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TECHNICAL MEMORANDUM

Date: December 13, 2013
To: Christopher Maurer
From: David Dinkuhn, P.E.
Subject: Former Chevron Property Long Term Monitoring Event 2 (July 2013)
cc: Thomas Knuckey, P.E.
Project Number: 233-1896-107
Project Name: Former Chevron Property Remediation

FORMER CHEVRON PROPERTY LONG TERM GROUNDWATER MONITORING EVENT 2

This technical memorandum presents a summary of the results of the second long-term groundwater monitoring event (Event 2) at the Former Chevron Property in Bremerton, Washington. Long-term monitoring is being performed under the site's Agreed Order Number DE-12TCPHQ-9509. Sampling was conducted in accordance with the site's Long Term Monitoring Plan (LTGMP; Parametrix 2013). Data from this long-term monitoring event is intended to be used to evaluate groundwater quality trends at the site and confirm the continued occurrence of natural attenuation.

EVENT 2 MONITORING RESULTS

Groundwater samples were collected on July 30 and 31, 2013 using a peristaltic pump and low flow sampling techniques. Samples were collected from eleven designated long-term monitoring wells including: MW-4R, -9R, -10R, -11, -13R, -20R, -21R, -22R, -25, -26R, and -27. A figure showing well locations (Figure 1) is attached.

Prior to sampling, all wells were purged until measured water quality parameters stabilized according to criteria specified in the LTGMP. Upon stabilization, groundwater samples were collected in appropriate containers. The final set of water quality parameter measurements is provided in Table 1. Due to low-water conditions, several wells (MW-10R, MW-13R, and MW-21R) produced very little water and general chemistry samples were not collected. Field sampling forms related to the sample collection are attached.

Groundwater samples were submitted to Onsite Environmental of Redmond, Washington, for chemical analysis of gasoline, diesel, and lube oil along with benzene, toluene, ethylbenzene, and xylenes, total and dissolved lead and general chemistry parameters. A summary of analytical results is presented in Table 1. An analytical data review memorandum and laboratory report are also attached.

The depth to groundwater was measured in each well on August 16, 2013. Inferred groundwater surface elevation contours were developed from the measurements as shown on Figure 1.

DISCUSSION

Concentration trends versus time for benzene and gasoline have been graphed as shown in Figures 2 and 3. The trend lines show generally stable or decreasing concentrations with one significant exception: MW-9R is apparently exhibiting rebound in benzene concentration. However, MW-9R was one of the wells with poor groundwater production and the well could not be purged properly prior to sampling collection. It is likely that the elevated benzene is the result of suspended sediments in the sample.

Evidence that ongoing anaerobic respiration is occurring in the impacted aquifer is demonstrated by elevated alkalinity and general absence of dissolved oxygen in the impacted wells. Additional evidence is provided by elevated dissolved methane concentrations with associated negative oxidation reduction potential values (Table 1).

Diesel concentrations are currently below the MTCA A cleanup levels in all wells except well MW-25. The sample from this well shows an increase in diesel over historical results because a silica gel cleanup was inadvertently not performed on the sample. The elevated detection reflects the presence of polar degradation products in the sample that would normally be removed during silica gel cleanup. Degradation products were produced by the soil mixing with RegenOx® during the Interim Action and by ongoing aerobic/anaerobic degradation. Silica gel cleanup was performed on all other samples collected during Event 2 and all previous RI/FS and long-term groundwater monitoring samples collected at the site.

Lube oil concentrations were slightly over the MTCA A Cleanup Level in wells MW-13R and MW-09R.

The sample from MW-09R was tested for both total and dissolved lead. Only total lead was detected (at a concentration well below the cleanup level).

REFERENCES

Parametrix. 2013. Former Chevron Property Long-Term Groundwater Monitoring Plan. Prepared for Ecology on behalf of City of Bremerton. July 8.

ATTACHMENTS:

Figure 1 – Long Term Groundwater Monitoring Event 2 Sampling Results – July 2013

Figure 2 – Benzene Results

Figure 3 – Gasoline Results

Table 1 – Groundwater Results Summary

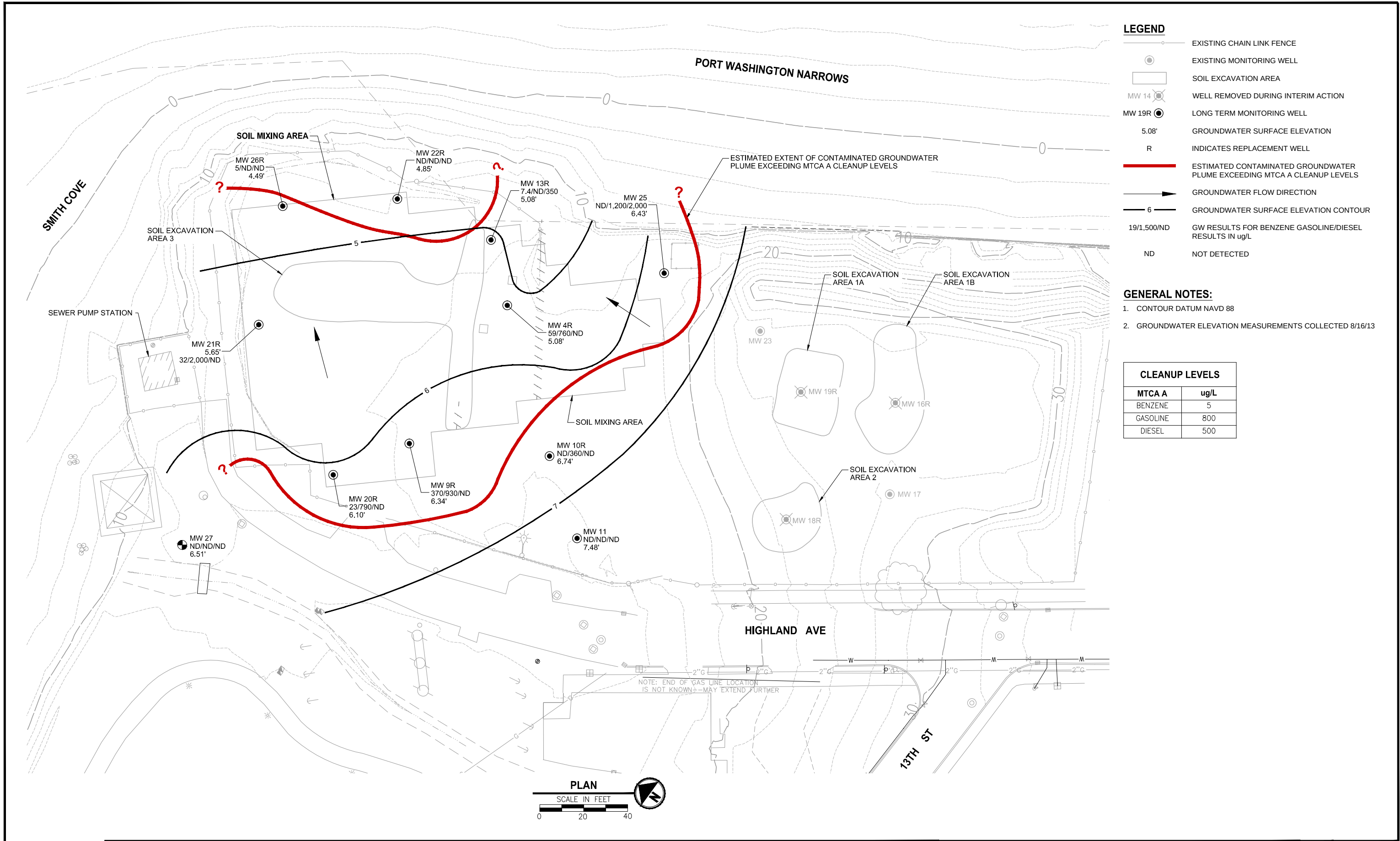
Monitoring Well Logs

Field Sampling Forms

Data Validation Technical Memorandum

Laboratory Report

FILE: BR1896107-F04
DATE: Dec 13, 2013 - 1:01pm
IMAGES: YB-BREM_WTRFRNT-BA-SV-081201 | XBR1896063PC41301F-BA
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PLOTTED BY: peterjui



REVISIONS				01"2" TWO INCHES AT FULL SCALE IF NOT SCALE ACCORDINGLY SCALE HORIZ. 1"=20' VERT. N/A	FIELD BOOK	CITY OF BREMERTON DEPARTMENT OF PUBLIC WORKS & UTILITIES ENGINEERING DIVISION				FORMER CHEVRON PROPERTY LONG-TERM GROUNDWATER MONITORING EVENT 2 SAMPLING RESULTS - JULY 2013				FIG. NO.	PN: 233-1096-107	SHEET 1 OF 1
NO.	DESCRIPTION	DATE	BY		DRAWING NO.	DRAWN BY: JLP DATE 11/13		DESIGN BY: DLD WASH. P.E. # DATE 11/13		CHECKED BY: WASH. P.E. # DATE						

