within holding time? Yes No
 Container/Temp Blank temperature Cooler Temp: NA
 Water - VOA vials have zero headspace / no bubbles? Yes No No VOA vials submitted
 Sample labels checked for correct preservation? Yes No
 TTLC Metal - pH acceptable upon receipt (pH<2)? Yes No NA

Client contacted: Date contacted: Contacted by:

Comments:



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AEI Consultants 2500 Camino Diablo, Ste. #200 Walnut Creek, CA 94597	Client Project ID: #270852; Williamson	Date Sampled: 07/02/07
		Date Received: 07/03/07
	Client Contact: Adrian Angel	Date Extracted: 07/04/07-07/05/07
	Client P.O.:	Date Analyzed 07/04/07-07/05/07

Oxygenated Volatile Organics + EDB and 1,2-DCA by P&T and GC/MS*

Extraction Method: SW5030B

Analytical Method: SW8260B

Work Order: 0707028

Lab ID	0707028-001B	0707028-002B	0707028-003B		Reporting Limit for DF =1	
Client ID	MW-1	MW-2	MW-3			
Matrix	W	W	W			
DF	1	10	1		S	W

Compound	Concentration				ug/kg	ug/L
	tert-Amyl methyl ether (TAME)	ND	ND<5.0	ND		NA
t-Butyl alcohol (TBA)	ND	150	ND		NA	5.0
1,2-Dibromoethane (EDB)	ND	ND<5.0	ND		NA	0.5
1,2-Dichloroethane (1,2-DCA)	ND	ND<5.0	ND		NA	0.5
Diisopropyl ether (DIPE)	ND	ND<5.0	ND		NA	0.5
Ethanol	ND	ND<500	ND		NA	50
Ethyl tert-butyl ether (ETBE)	ND	ND<5.0	ND		NA	0.5
Methanol	ND	ND<5000	ND		NA	500
Methyl-t-butyl ether (MTBE)	23	88	ND		NA	0.5

Surrogate Recoveries (%)

%SS1:	99	96	100		
-------	----	----	-----	--	--

Comments

* water and vapor samples are reported in µg/L, soil/sludge/solid samples in mg/kg, product/oil/non-aqueous liquid samples and all TCLP & SPLP extracts are reported in mg/L, wipe samples in µg/wipe.

ND means not detected above the reporting limit; N/A means analyte not applicable to this analysis.

surrogate diluted out of range or coelutes with another peak; &) low surrogate due to matrix interference.

h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~1 vol. % sediment; j) sample diluted due to high organic content/matrix interference; J) analyte detected below quantitation limits; k) reporting limit near, but not identical to our standard reporting limit due to variable Encore sample weight; m) reporting limit raised due to insufficient sample amount; n) results are reported on a dry weight basis; p) see attached narrative.



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AEI Consultants 2500 Camino Diablo, Ste. #200 Walnut Creek, CA 94597	Client Project ID: #270852; Williamson	Date Sampled: 07/02/07
		Date Received: 07/03/07
	Client Contact: Adrian Angel	Date Extracted: 07/05/07-07/09/07
	Client P.O.:	Date Analyzed 07/05/07-07/09/07

Gasoline Range (C6-C12) Volatile Hydrocarbons as Gasoline with BTEX and MTBE*

Extraction method SW5030B

Analytical methods SW8021B/8015Cm

Work Order: 0707028

Lab ID	Client ID	Matrix	TPH(g)	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes	DF	% SS
001A	MW-1	W	150,m	ND<25	ND	1.0	ND	ND	1	116
002A	MW-2	W	5100,a	ND<180	260	21	320	370	10	105
003A	MW-3	W	ND	ND	ND	ND	ND	ND	1	91

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	W	50	5.0	0.5	0.5	0.5	0.5	0.5	1	µg/L
	S	NA	NA	NA	NA	NA	NA	NA	1	mg/Kg

* water and vapor samples and all TCLP & SPLP extracts are reported in ug/L, soil/sludge/solid samples in mg/kg, wipe samples in µg/wipe, product/oil/non-aqueous liquid samples in mg/L.

cluttered chromatogram; sample peak coelutes with surrogate peak.

+The following descriptions of the TPH chromatogram are cursory in nature and McC Campbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified gasoline is significant; b) heavier gasoline range compounds are significant(aged gasoline?); c) lighter gasoline range compounds (the most mobile fraction) are significant; d) gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline?; e) TPH pattern that does not appear to be derived from gasoline (stoddard solvent / mineral spirit?); f) one to a few isolated non-target peaks present; g) strongly aged gasoline or diesel range compounds are significant; h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~1 vol. % sediment; j) reporting limit raised due to high MTBE content; k) TPH pattern that does not appear to be derived from gasoline (aviation gas). m) no recognizable pattern; n) TPH(g) range non-target isolated peaks subtracted out of the TPH(g) concentration at the client's request; p) see attached narrative.



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AEI Consultants 2500 Camino Diablo, Ste. #200 Walnut Creek, CA 94597	Client Project ID: #270852; Williamson	Date Sampled: 07/02/07
		Date Received: 07/03/07
	Client Contact: Adrian Angel	Date Extracted: 07/03/07
	Client P.O.:	Date Analyzed 07/04/07-07/05/07

Diesel Range (C10-C23) Extractable Hydrocarbons as Diesel*

Extraction method SW3510C

Analytical methods SW8015C

Work Order: 0707028

Lab ID	Client ID	Matrix	TPH(d)	DF	% SS
0707028-001C	MW-1	W	79,d,b	1	98
0707028-002C	MW-2	W	750,d	1	89
0707028-003C	MW-3	W	ND	1	100

Reporting Limit for DF =1; ND means not detected at or above the reporting limit	W	50	µg/L
	S	NA	NA

* water samples are reported in µg/L, wipe samples in µg/wipe, soil/solid/sludge samples in mg/kg, product/oil/non-aqueous liquid samples in mg/L, and all DISTLC / STLC / SPLP / TCLP extracts are reported in µg/L.

cluttered chromatogram resulting in coeluted surrogate and sample peaks, or; surrogate peak is on elevated baseline, or; surrogate has been diminished by dilution of original extract.

+The following descriptions of the TPH chromatogram are cursory in nature and McC Campbell Analytical is not responsible for their interpretation: a) unmodified or weakly modified diesel is significant; b) diesel range compounds are significant; no recognizable pattern; c) aged diesel? is significant); d) gasoline range compounds are significant; e) unknown medium boiling point pattern that does not appear to be derived from diesel; f) one to a few isolated peaks present; g) oil range compounds are significant; h) lighter than water immiscible sheen/product is present; i) liquid sample that contains greater than ~1 vol. % sediment; k) kerosene/kerosene range/jet fuel range; l) bunker oil; m) fuel oil; n) stoddard solvent/mineral spirit.