Figure 2. Benzene Results - Former Chevron Property

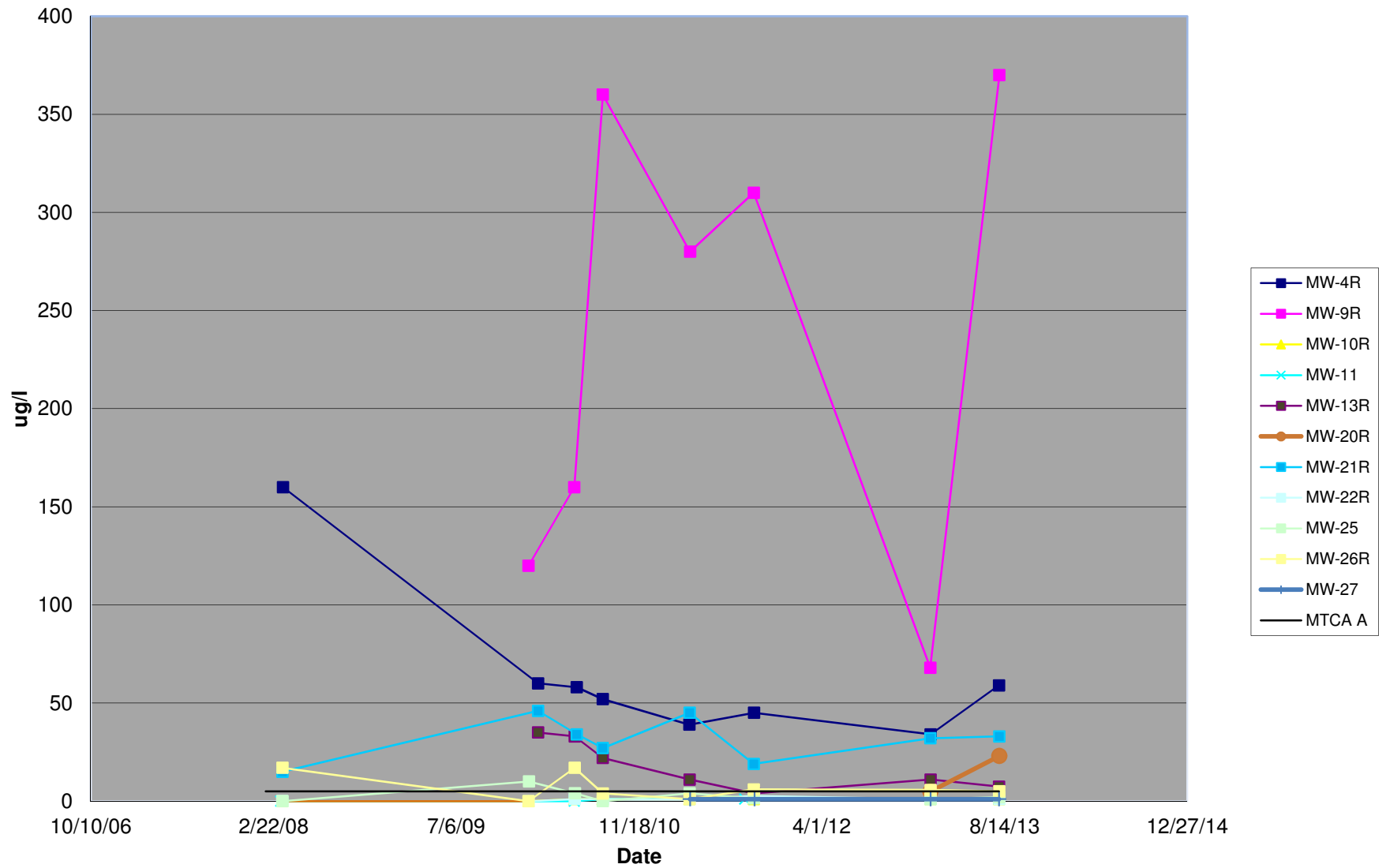


Figure 3. Gasoline Results - Former Chevron Property

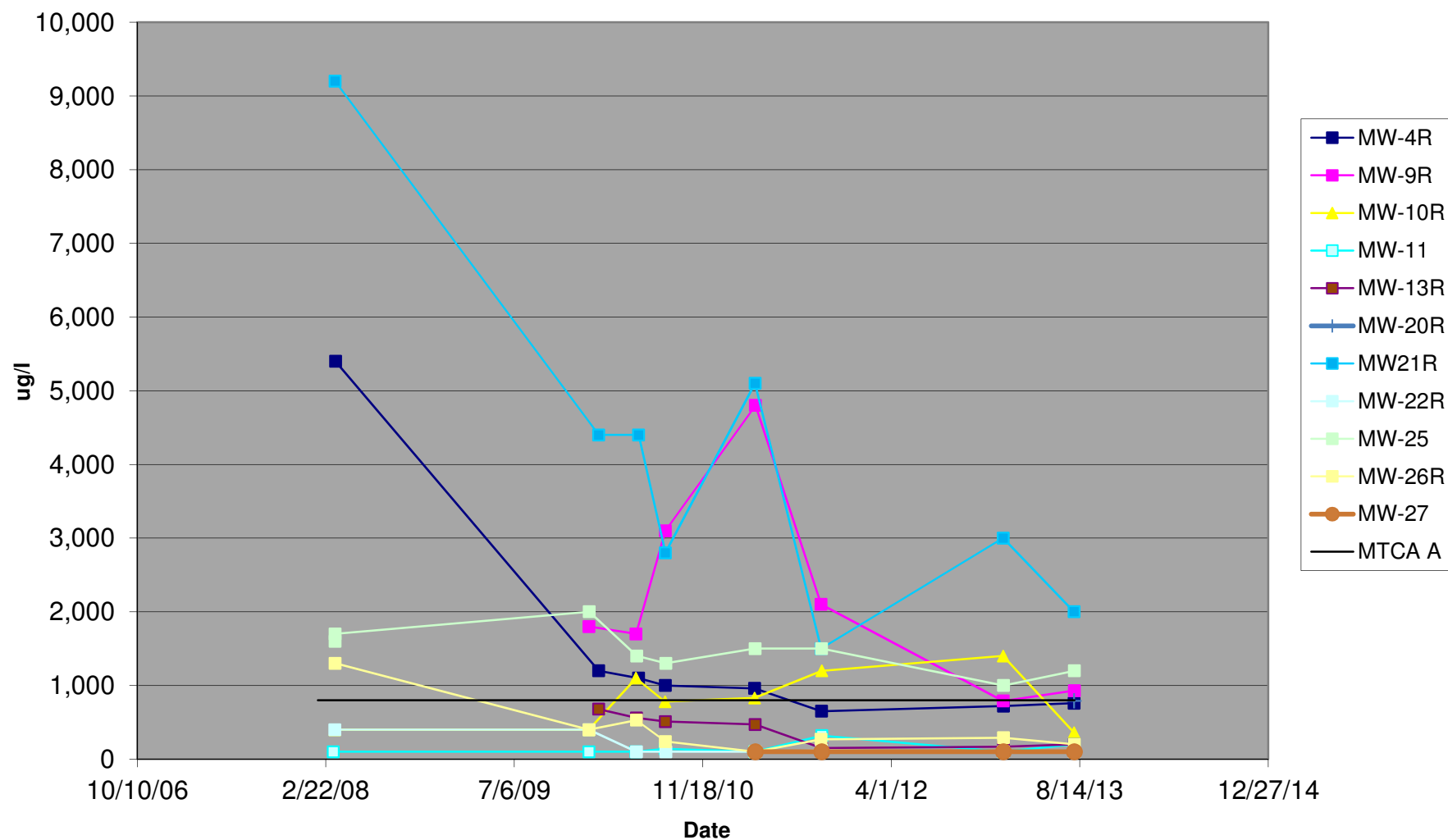


Table 1 Groundwater Results Summary, Long Term Monitoring Event 2 (July 2013)

Monitoring Well No.			MW-04R											MW-09R								MW-10R					
PARAMETERS	Units	Sample Date	3/19/08 ¹	1/21/10	6/1/10	6/1/10*	8/11/10	8/11/10*	4/5/11	4/5/11*	9/29/11	1/24/13	7/30/13	1/20/10	5/25/10	5/25/10*	8/11/10	4/7/11	9/28/11	1/23/13	7/31/13	3/17/08 ¹	1/20/10	5/25/10	8/10/10	4/5/11	9/30/11
VOLATILE ORGANICS (BTEX)			MTCA A																								
Benzene	ug/L	5	160	60 J	58	--	52	--	39	--	45	34	59	120 J	160	170	360	280	310	68	370	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	1,000	10 U	2.0 J	1.0 U	--	1.0 U	--	4.0 U	--	1.0 U	2.1 U	4.0 U	4 U	3.2	3.6	11	11	13	4	7.4	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.2
Ethylbenzene	ug/L	700	45	31 J	45	--	40	--	17	--	20	7.9	5.9	89 J	89	97	230	220	150	20	25	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.2
m,p-Xylene	ug/L	1,000	86	15 J	7.6	--	4.7	--	9.4	--	2.1	4.1	9.4	170 J	120	140	400	300	190	12	6.9	6.8	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U
o-Xylene	ug/L	1,000	12	1.8 J	1.0 U	--	1.0 U	--	4.0	--	1.0 U	1.5	4.0 U	4 U	3.5	3.9	8.1	11	10	4	2.5	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U
TOTAL PETROLEUM HYDROCARBONS																											
Gasoline	ug/L	800	5,400	1,200 J	1,100	--	1,000	--	960	--	650	720	760	1,800 J	1,500	1,700	3,100	4,800	2,100	790	930	400 U	400 U	1,100	780	830	1200
Diesel	mg/L	0.5	27	0.64 M	0.34 U	--	0.62 M	--	0.46	--	0.34 U	0.31 U	0.31 U	0.31 U	0.29 U	0.69	0.45 M	0.82	0.33 U	0.26 U	0.54 U	160	0.27 U	0.61 U	0.42 U	0.45 U	0.81 U
Lube Oil	mg/L	0.5	2.3	0.45 U	0.42 U	--	0.41 U	--	0.42 U	--	0.42 U	0.41 U	0.41 U	0.49 U	0.47 U	0.66	0.42 U	0.43 U	0.42 U	0.41 U	0.54	8.8 U	0.44 U	0.42 U	0.45 U	0.43 U	0.43 U
METALS																											
Total Lead	ug/L	15	--	8.2	--	--	--	--	--	--	--	--	--	80	36 J	74 J	21 J	170	--	1.00 U	3.90	--	3.8	--	--	--	--
Dissolved Lead	ug/L	15	--	1.0 U	--	--	--	--	--	--	--	--	--	13	12	14	17	3.0	--	1.00 U	1.10 U	--	2.2	--	--	--	--
Dissolved Iron	ug/L		--	4,200	--	--	--	--	--	--	--	--	--	34,000	--	--	--	--	--	--	--	--	6,400	--	--	--	--
Total Ferrous Iron	mg/L		--	--	7.36	--	9.75	--	5.4	--	--	7.35	9.70	--	46.2	42.1	29.2	49.4	--	34.20	36.20	--	--	25.2	34.4	12.4	--
Dissolved Manganese	ug/L		--	3,000	4,600	--	4,400	--	3,400	--	--	4,500	6,500	5,000	3,600	3,900	4,200	4,500	--	4,000	4,500	--	1,100	1,400	2,000	1,500	--
PAHs																											
Naphthalene	ug/L		--	1.4	--	--	--	--	1.0 U	1.0 U	--	--	--	6.4	--	--	--	--	--	--	--	--	0.14	--	--	--	--
2-Methylnaphthalene	ug/L		--	0.20	--	--	--	--	1.0 U	1.0 U	--	--	--	2.8	--	--	--	--	--	--	--	--	0.12 U	--	--	--	--
1-Methylnappthalene	ug/L		--	3.2	--	--	--	--	4.7	4.9	--	--	--	2.2	--	--	--	--	--	--	--	--	21	--	--	--	--
Acenaphthylene	ug/L		--	0.23	--	--	--	--	1.0 U	1.0 U	--	--	--	0.11 U	--	--	--	--	--	--	--	--	0.12 U	--	--	--	--
Acenaphthene	ug/L		--	1.9	--	--	--	--	3.3	3.4	--	--	--	0.18	--	--	--	--	--	--	--	--	0.23	--	--	--	--
Flourene	ug/L		--	1.8	--	--	--	--	2.3	2.3	--	--	--	0.14	--	--	--	--	--	--	--	--	0.32	--	--	--	--
Phenanthrene	ug/L		--	0.15	--	--	--	--	1.0 U	1.0 U	--	--	--	0.17	--	--	--	--	--	--	--	--	0.12 U	--	--	--	--
Anthracene	ug/L		--	0.44	--	--	--	--	1.0 U	1.0 U	--	--	--	0.11 U	--	--	--	--	--	--	--	--	0.12 U	--	--	--	--
Fluoranthene	ug/L		--	0.39	--	--	--	--	1.0 U	1.0 U	--	--	--	0.11 U	--	--	--	--	--	--	--	--	0.12 U	--	--	--	--
Pyrene	ug/L		--	0.26	--	--	--	--	1.0 U	1.0 U	--	--	--	0.11 U	--	--	--	--	--	--	--	--	0.12 U	--	--	--	--
Benzo(a)anthracene	ug/L		--	0.047	0.032	0.03	0.050 U	0.042	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.014	--	--	--	--
Chrysene	ug/L		--	0.033	0.010 U	0.010 U	0.050 U	0.023	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.012 U	--	--	--	--
Benzo(b)fluoranthene	ug/L		--	0.013	0.010 U	0.010 U	0.010 U	0.010 U	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.012 U	--	--	--	--
Benzo(k)fluoranthene	ug/L		--	0.028	0.010 U	0.010 U	0.010 U	0.010 U	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.012 U	--	--	--	--
Benzo(a)pyrene	ug/L	0.1	--	0.020	0.010 U	0.010 U	0.010 U	0.010 U	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.012 U	--	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L		--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.012 U	--	--	--	--
Dibenz(a,h)anthracene	ug/L		--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.012 U	--	--	--	--
Benzo[g,h,i]perylene	ug/L		--	0.010 U	--	--	--	--	0.10 U	0.10 U	--	--	--	0.011 U	--	--	--	--	--	--	--	--	0.012 U	--	--	--	--
GENERAL CHEMISTRY																											
Alkalinity	mg/L		--	190	1,900	--	2,100	--	2,300	--	--	7100	3300	700	720	730	800	730	--	450	85	220	190	200	210	230	--
Nitrate (as Nitrogen)	mg/L		--	0.050 U	0.050 U	--	0.050 U	--	0.050 U	--	--	0.05 U	0.05 U	0.050 U	0.050 U	0.050 U	0.14	0.050 U	--	0.05 U	0.05 U	0.050 U	0.77	0.094	0.050 U	0.050 U	--
Sulfate	mg/L		--	250	150	--	120	--	110	--	--	5.00 U	5.00 U	30	7.5	7.4	5.0 U	5.0 U	--	25.00 U	5.00 U	5.0 U	10	10 U	5.0 U	5.0 U	--
Chloride	mg/L		--	290	250	--	250	--	230	--	--	240	520	77	120	120	78	91	--	32	35	2.5	10	10	14	6.8	--
Dissolved Methane	ug/L		--	710	590	--	670	--	740	--	--	690	540	2,100	8,600	7,800	6,600	9,900	--	11000	7100	--	170	510	260	590	--
BOD5	mg/L		--	8.97	8.1	--	8.6	--	--	--	--	--	--	5.46	3.0	4.3	12.3	--	--	--	--	--	3.06	2.0	12 U	--	--
FIELD PARAMETERS																											
Turbidity	Neth. Turbidity Units		--	333	5.3	5.3	106	106	9.0	9.0	116.0	NM	0.6	146	57.9	57.9	>1000	>1000	106.0	NM	60.0	208	54.7	3.0	235	2.7	6.5
pH	--		--	6.63	6.90	6.90	7.01	7.01	7.09	7.09	7.11	7.07	7.24	6.36	6.77	6.77	6.94	6.78	7.05	6.87	7.18	6.38	6.00	6.32	6.05	6.50	6.52
Specific Conductance	Millisiemens/cm		--	3.50	3.42	3.42	32.6	32.6	35.1	35.1	5.48	5.41	5.43	1.52	1.42	1.42	2.65	1.81	1.91	1.47	1.77	53.4	35.9	51.2	90	90	81.2
Dissolved Oxygen	mg/L		--	4.91	4.55	4.55	0.0	0.0	4.02	4.02	0.06	0.00	1.01	9.65	0.96	0.96	0.0	0.40	6.68	3.92	0.97	0.0	5.38	6.31	2.38	2.20	6.16
Oxdat. Red. Potential	Millivolts		--	-136	-115	-115	-161	-161	-149	-149	-163	-247	-123	-124	-136.8	-136.8	-169	-134	-152	-211	-139	-35	-64	-19.0	-79	-110	-96

Notes:
1 Sample collected from replaced well.
* Duplicate sample.
J = Reported concentration is an estimate.
mg/L= Milligrams per liter.
NM = Not measured due to equipment malfunction.
µg/L = Micrograms per liter.
U = Analyte not detected above practical quantitation limit given.
U1 = The practical quantitation limit is elevated due to interferences present in the sample.
Exceeds MTCA A cleanup level.

Table 1 Groundwater Results Summary, Long Term Monitoring Event 2 (July 2013)

Monitoring Well No.			MW-10R		MW-11										MW-13R								MW-20R		MW-21R				
PARAMETERS	Units	Sample Date	1/23/13	7/30/13	3/13/08	1/20/10	5/25/10	8/10/10	8/10/10*	4/5/11	4/5/11*	9/30/11	1/23/13	1/23/2013*	7/30/13	2/15/10	5/26/10	8/11/10	4/6/11	9/29/11	1/24/13	7/30/13	7/30/13	1/23/13	7/31/13	3/18/08 ¹	2/15/10	6/1/10	
MTCA A																													
VOLATILE ORGANICS (BTEX)																													
Benzene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4 U	35 J	33	22	11	4	11	11	7.4	4.8	23	15	46 J	34	
Toluene	ug/L	1,000	1.7	1.7	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4 U	4.0 U	1.3	1.0 U	1.0 U	1.0 U	1 U	1 U	4 U	1 U	4 U	91	5.0 J	2.9	
Ethylbenzene	ug/L	700	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4 U	13 J	15	10	2.6	1.0 U	2	2	8.8	3	40	620	230 J	240	
m,p-Xylene	ug/L	1,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4 U	4.0 U	1.4	1.7	1.0 U	1.0 U	1 U	1 U	4 U	1 U	4 U	910	190 J	210	
o-Xylene	ug/L	1,000	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1 U	1 U	4 U	1 U	4 U	110	8.9 J	2.3	
TOTAL PETROLEUM HYDROCARBONS																													
Gasoline	ug/L	800	1400	360	100 U	100 U	100 U	140	130	100 U	100 U	320	100 U	100 U	400 U	680 J	560	510	420	150	170	170	400 U	260	790	9,200	4,400 J	4,400	
Diesel	mg/L	0.5	0.76 U	--	0.27	0.17 U	0.26 U	0.25 U	0.25 U	0.26 U	0.26 U	0.37	0.26 U	0.26 U	0.27 U	0.49 U1	0.43	0.39 U	0.41	0.26 U	0.26 U	0.26 U	0.35	0.26 U	0.27 U	1.7	0.89 U1	0.79 U	
Lube Oil	mg/L	0.5	0.41 U	--	0.40 U	0.27 U	0.42 U	0.41 U	0.41 U	0.42 U	0.42 U	0.42 U	0.41 U	0.41 U	0.44 U	0.70 J	0.45 U	0.43 U	0.42 U	0.42 U	0.42 U	0.42 U	0.64	0.42 U	0.43 U	0.40 U	0.46 U	0.42 U	
METALS																													
Total Lead	ug/L	15	--	--	--	4.7	--	--	--	--	--	--	--	--	--	5.2	--	--	--	--	--	--	--	--	--	10	15	2.8 J	
Dissolved Lead	ug/L	15	--	--	--	1.4	--	--	--	--	--	--	--	--	--	1.1	--	--	--	--	--	--	--	--	--	8.9	2.3	1.4	
Dissolved Iron	ug/L		--	--	--	270	--	--	--	--	--	--	--	--	--	3,600	--	--	--	--	--	--	--	--	--	--	18,000	--	
Total Ferrous Iron	mg/L		40.80	--	--	--	19.0	30.4	30.0	2.66	2.74	--	0.67	0.88	35.90	--	15.2	9.31	7.94	--	4.51	4.51	--	26.20	29.20	--	--	16.2	
Dissolved Manganese	ug/L		3,700	--	--	300	1,400	2,600	2,600	400	400	--	370	350	3800	1,500	1,300	2,000	1,800	--	1,700	1,700	--	1,900	2,600	--	4,100	4,500	
PAHs																													
Naphthalene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	15	--	--	0.35	--	--	--	--	--	--	18	18	--	
2-Methylnaphthalene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	1.1	--	--	0.10 U	--	--	--	--	--	--	32	7.3	--	
1-Methylnapthalene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	4.7	--	--	0.38	--	--	--	--	--	--	20	18	--	
Acenaphthylene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	1.1	--	--	0.40	--	--	--	--	--	--	0.099	1.1 U	--	
Acenaphthene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	48	--	--	22	--	--	--	--	--	--	1.1	1.3	--	
Flourene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	21	--	--	7.6	--	--	--	--	--	--	0.96	0.61	--	
Phenanthrene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	3.2	--	--	0.70	--	--	--	--	--	--	0.65	0.44	--	
Anthracene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	1.9	--	--	1.2	--	--	--	--	--	--	0.095 U	0.26	--	
Fluoranthene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	1.5	--	--	1.2	--	--	--	--	--	--	0.11	0.12	--	
Pyrene	ug/L		--	--	--	0.13 U	--	--	--	--	--	--	--	--	--	0.91	--	--	0.58	--	--	--	--	--	--	0.095 U	0.11 U	--	
Benzo(a)anthracene	ug/L		--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.15	0.057	0.061	0.058	--	--	--	--	--	--	0.012	0.011 U	--	
Chrysene	ug/L		--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.15	0.040	0.050 U	0.044	--	--	--	--	--	--	0.011	0.011 U	--	
Benzo(b)fluoranthene	ug/L		--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.093	0.010 U	0.010 U	0.018	--	--	--	--	--	--	0.010	0.011 U	--	
Benzo(k)fluoranthene	ug/L		--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.083	0.010 U	0.010 U	0.014	--	--	--	--	--	--	0.011	0.011 U	--	
Benzo(a)pyrene	ug/L	0.1	--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.092	0.010 U	0.010 U	0.017	--	--	--	--	--	--	0.012	0.011 U	--	
Indeno(1,2,3-cd)pyrene	ug/L		--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.041	0.010 U	0.010 U	0.010 U	--	--	--	--	--	--	0.0099	0.011 U	--	
Dibenz(a,h)anthracene	ug/L		--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.013	0.010 U	0.010 U	0.010 U	--	--	--	--	--	--	0.0095 U	0.011 U	--	
Benzo[g,h,i]perylene	ug/L		--	--	--	0.013 U	--	--	--	--	--	--	--	--	--	0.053	--	--	0.010 U	--	--	--	--	--	--	--	0.013	0.011 U	--
GENERAL CHEMISTRY																													
Alkalinity	mg/L		250	--	170	52	210	120	110	70	66	--	130	180	160	1,300	1,400	1,600	1,500	--	1900	1900	--	220	270	150	140	1,400	
Nitrate (as Nitrogen)	mg/L		0.05 U	--	0.050 U	0.050 U	0.070	0.086	0.1	0.050 U	0.050 U	--	2.40	1.60	0.05 U	0.050 U	0.050 U	0.050 U	0.050 U	--	0.05 U	0.05 U	--	0.05 U	0.05 U	0.050 U	0.050 U	0.050 U	
Sulfate	mg/L		25.00 U	--	5.0 U	8.8	10 U	25 U	25 U	5.0 U	5.0 U	--	56	47	5 U	460	460	560	280	--	160.00	160.00	--	25 U	10 U	5.0 U	230	170	
Chloride	mg/L		14.00	--	5.2	3.1	7.9	8.8	9.4	6.0	5.5	--	2.70	3.60	9.70	710	670	750	420	--	400.00	400.00	--	24	28	28	140	120	
Dissolved Methane	ug/L		2900	--	--	15	1,200	870	730	310	340	--	53	68	390	280	580	680	290	--	10.00	10.00	--	540	2000	--	5,700	4,200	
BOD5	mg/L		--	--	--	3.36	3.1	12 U	12 U	--	--	--	--	--	--	4.47	2.2	5.1	--	--	--	--	--	--	--	--	17	8.4	
FIELD PARAMETERS																													
Turbidity	Neth. Turbidity Units		NM	NM	12.6	165	1.5	32.9	32.9	3.4	3.4	21.1	NM	--	5.80	366	275.3	106	>1000	170.0	NM	NM	11.2	NM	0	168	303	8.9	
pH	--		6.58	NM	6.20	5.27	6.20	6.27	6.27	6.17	6.17	6.41	6.19	--	6.72	6.96	6.81	6.89	6.99	7.42	7.20	7.20	7.31	6.67	6.62	6.39	6.56	6.83	
Specific Conductance	Millisiemens/cm		0.8	NM	63.5	10.3	32.0	90	90	64.3	64.3	89.0	0.4	--	0.61	57.3	4.53	55.2	438	5.99	4.85	4.85	5.82	0.6	0.7	44.4	33.3	2.50	
Dissolved Oxygen	mg/L		0.20	NM	0.0	5.87	0.90	0.0	0.0	2.67	2.67	0.00	0.91	--	0.59	7.56	3.07	0.0	4.82	7.70	7.68	7.68	5.34	0.00	3.79	0.0	0.00	4.92	
Oxdat. Red. Potential	Millivolts		-194	NM	62	169	-49.3	-110	-110	-31	-31	-106	-221	--	-98	-13	-96.3	-146	-103	-133	151	151	151	-243	-79	15	-107	-140.0	