QC SUMMARY REPORT FOR SW8260B

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder 0707028

EPA Method SW8260B	Extraction SW5030B			BatchID: 29093			Spiked Sample ID: 0707025-003D					
	Analyte	Sample	Spiked	MS	MSD	MS-MSD	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)		
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	RPD	LCS/LCSD	RPD
tert-Amyl methyl ether (TAME)	ND	10	87.4	86.5	0.954	85.1	83.4	2.03	70 - 130	30	70 - 130	30
t-Butyl alcohol (TBA)	ND	50	94.7	97.5	2.94	88.7	91.1	2.69	70 - 130	30	70 - 130	30
1,2-Dibromoethane (EDB)	ND	10	89.1	93	4.21	86	85.9	0.0603	70 - 130	30	70 - 130	30
1,2-Dichloroethane (1,2-DCA)	ND	10	97.5	93.4	4.36	90.6	90.9	0.384	70 - 130	30	70 - 130	30
Diisopropyl ether (DIPE)	ND	10	108	110	1.81	103	103	0	70 - 130	30	70 - 130	30
Ethanol	ND	500	108	102	6.12	103	106	2.17	70 - 130	30	70 - 130	30
Ethyl tert-butyl ether (ETBE)	ND	10	91.2	93.9	2.86	89.7	89.3	0.421	70 - 130	30	70 - 130	30
Methanol	ND	2500	101	101	0	101	101	0	70 - 130	30	70 - 130	30
Methyl-t-butyl ether (MTBE)	ND	10	84.9	85.5	0.692	82.4	83.7	1.56	70 - 130	30	70 - 130	30
%SS1:	100	10	112	103	8.52	111	112	0.461	70 - 130	30	70 - 130	30

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

BATCH 29093 SUMMARY

Sample ID	Date Sampled	Date Extracted	Date Analyzed	Sample ID	Date Sampled	Date Extracted	Date Analyzed
0707028-001B	07/02/07 4:55 PM	07/04/07	07/04/07 6:56 PM				

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = $100 * (MS - Sample) / (Amount Spiked)$; $RPD = 100 * (MS - MSD) / ((MS + MSD) / 2)$.

MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.



QC SUMMARY REPORT FOR SW8260B

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder 0707028

Analyte	Extraction SW5030B		BatchID: 29105						Spiked Sample ID: 0707029-001B			
	Sample µg/L	Spiked µg/L	MS % Rec.	MSD % Rec.	MS-MSD % RPD	LCS % Rec.	LCSD % Rec.	LCS-LCSD % RPD	Acceptance Criteria (%)			
tert-Amyl methyl ether (TAME)	ND	10	107	102	4.18	87.4	88.4	1.05	70 - 130	30	70 - 130	30
t-Butyl alcohol (TBA)	ND	50	95.5	95.3	0.205	91	92	1.06	70 - 130	30	70 - 130	30
1,2-Dibromoethane (EDB)	ND	10	107	106	0.768	91.5	93.9	2.62	70 - 130	30	70 - 130	30
1,2-Dichloroethane (1,2-DCA)	ND	10	118	114	3.39	97.3	98.9	1.64	70 - 130	30	70 - 130	30
Diisopropyl ether (DIPE)	ND	10	122	124	1.04	109	113	3.64	70 - 130	30	70 - 130	30
Ethanol	ND	500	102	103	0.828	104	105	0.777	70 - 130	30	70 - 130	30
Ethyl tert-butyl ether (ETBE)	ND	10	114	112	1.70	93.2	96.7	3.71	70 - 130	30	70 - 130	30
Methanol	ND	2500	101	101	0	100	101	0.600	70 - 130	30	70 - 130	30
Methyl-t-butyl ether (MTBE)	ND	10	113	111	2.27	88.7	90.8	2.42	70 - 130	30	70 - 130	30
%SS1:	100	10	104	100	3.73	112	113	0.236	70 - 130	30	70 - 130	30

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

BATCH 29105 SUMMARY

Sample ID	Date Sampled	Date Extracted	Date Analyzed	Sample ID	Date Sampled	Date Extracted	Date Analyzed
0707028-002B	07/02/07 5:00 PM	07/04/07	07/04/07 7:41 PM	0707028-003B	07/02/07 4:45 PM	07/05/07	07/05/07 11:36 AM

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 * (MS-Sample) / (Amount Spiked); RPD = 100 * (MS - MSD) / ((MS + MSD) / 2).

MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.