Notes:
1 Sample collected from replaced well.
* Duplicate sample.
J = Reported concentration is an estimate.
mg/L= Milligrams per liter.
NM = Not measured due to equipment malfunction.
µg/L = Micrograms per liter.
U = Analyte not detected above practical quantitation limit given.
U1 = The practical quantitation limit is elevated due to interferences present in the sample.
Exceeds MTCA A cleanup level.

Table 1 Groundwater Results Summary, Long Term Monitoring Event 2 (July 2013)

Monitoring Well No.			MW-21R								MW-22R								MW-25								
PARAMETERS	Units	Sample Date	8/11/10	8/11/10*	4/6/11	4/6/11*	9/28/11	1/23/13	7/31/13	7/31/13*	3/17/08 ¹	1/20/10	5/26/10	8/12/10	4/6/11	9/29/11	1/24/13	7/31/13	3/18/08	3/18/08	1/21/10	5/27/10	8/12/10	4/6/11	9/29/11	1/24/13	7/30/13
MTCA A																											
VOLATILE ORGANICS (BTEX)																											
Benzene	ug/L	5	27	--	45	--	19	32	39	33	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	2.7	1.0 U	1.0 U	4.0 U	4.0	10 J	4.0 U	1.3	4.0 U	1.4	1.0	4.0 U
Toluene	ug/L	1,000	1.7	--	6.7	--	1.0 U	4.5	7.3	6.7	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	4.0	7.2 J	4.0 U	2.1	4.0 U	2.5	1.2	4.0 U
Ethylbenzene	ug/L	700	120	--	340	--	34	160	98	82	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	56	56	74 J	4.0 U	6.1	5.3	11	2	5
m,p-Xylene	ug/L	1,000	100	--	290	--	21	85	59	48	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.2	4.1	140 J	4.0 U	5.0 U	8.4	1.2	3.4	9.0
o-Xylene	ug/L	1,000	1.9	--	4.0 U	--	1.0 U	2.3	4.0 U	4.0 U	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	4.0	200 U1	4.0 U	1.0 U	4.0 U	1.0 U	1.0 U	4.0 U
TOTAL PETROLEUM HYDROCARBONS																											
Gasoline	ug/L	800	2,800	--	5,100	--	1500	3000	2300	2000	400 U	400 U	100 U	100 U	100 U	120	100 U	100 U	1,600	1,700	2,000 U	1,400	1,300	1,500	1500	1000	1200
Diesel	mg/L	0.5	0.87	--	0.68 U	--	0.42 U	0.47 U	0.59 U	0.65 U	0.26 U	0.26 U	0.27 U	0.25 U	0.27 U	0.26 U	0.26 U	0.27 U	1.2	1	0.49	0.92	2	7.0	1.3	0.7 U	2.0
Lube Oil	mg/L	0.5	0.41 U	--	0.42 U	--	0.42 U	0.41 U	0.43 U	0.42 U	0.41 U	0.41 U	0.43 U	0.41 U	0.43 U	0.41 U	0.41 U	0.44 U	0.48 U	0.46 U	0.42 U	0.42 U	0.41 U	0.42 U	0.41 U	0.44 U	0.48
METALS																											
Total Lead	ug/L	15	10 J	5.5 J	1.1	1.1 U	--	--	--	--	1.1 U	1.3	--	--	--	--	--	--	1.2	1.3	1.1 U	--	--	--	--	--	--
Dissolved Lead	ug/L	15	1.4	1.0	1.0 U	1.0 U	--	--	--	--	1.0 U	1.0 U	--	--	--	--	--	--	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--
Dissolved Iron	ug/L		--	--	--	--	--	--	--	--	--	220	--	--	--	--	--	--	--	--	2,000	--	--	--	--	--	--
Total Ferrous Iron	mg/L		17.9	--	10.1	--	--	6.45	7.10	--	--	--	0.295	1.29	0.043	--	0.06	0.04 U	--	--	--	0.352	3.78	1.39	--	5.71	108.00
Dissolved Manganese	ug/L		3,500	--	4,200	--	--	2,800	3,400	--	--	1,400	890	3,200	840	--	700	770	--	--	120	220	130	170	--	670	2700
PAHs																											
Naphthalene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	1.2	1.4	0.27	--	--	--	--	--	--
2-Methylnaphthalene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	0.11 U	0.11 U	0.10 U	--	--	--	--	--	--
1-Methylnapthalene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	22	25	0.67	--	--	--	--	--	--
Acenaphthylene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	0.17	0.17	0.10 U	--	--	--	--	--	--
Acenaphthene	ug/L		--	--	--	--	--	--	--	--	0.52	0.10 U	--	--	--	--	--	--	0.98	0.96	0.15	--	--	--	--	--	--
Flourene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	1.6	1.7	0.18	--	--	--	--	--	--
Phenanthrene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	0.11 U	0.11 U	0.10 U	--	--	--	--	--	--
Anthracene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	0.11 U	0.11 U	0.10 U	--	--	--	--	--	--
Fluoranthene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	0.11 U	0.11 U	0.10 U	--	--	--	--	--	--
Pyrene	ug/L		--	--	--	--	--	--	--	--	0.098 U	0.10 U	--	--	--	--	--	--	0.11 U	0.11 U	0.10 U	--	--	--	--	--	--
Benzo(a)anthracene	ug/L		--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.011 U	0.010 U	--	--	--	--	--	--
Chrysene	ug/L		--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.011 U	0.010 U	--	--	--	--	--	--
Benzo(b)fluoranthene	ug/L		--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.011 U	0.010 U	--	--	--	--	--	--
Benzo(k)fluoranthene	ug/L		--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.011 U	0.010 U	--	--	--	--	--	--
Benzo(a)pyrene	ug/L	0.1	--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.011 U	0.010 U	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L		--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.011 U	0.010 U	--	--	--	--	--	--
Dibenz(a,h)anthracene	ug/L		--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.011 U	0.010 U	--	--	--	--	--	--
Benzo[g,h,i]perylene	ug/L		--	--	--	--	--	--	--	--	0.0098 U	0.010 U	--	--	--	--	--	--	0.011 U	0.11 U	0.010 U	--	--	--	--	--	--
GENERAL CHEMISTRY																											
Alkalinity	mg/L		1,500	--	2,000	--	--	1700	1800	--	340	160	320	240	310	--	250	200	420	410	140	190	260	200	--	400	130
Nitrate (as Nitrogen)	mg/L		0.057	--	0.27	--	--	0.05 U	0.05 U	--	0.050 U	0.50	0.050 U	0.17	0.41	--	0.31 U	0.22	0.052	0.050 U	3.4	0.73	0.050 U	1.4	--	0.05 U	0.05 U
Sulfate	mg/L		120	--	110	--	--	5.00 U	5.00 U	--	22	1,200	75	200	39	--	34	510	36	36	13	8.0	26	5.0 U	--	18	1100
Chloride	mg/L		110	--	100	--	--	74	120	--	370	9,100	390	1,600	97	--	90	4100	980	910	38	31	610	24	--	120	8000
Dissolved Methane	ug/L		4,800	--	3,200	--	--	1300	2200	--	--	6.3	21	10	6.8	--	1.90	3.30	--	--	220	190	330	190	--	110	57
BOD5	mg/L		16.2	--	--	--	--	--	--	--	--	2.00 U	1.0 U	1.2 U	--	--	--	--	--	--	2.00 U	1.9	4.3	--	--	--	--
FIELD PARAMETERS																											
Turbidity	Neth. Turbidity Units		384	384	52.2	52.2	646.0	NM	NM	5.6	212	56.3	4.1	132	0.8	112.0	NM	0.0	120	120	164	4.8	32.6	65.5	60.0	NM	49.0
pH	--		7.00	7.00	7.06	7.06	7.06	7.08	7.08	7.20	6.62	6.32	6.82	6.69	7.03	7.65	7.08	6.97	6.31	6.31	5.81	6.28	6.96	6.20	6.21	6.54	6.30
Specific Conductance	Millisiemens/cm		4.47	4.47	430	430	3.33	3.22	3.22	3.09	19.6	17.9	1.37	NM	128	6.04	0.85	11.00	19.8	19.8	31.8	28.9	5.13	90	51.6	1.1	23.4
Dissolved Oxygen	mg/L		0.0	0.0	1.80	1.80	0.00	0.70	0.70	0.71	0.0	7.55	4.90	0.01	1.75	8.48	8.69	7.10	0.0	0.0	4.96	1.10	0.0	0.57	0.00	0.07	0.50
Oxdat. Red. Potential	Millivolts		-162	-162	-160	-160	-195	-244	-244	-117	148	54	62.0	-36	32	-139	-161	35	-56	-56	-14	85.6	-120	-30	-99	-287	-32