QC SUMMARY REPORT FOR SW8021B/8015Cm

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder 0707028

EPA Method SW8021B/8015Cm		Extraction SW5030B			BatchID: 29102			Spiked Sample ID: 0707025-004A				
Analyte	Sample	Spiked	MS	MSD	MS-MSD	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)			
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	RPD	LCS/LCSD	RPD
TPH(btex) ^f	ND	60	97.8	108	10.3	93.6	72.5	25.3	70 - 130	30	70 - 130	30
MTBE	ND	10	111	119	7.07	105	99.4	5.75	70 - 130	30	70 - 130	30
Benzene	ND	10	103	108	5.56	97.7	87	11.6	70 - 130	30	70 - 130	30
Toluene	ND	10	93.1	100	7.20	98	89.1	9.50	70 - 130	30	70 - 130	30
Ethylbenzene	ND	10	103	106	2.69	98.3	89.3	9.58	70 - 130	30	70 - 130	30
Xylenes	ND	30	96.7	107	9.84	91.3	82.3	10.4	70 - 130	30	70 - 130	30
%SS:	103	10	96	99	3.06	105	102	3.40	70 - 130	30	70 - 130	30

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

BATCH 29102 SUMMARY

Sample ID	Date Sampled	Date Extracted	Date Analyzed	Sample ID	Date Sampled	Date Extracted	Date Analyzed
0707028-001A	07/02/07 4:55 PM	07/09/07	07/09/07 8:24 PM	0707028-002A	07/02/07 5:00 PM	07/06/07	07/06/07 2:56 AM
0707028-003A	07/02/07 4:45 PM	07/05/07	07/05/07 8:11 PM				

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 * (MS-Sample) / (Amount Spiked); RPD = 100 * (MS - MSD) / ((MS + MSD) / 2).

MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

£ TPH(btex) = sum of BTEX areas from the FID.

cluttered chromatogram; sample peak coelutes with surrogate peak.



QC SUMMARY REPORT FOR SW8015C

W.O. Sample Matrix: Water

QC Matrix: Water

WorkOrder 0707028

Analyte	Extraction SW3510C			BatchID: 29077					Spiked Sample ID: N/A			
	Sample	Spiked	MS	MSD	MS-MSD	LCS	LCSD	LCS-LCSD	Acceptance Criteria (%)			
	µg/L	µg/L	% Rec.	% Rec.	% RPD	% Rec.	% Rec.	% RPD	MS / MSD	RPD	LCS/LCSD	RPD
TPH(d)	N/A	1000	N/A	N/A	N/A	104	106	1.55	N/A	N/A	70 - 130	30
%SS:	N/A	2500	N/A	N/A	N/A	89	88	0.567	N/A	N/A	70 - 130	30

All target compounds in the Method Blank of this extraction batch were ND less than the method RL with the following exceptions:
NONE

BATCH 29077 SUMMARY

Sample ID	Date Sampled	Date Extracted	Date Analyzed	Sample ID	Date Sampled	Date Extracted	Date Analyzed
0707028-001C	07/02/07 4:55 PM	07/03/07	07/04/07 5:57 PM	0707028-002C	07/02/07 5:00 PM	07/03/07	07/05/07 3:49 PM
0707028-003C	07/02/07 4:45 PM	07/03/07	07/04/07 4:18 PM				

MS = Matrix Spike; MSD = Matrix Spike Duplicate; LCS = Laboratory Control Sample; LCSD = Laboratory Control Sample Duplicate; RPD = Relative Percent Deviation.

% Recovery = 100 * (MS-Sample) / (Amount Spiked); RPD = 100 * (MS - MSD) / ((MS + MSD) / 2).

MS / MSD spike recoveries and / or %RPD may fall outside of laboratory acceptance criteria due to one or more of the following reasons: a) the sample is inhomogenous AND contains significant concentrations of analyte relative to the amount spiked, or b) the spiked sample's matrix interferes with the spike recovery.

N/A = not enough sample to perform matrix spike and matrix spike duplicate.

NR = analyte concentration in sample exceeds spike amount for soil matrix or exceeds 2x spike amount for water matrix or sample diluted due to high matrix or analyte content.