Notes:
1 Sample collected from replaced well.
* Duplicate sample.
J = Reported concentration is an estimate.
mg/L= Milligrams per liter.
NM = Not measured due to equipment malfunction.
µg/L = Micrograms per liter.
U = Analyte not detected above practical quantitation limit given.
U1 = The practical quantitation limit is elevated due to interferences present in the sample.
Exceeds MTCA A cleanup level.

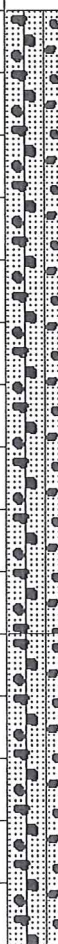
Table 1 Groundwater Results Summary, Long Term Monitoring Event 2 (July 2013)

Monitoring Well No.			MW-26R								MW-27			
PARAMETERS	Units	Sample Date	3/18/08 ¹	1/20/10	5/26/10	8/11/10	4/6/11	9/28/11	1/24/13	7/31/13	4/7/11	9/30/11	1/24/13	7/30/13
MTCA A														
VOLATILE ORGANICS (BTEX)														
Benzene	ug/L	5	17	4.0 U	17	3.9	1.0 U	6.0	5.7	5.0	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	1,000	4.0 U	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	700	4.0 U	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U
m,p-Xylene	ug/L	1,000	4.0 U	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.1	4.0	1.0 U	1.0 U	1.0 U	1.0 U
o-Xylene	ug/L	1,000	4.0 U	4.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U	4.0 U	1.0 U	1.0 U	1.0 U	1.0 U
TOTAL PETROLEUM HYDROCARBONS														
Gasoline	ug/L	800	1,300	400 U	530	240	100 U	270	290	400 U	100 U	100 U	100 U	100 U
Diesel	mg/L	0.5	1.3	0.27 U	0.26 U	0.31 U	0.27 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.27 U
Lube Oil	mg/L	0.5	0.40 U	0.43 U	0.41 U	0.40 U	0.43 U	0.41 U	0.41 U	0.41 U	0.41 U	0.42 U	0.42 U	0.43 U
METALS														
Total Lead	ug/L	15	3.3	1.1 U	--	--	--	--	--	--	--	--	--	--
Dissolved Lead	ug/L	15	1.0 U	1.0 U	--	--	--	--	--	--	--	--	--	--
Dissolved Iron	ug/L		--	56 U	--	--	--	--	--	--	--	--	--	--
Total Ferrous Iron	mg/L		--	--	0.758	0.8	0.059	--	0.395	0.706	27.6	--	34.9	42.6
Dissolved Manganese	ug/L		--	11 U	66	560	10 U	--	4,000	260	3,900	--	4,300	6,500
PAHs														
Naphthalene	ug/L		0.80	0.10 U	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	ug/L		0.10 U	0.10 U	--	--	--	--	--	--	--	--	--	--
1-Methylnapthalene	ug/L		69	0.10 U	--	--	--	--	--	--	--	--	--	--
Acenaphthylene	ug/L		0.45	0.15 U	--	--	--	--	--	--	--	--	--	--
Acenaphthene	ug/L		23	0.17 U	--	--	--	--	--	--	--	--	--	--
Flourene	ug/L		4.8	0.10 U	--	--	--	--	--	--	--	--	--	--
Phenanthrene	ug/L		10	0.10 U	--	--	--	--	--	--	--	--	--	--
Anthracene	ug/L		2.4	0.17 U	--	--	--	--	--	--	--	--	--	--
Fluoranthene	ug/L		0.88	0.10 U	--	--	--	--	--	--	--	--	--	--
Pyrene	ug/L		1.2	0.10 U	--	--	--	--	--	--	--	--	--	--
Benzo(a)anthracene	ug/L		0.10	0.016 U	--	--	--	--	--	--	--	--	--	--
Chrysene	ug/L		0.098	0.010 U	--	--	--	--	--	--	--	--	--	--
Benzo(b)fluoranthene	ug/L		0.022	0.010 U	--	--	--	--	--	--	--	--	--	--
Benzo(k)fluoranthene	ug/L		0.027	0.010 U	--	--	--	--	--	--	--	--	--	--
Benzo(a)pyrene	ug/L	0.1	0.051	0.010 U	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	ug/L		0.017	0.010 U	--	--	--	--	--	--	--	--	--	--
Dibenz(a,h)anthracene	ug/L		0.010 U	0.010 U	--	--	--	--	--	--	--	--	--	--
Benzo[g,h,i]perylene	ug/L		0.020	0.010 U	--	--	--	--	--	--	--	--	--	--
GENERAL CHEMISTRY														
Alkalinity	mg/L		190	180	270	210	300	--	330	200	310	--	270	310
Nitrate (as Nitrogen)	mg/L		0.050 U	1.0	0.16	0.050 U	0.050 U	--	0.05 U	0.05 U	0.050 U	--	0.05 U	0.05 U
Sulfate	mg/L		1,400	1,200	1,400	2,200	1,300	--	1100	1100	25 U	--	25 U	10 U
Chloride	mg/L		9,400	9,100	10,000	20,000	8,400	--	7200	14000	9.8	--	10	20
Dissolved Methane	ug/L		--	3.0	68	5.0	29	--	270	16	8,600	--	6900	5200
BOD5	mg/L		--	2.00 U	1.7	1.5	--	--	--	--	--	--	--	--
FIELD PARAMETERS														
Turbidity	Neth. Turbidity Units		85.7	70.2	3.8	38.0	0.1	82.3	NM	0.0	49.2	>1000	NM	NM
pH	--		6.24	6.19	6.31	6.53	6.88	6.52	6.72	6.68	6.58	6.53	6.61	6.60
Specific Conductance	Millisiemens/cm		3.25	16.6	22.42	--	--	--	5.70	38.00	92	1.18	5.76	0.82
Dissolved Oxygen	mg/L		0.0	6.75	5.52	0.01	0.36	0.00	0.21	2.11	0.27	0.00	0.10	5.20
Oxdat. Red. Potential	Millivolts		48	58	-64.5	-98	-84	-275	-321	-88	-88	-111	-210	-99

Notes:
1 Sample collected from replaced well.
* Duplicate sample.
J = Reported concentration is an estimate.
mg/L= Milligrams per liter.
NM = Not measured due to equipment malfunction.
µg/L = Micrograms per liter.
U = Analyte not detected above practical quantitation limit given.
U1 = The practical quantitation limit is elevated due to interferences present in the sample.
Exceeds MTCA A cleanup level.

Parametrix

Boring Log

Boring ID: MW-4R			Drilling Company:		Sheet 1 of 1	
Project Name: Chevron Interim Action			Drilling Method: Direct Push		Starting Date: 12/14/09	
Project #: 255-1896-063 / 04-1304			Logged by: Lily Vagelatos		Ending Date: 12/14/09	
Location: Bremerton, WA			Checked by: Ingmar Saul, L.G.		Boring Depth: 15 ft	
					Depth to Water: 5 ft	
Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		MIXED TREATMENT ZONE Sandy silt with gravel, tan brown, very moist.		50"		5
5						55"
10		Silty sand and gravel, tan brown, saturated, starting at approximately 10 ft bgs.		40"		15
15		Bottom of boring at 15 feet bgs.				20



Parametrix

Boring Log

Boring ID: MW-9R

Drilling Company:

Project Name: Chevron Interim Action

Drilling Method: Direct Push

Project #: 255-1896-063 / 04-1304

Logged by: Lily Vagelatos

Location: Bremerton, WA

Checked by: Ingmar Saul, L.G.

Sheet 1 of 1

Starting Date: 12/15/09

Ending Date: 12/15/09

Boring Depth: 15 ft

Depth to Water: 9 ft

Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface			 Bentonite Seal from 0 to 5' 0.75" Diameter Casing; 0 to 5' Well Screen Sand Pack from 5' to 15' 0.75" Diameter Prepacked Well Screen; 5' to 15' Ground Water at 9' bgs	0
		TOP SOIL with VEGETATION Silty sand		30"		
		MIXED TREATMENT ZONE Sandy silt with gravel, tan brown, very moist.		45"		
10		Silty sand and gravel, tan brown, saturated, starting at approximately 10 ft bgs.	CHEV-SO-MW9R-0090	24"		10
15		Bottom of boring at 15 feet bgs.				15
20						20

Parametrix

Boring Log

Boring ID: MW-10R

Drilling Company:

Project Name: Chevron Interim Action

Drilling Method: Direct Push

Project #: 255-1896-063 / 04-1304

Logged by: Lily Vagelatos

Location: Bremerton, WA

Checked by: Ingmar Saul, L.G.

Sheet 1 of 1

Starting Date: 12/29/09

Ending Date: 12/29/09

Boring Depth: 15 ft

Depth to Water: 7 ft

Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		TILL and FILL MATERIAL Silty sand and gravel, brown tan.		12"		
5		Damp, starting at approximately 5 ft bgs.				5
		Saturated starting at approximately 7 ft bgs.	CHEV-SO-MW10R-0070	20"		
10				20"		10
15		Bottom of boring at 15 feet bgs.				15
20						20

Ground Water at 7' bgs

Bentonite Seal from 0 to 5'
0.75" Diameter Casing; 0 to 5'

Well Screen Sand Pack from 5' to 15'
0.75" Diameter Prepacked Well Screen; 5' to 15'

MONITOR WELL NO. M 11

WELL SCHEMATIC

Casing Elevation: 100.03
Casing Stickup: -0.3

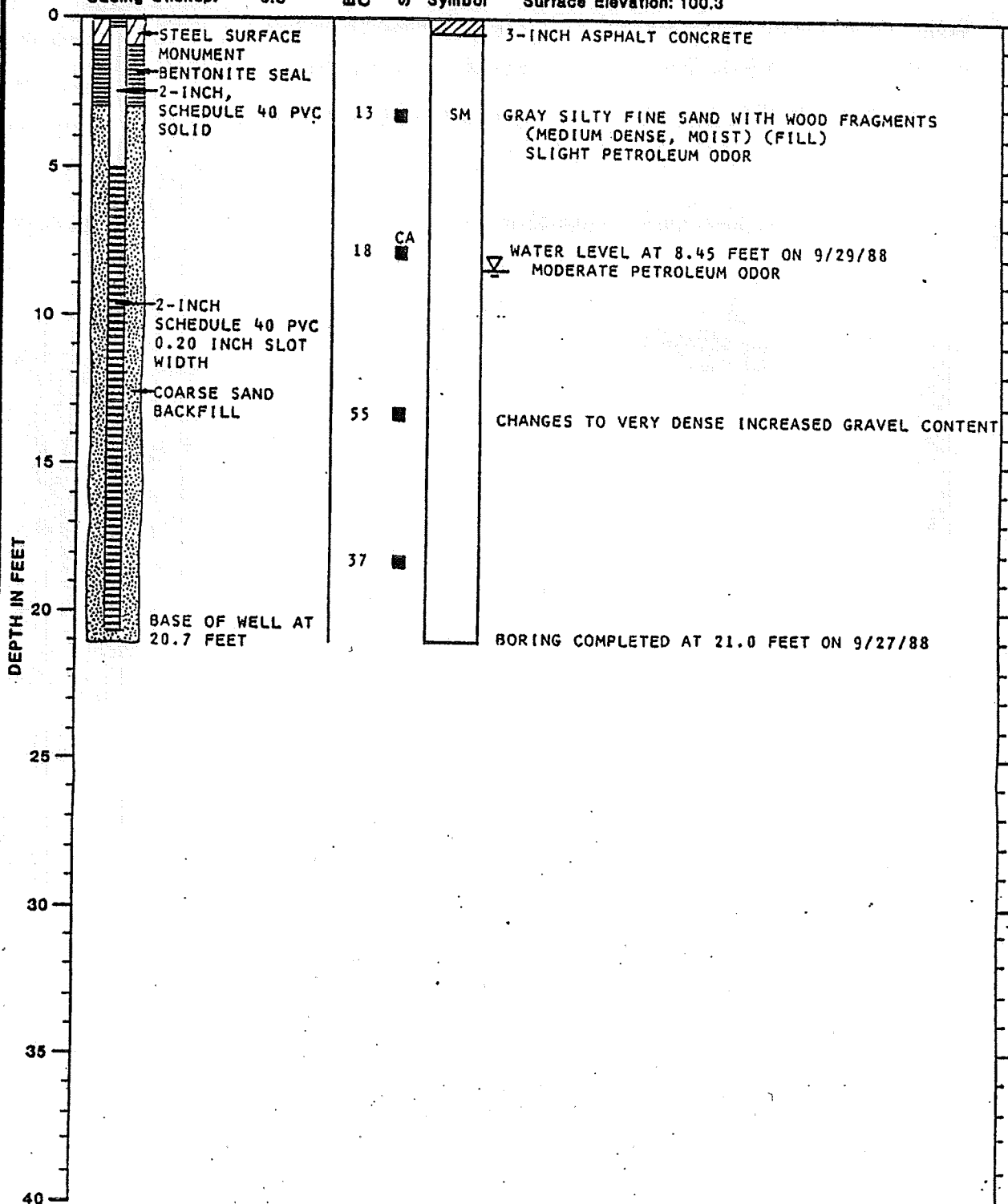
Blow-
Count

Samples

Group
Symbol

DESCRIPTION

Surface Elevation: 100.3



Note: See Figure A-2 for Explanation of Symbols

Geo  Engineers

LOG OF MONITOR WELL

FIGURE A-13

0372-34-4 KRF:DWA:GD 10/12/88

Parametrix

Boring Log

Boring ID: MW-13R

Drilling Company:

Project Name: Chevron Interim Action

Drilling Method: Direct Push

Project #: 255-1896-063 / 04-1304

Logged by: Lily Vagelatos

Location: Bremerton, WA

Checked by: Ingmar Saul, L.G.

Sheet 1 of 1

Starting Date: 12/14/09

Ending Date: 12/14/09

Boring Depth: 15 ft

Depth to Water: 7 ft

Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		MIXED TREATMENT ZONE Sandy silt with gravel, tan brown, very moist.		45"		
5				50"		5
10		Silty sand and gravel, tan brown, saturated, at approximately 10 ft bgs.		30"		10
15		Bottom of boring at 15 feet bgs.				15
20						20

Ground Water at 7' bgs

Bentonite Seal from 0 to 5'
0.75" Diameter Casing; 0 to 5'

Well Screen Sand Pack from 5' to 15'
0.75" Diameter Prepacked Well Screen; 5' to 15'

Parametrix

Boring Log

Boring ID: MW-16R

Drilling Company:

Project Name: Chevron Interim Action

Drilling Method: Direct Push

Project #: 255-1896-063 / 04-1304

Logged by: Lily Vagelatos

Location: Bremerton, WA

Checked by: Ingmar Saul, L.G.

Sheet 1 of 1

Starting Date: 12/29/09

Ending Date: 12/29/09

Boring Depth: 15 ft

Depth to Water: 7 ft

Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		SILTY GRAVELLY SAND Gray brown, damp, fill.				
5						5
10						10
15		Bottom of boring at 15 feet bgs.				15
20						20

Ground Water at 7' bgs

Bentonite Seal from 0 to 5'
0.75" Diameter Casing; 0 to 5'

Well Screen Sand Pack from 5' to 15'
0.75" Diameter Prepacked Well Screen; 5' to 15'

Parametrix

Boring Log

Boring ID: MW-18R

Drilling Company:

Project Name: Chevron Interim Action

Drilling Method: Direct Push

Project #: 255-1896-063 / 04-1304

Logged by: Lily Vagelatos

Location: Bremerton, WA

Checked by: Ingmar Saul, L.G.

Sheet 1 of 1

Starting Date: 12/29/09

Ending Date: 12/29/09

Boring Depth: 15 ft

Depth to Water: 5 ft

Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		SILTY GRAVELLY SAND Gray brown, damp, fill.				
5						5
10						10
15		Bottom of boring at 15 feet bgs.				15
20						20

Ground Water at 5' bgs

Bentonite Seal from 0 to 5'
0.75" Diameter Casing; 0 to 5'

Well Screen Sand Pack from 5' to 15'
0.75" Diameter Prepacked Well Screen; 5' to 15'

Parametrix

Boring Log

Boring ID: MW-19R		Drilling Company:		Sheet 1 of 1	
Project Name: Chevron Interim Action		Drilling Method: Direct Push		Starting Date: 12/29/09	
Project #: 255-1896-063 / 04-1304		Logged by: Lily Vagelatos		Ending Date: 12/29/09	
Location: Bremerton, WA		Checked by: Ingmar Saul, L.G.		Boring Depth: 15 ft	
				Depth to Water: 4 ft	

Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
0 to 20		SILTY GRAVELLY SAND Gray brown, damp, fill.				0 to 20
20		Bottom of boring at 20 feet bgs.				20
25						25

Boring ID: MW-20R

Drilling Method: HSA

Sheet 1 of 1

Project Name: Chevron LTM

Sample Method: Sprit Spoon

Drilling Date: 1/10/13

Project #: 233-1896-107

Logged by: Lara Linde, L.G.

Boring Depth: 15 ft

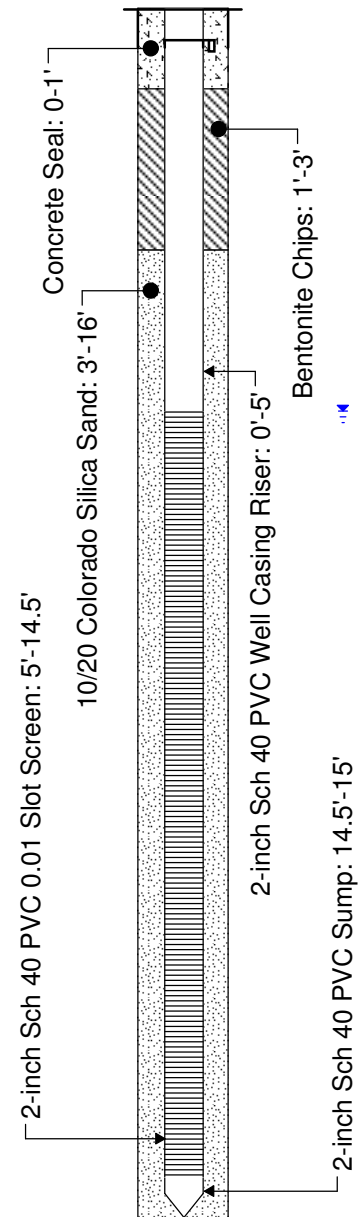
Location: Bremerton, WA

Checked by: Ingmar Saul, L.G.

Depth to Water: 4.99 ft

Ecology Tag #: BHK 398

Elevation (ft)	Lithologic Symbol	U.S.C.S.	Description/Classification of Materials; Soil: Group name, group symbol, color, plasticity, grain size, moisture, density, misc.	PID (PPM)	Recovery (in)	Well Diagram	Depth (ft)
0.0			Ground Surface				0
	SM		SAND (SM) Brown-gray, nonplastic, medium to fine, moist, loose, trace of fine rounded gravel, no petroleum odor.		36"/60"		
-8.0			Increasing silt content starting at approx. 8 ft bgs.		30"/60"		
-9.0			Strong petroleum odor starting at approx. 9 ft bgs.				
-9.5	SP		SAND (SP) Gray, low plasticity, fine to medium grained, wet, loose, some fine rounded gravel, strong petroleum odor.		36"/60"		
-14.0							
-15.0	ML		SILT (ML) Brown-gray, high plasticity, moist, soft, some fine rounded gravel, slight petroleum odor.				
			Bottom of boring at 15 feet bgs.				15

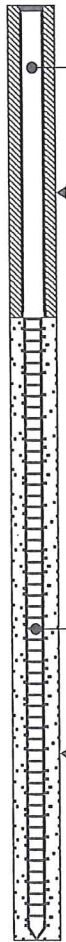


Parametrix

Boring Log

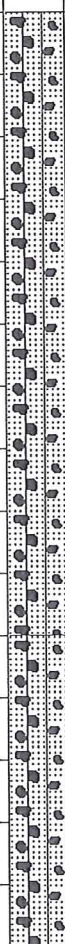
Boring ID: MW-21R			Drilling Company:		Sheet 1 of 1	
Project Name: Chevron Interim Action			Drilling Method: Direct Push		Starting Date: 12/15/09	
Project #: 255-1896-063 / 04-1304			Logged by: Lily Vagelatos		Ending Date: 12/15/09	
Location: Bremerton, WA			Checked by: Ingmar Saul, L.G.		Boring Depth: 15 ft	
					Depth to Water: 7 ft	

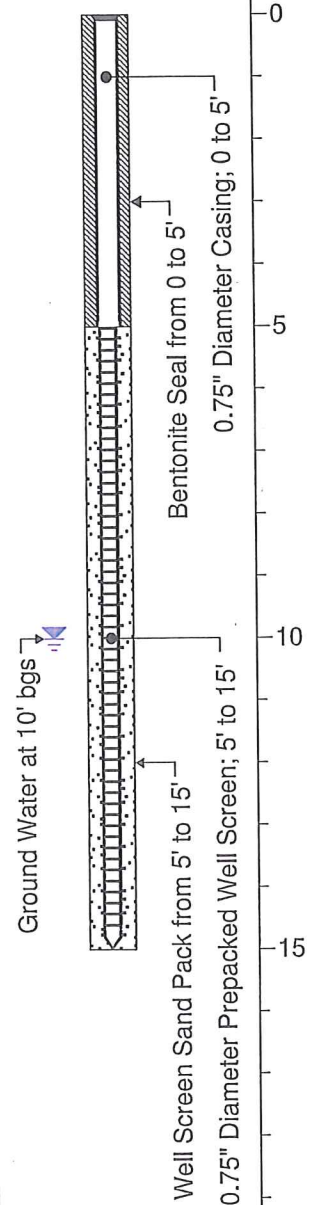
Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		MIXED TREATMENT ZONE Sandy silt with gravel, tan brown, very moist.		50"		5
5						50"
10		Silty sand and gravel, tan brown, saturated, starting at approximately 10 ft bgs.	CHEV-SO-MW21R-0100	40"		15
15		Bottom of boring at 15 feet bgs.				20



Parametrix

Boring Log

Boring ID: MW-22R			Drilling Company:		Sheet 1 of 1	
Project Name: Chevron Interim Action			Drilling Method: Direct Push		Starting Date: 12/14/09	
Project #: 255-1896-063 / 04-1304			Logged by: Lily Vagelatos		Ending Date: 12/14/09	
Location: Bremerton, WA			Checked by: Ingmar Saul, L.G.		Boring Depth: 15 ft	
					Depth to Water: 10 ft	
Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		MIXED TREATMENT ZONE Sandy silt with gravel, tan brown, very moist.		50"		5
5						55"
10		Silty sand and gravel, tan brown, saturated, starting at approximately 10 ft bgs.	CHEV-SO-MW22R-0100	45"		15
15		Bottom of boring at 15 feet bgs.				20



Boring ID: MW-25

Drilling Company: ESN

Sheet 1 of 1

Project Name: Chevron Prop RI/FS

Drilling Method: Auger

Drilling Date: 3/7/08

Project #: 255-1896-063

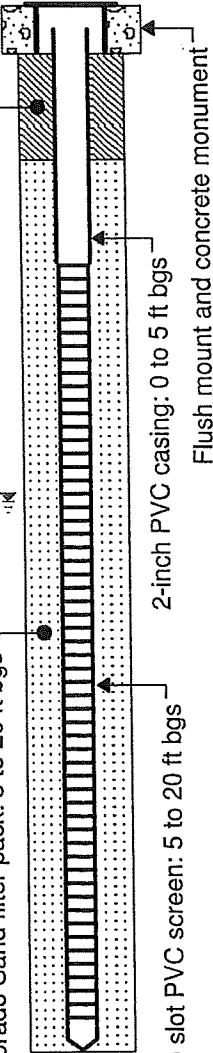
Logged by: David Dinkuhn, P.E.

Boring Depth: 20 ft

Location: SEE MAP

Checked by: David Dinkuhn, P.E.

Depth to Water: 9.5 ft

Depth (ft)	Sample Type	Lithologic Symbol	Description/Classification of Materials	Sample			Well Point Diagram	Depth (ft)
				PID Reading	Sample ID	Recovery (ft)		
0			Ground Surface				 Bentonite Anular Seal: 1 to 3 ft bgs 10/20 Colorado Sand filter pack: 3 to 20 ft bgs 2-inch 0.010 slot PVC screen: 5 to 20 ft bgs 2-inch PVC casing: 0 to 5 ft bgs Flush mount and concrete monument	0
			Silty Sandy Gravel Gray brown, damp, No petroleum hydrocarbon odor (FILL)	0		4		
5				0		3		
				0		3		
10			Silty Gravelly Sand Gray, wet, moderate petroleum hydrocarbon odor (FILL)	1400	CHEV-SO-MW25-0100	3		
			Silty Gravelly Sand Wet, No petroleum hydrocarbon odor (OUTWASH)			3		
15				4		3		
						3		
20						1		
			Bottom of boring at 20 feet bgs.					

Parametrix

Boring Log

Boring ID: MW-26R

Drilling Company:

Project Name: Chevron Interim Action

Drilling Method: Direct Push

Project #: 255-1896-063 / 04-1304

Logged by: Lily Vagelatos

Location: Bremerton, WA

Checked by: Ingmar Saul, L.G.

Sheet 1 of 1

Starting Date: 12/14/09

Ending Date: 12/14/09

Boring Depth: 15 ft

Depth to Water: 9.5 ft

Depth (ft)	Lithologic Symbol	Description/Classification of Materials	Sample		Boring Diagram	Depth (ft)
			Sample ID	Recovery		
0		Ground Surface				0
		MIXED TREATMENT ZONE Sandy silt with gravel, tan brown, very moist.		50"		
5				45"		5
10		Silty sand and gravel, tan brown, saturated, untreated fill in saturation zone, starting at approximately 10 ft bgs.	CHEV-SO-MW26R-0095	40"		10
15		Bottom of boring at 15 feet bgs.				15
20						20

Ground Water at 9.5' bgs

Bentonite Seal from 0 to 5'
0.75" Diameter Casing; 0 to 5'

Well Screen Sand Pack from 5' to 15'
0.75" Diameter Prepacked Well Screen; 5' to 15'

Boring ID: MW-27

Drilling Method: Probe/HSA Combo

Project Name: Former Chevron Prop. Remediation

Sample Method: Split Spoon

Project #: 233-1896-098 / 01-03

Logged by: Lara Linde

Location: 1310 Highland Drive, Bremerton

Checked by: Ingmar Saul, R.G.

Sheet 1 of 1

Drilling Date: 3/11/11

Boring Depth: 16 ft

Depth to Water: 6 ft

Ecology Tag #: BCN 891

Elevation (ft)	Lithologic Symbol	U.S.C.S.	Description/Classification of Materials; Soil: Group name, group symbol, color, plasticity, grain size, moisture, density, misc.	PID (PPM)	Recovery (in)	Well Diagram	Depth (ft)
12.0			Ground Surface				0
11.5	GW		RIP RAP Coarse gravel to cobbles (beach reinforcement)				
9.0	SP		SAND Brown, fine to medium grained, dry, loose, occassional fine gravel, no odor.	0	36/48		
6.0			Red, moist, iron staining starting at approximately 3 ft bgs.				
3.5			Moist to wet, few fine gravels, no odor, starting at approximately 6 ft bgs.	0	18/48		5
	SM		SAND Brown to gray, fine to medium grained, wet, loose, organic odor, no sheen.	0	40/48		10
-4.0			Gray, fine grained, wet to saturated, 5% shell fragments, moderate petroleum odor at approximately 16 ft bgs.	0	42/48		15
			Bottom of boring at 16 feet bgs.				

Groundwater Sampling Field Data Sheet No. 2

CHFL - GW - MW04R - 0/50

Well #: MW4R

Sample #:

Project Number: <u>233 1896 107</u>	Date: <u>7/30/13</u>
Project Name:	Location:
Project Address:	Sampled By: <u>D DINKUHJN</u>
Client Name:	Purged By:

Casing Diameter: 2" _____ 4" _____ 6" _____ Other $\frac{3}{4}$ "

Depth to Water (feet): 11.1 Purge Volume Measurement Method: _____
 Depth of Well (feet): _____ Date Purged: _____
 Reference Point (surveyor's notch, etc.): _____ Purge Time (from/to) 14:10 - 14:45
 Date/Time Sampled: 14:45

Purge Volume Calculation: ($\pi^2 h$) (7.48 gal/ ft^3) (# Casing volumes)
Purge Volume (gallons) for: 2" = (0.16)(h)(#Cv); 4" = (0.653)(h)(#Cv); 6" = (1.48)(h)(#Cv)
Calculated Purge Volume (gallons): _____ Actual Purge Volume (gallons): _____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	TURB (NTU) SAL %	REDOX (mv)
<u>1418</u>	<u>-</u>	<u>7.23</u>	<u>5.99</u>	<u>1.53</u>	<u>16.7</u>	<u>3.6</u>	<u>-129</u>
<u>1433</u>	<u>-</u>	<u>7.24</u>	<u>5.44</u>	<u>1.18</u>	<u>15.06</u>	<u>0.0</u>	<u>-124</u>
<u>1436</u>	<u>-</u>	<u>7.24</u>	<u>5.42</u>	<u>0.96</u>	<u>15.02</u>	<u>0.2</u>	<u>-123</u>
<u>1439</u>	<u>-</u>	<u>7.24</u>	<u>5.41</u>	<u>0.98</u>	<u>15.03</u>	<u>0.0</u>	<u>-123</u>
<u>1442</u>	<u>-</u>	<u>7.24</u>	<u>5.43</u>	<u>1.01</u>	<u>15.03</u>	<u>0.6</u>	<u>-123</u>

Purge Equipment: <u>PERI</u>	Sampling Equipment: <u>PERI</u>
Laboratory: _____	Date Sent to Lab: _____
Chain-of-Custody (yes/no): _____	Field QC Sample Number: _____
Shipment Method: _____	Split With (names[s]/organization): _____

Well Integrity: _____

Remarks: [Signature] 0.25 LPM

Signature: _____

2/15
G4C
PURGED

TUBING DEPTH 15'

Groundwater Sampling Field Data Sheet No. 2

CHEV-GW-MW/OR-0000

Well #: MW 10R

Sample #:

[illegible]

TUBING DEPTH 15'

SOME SEDIMENT
IN SAMPLE

Well #: MW 11

CHEV-6W-MW11-0110

Sample #:

Sample #:

Project Number: 2331896 107 Date: 7/30/13
Project Name: CHEVRON Location:
Project Address: Sampled By: D DINKUHN
Client Name: Purged By:

Casing Diameter: 2" ☒ 4" _____ 6" _____ Other _____

Depth to Water (feet): 8.50 BTOC Purge Volume Measurement Method: E
Depth of Well (feet): ~15 Date Purged:
Reference Point (surveyor's notch, etc.): Purge Time (from/to): 10:54 - 11:15
Date/Time Sampled: 11:30

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)(\# \text{ Casing volumes})$

Purge Volume (gallons) for: 2" = $(0.16)(h)(\#Cv)$; 4" = $(0.653)(h)(\#Cv)$; 6" = $(1.48)(h)(\#Cv)$

Calculated Purge Volume (gallons): _____ Actual Purge Volume (gallons): _____

TIME (2400 hr)	WATER LEVEL (feet)	± 0.1 pH (units)	$\pm 3\%$ COND (mS/cm)	$\pm 10\%$ DO (mg/L)	TEMP °C	TURB ^{±1} (NTU) SAL %	± 10 REDOX (mv)
1055	8.89	6.72	0.598	2.16	14.66	49	-81
1100	9.52	6.69	0.596	1.87	15.1	26.0	-87
1104	9.84	6.72	0.607	1.70	15.35	10.3	-94
1112	10.10	6.75	0.609	0.65	15.62	6.8	-98
1115	10.10	6.75	0.610	0.60	15.64	6.0	-98
1118	10.1	6.72	0.610	0.59	15.62	5.8	-98

Purge Equipment: PERT. Sampling Equipment: PERT.
Laboratory: ON-SITE Date Sent to Lab:
Chain-of-Custody (yes/no): Field QC Sample Number:
Shipment Method: Split With (names[s]/organization):

Well Integrity: OK

Remarks: 0.2 LPM

Signature: [Signature]

TUBING DEPTH 11'

Groundwater Sampling Field Data Sheet No. 2

Well #: MW 13K

① HEV-GW-MW13R-0130

Sample #:

[illegible]

TUBING DEPTH 15' @ BOT. OF WELL
EMPTIED WELL. THEN LET SIT & RECOV.
MULT. TIMES TO FILL G/RTX & DRO ONLY

Groundwater Sampling Field Data Sheet No. 2

CHEV-GW-MW20R-0120

Well #: MW20R

Sample #:

Project Number: 2331896107	Date: 7/31/13
Project Name: CHEVRON	Location:
Project Address:	Sampled By: D. DINKUHN
Client Name: BREM.	Purged By:

Casing Diameter: 2" ☒ 4" ☐ 6" ☐ Other ☐
Depth to Water (feet): 8.71
Depth of Well (feet): ~15'
Reference Point (surveyor's notch, etc.):
Date/Time Sampled: 09:00
Purge Volume Measurement Method:
Date Purged:
Purge Time (from/to): 08:47 - 09:06

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)(\# \text{ Casing volumes})$ Purge Volume (gallons) for: 2" = $(0.16)(h)(\#Cv)$; 4" = $(0.653)(h)(\#Cv)$; 6" = $(1.48)(h)(\#Cv)$

Calculated Purge Volume (gallons): _____ Actual Purge Volume (gallons): _____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	TURB (NTU) SAL %	REDOX (mv)
0848	8.95	6.43	0.682	1.30	15.12	0.0	-46
0853	9.11	6.50	0.691	0.77	14.91	0.0	-62
0856	9.16	6.55	0.715	1.94	14.73	0.0	-73
0900	9.11	6.59	0.714	4.13	14.68	0.0	-76
0903	9.11	6.62	0.720	3.81	14.60	0.0	-78
0906	9.11	6.62	0.7	3.79	14.67	0.0	-79

Purge Equipment: PERI.	Sampling Equipment: PERI.
Laboratory:	Date Sent to Lab:
Chain-of-Custody (yes/no):	Field QC Sample Number:
Shipment Method:	Split With (names[s]/organization):

Well Integrity: GOOD
Remarks: 0.4 LPM 0.13 LPM CLEAR
Signature: <i>David Dinkuhn</i>

TUBING 14 12'

22 GAL
PURGED

Well #: MW 212

CHEV-GW-MW2IR-0130

Sample #:

PURPLE
~ 1.5
GAL

Tip point @ 13'

6/BTEX + D₂ DP CHEV-GW-MW21R-1130

Groundwater Sampling Field Data Sheet No. 2

Well #: MW22R
 Sample #: _____

Project Number: 233-1896-107 Date: 7/31/13
 Project Name: CHEVCON Location: _____
 Project Address: _____ Sampled By: D. DINKUHN
 Client Name: BREM Purged By: _____

Casing Diameter: 2" _____ 4" _____ 6" _____ Other _____
 Depth to Water (feet): 9.85 Purge Volume Measurement Method: _____
 Depth of Well (feet): 215 Date Purged: _____
 Reference Point (surveyor's notch, etc.): _____ Purge Time (from/to): 11:15 - 11:45
 Date/Time Sampled: 11:45

Purge Volume Calculation: $(\pi r^2 h)(7.48 \text{ gal/ft}^3)(\# \text{ Casing volumes})$

Purge Volume (gallons) for: 2" = $(0.16)(h)(\#Cv)$; 4" = $(0.653)(h)(\#Cv)$; 6" = $(1.48)(h)(\#Cv)$

Calculated Purge Volume (gallons): _____ Actual Purge Volume (gallons): _____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	TURB (NTU) SAL %	REDOX (mv)
<u>11:01</u>	<u>13.81</u>	<u>7.12</u>	<u>10.5</u>	<u>2.77</u>	<u>18.31</u>	<u>134</u>	<u>-15</u>
<u>11:20</u>	<u>13.81</u>	<u>7.05</u>	<u>10.4</u>	<u>2.52</u>	<u>18.08</u>	<u>127</u>	<u>3</u>
<u>11:31</u>	<u>13.84</u>	<u>7.02</u>	<u>10.9</u>	<u>2.56</u>	<u>15.33</u>	<u>15.8</u>	<u>10</u>
<u>11:35</u>	<u>13.84</u>	<u>7.00</u>	<u>11.1</u>	<u>2.72</u>	<u>15.20</u>	<u>5</u>	<u>30</u>
<u>11:38</u>	<u>13.84</u>	<u>6.97</u>	<u>11.1</u>	<u>7.09</u>	<u>15.27</u>	<u>0.9</u>	<u>33</u>
<u>11:45</u>	<u>13.84</u>	<u>6.97</u>	<u>11.0</u>	<u>7.10</u>	<u>15.34</u>	<u>0</u>	<u>35</u>

Purge Equipment: PERI Sampling Equipment: PERI
 Laboratory: _____ Date Sent to Lab: _____
 Chain-of-Custody (yes/no): _____ Field QC Sample Number: _____
 Shipment Method: _____ Split With (names[s]/organization): _____

Well Integrity: _____
 Remarks: 0.2 LPM
 Signature: [Signature]

TUBING @ 15'
 TIP

Well #: MW 25

CHEV-GW-MW25-0150

Sample #: _____

2264C
Purified

TUBING DEPTH 15 FT

Groundwater Sampling Field Data Sheet No. 2

Well #: MW26R

CHEV-6W-MW26R-015C

Sample #: _____

Project Number: <u>233-1896-107</u>	Date: <u>7/31/13</u>
Project Name: <u>CHEVRON</u>	Location: _____
Project Address: _____	Sampled By: <u>DDINKUHN</u>
Client Name: <u>BREM.</u>	Purged By: _____

Casing Diameter: 2" _____ 4" _____ 6" _____ Other <u>3/4"</u>
Depth to Water (feet): _____ Purge Volume Measurement Method: _____
Depth of Well (feet): <u>~15</u> Date Purged: _____
Reference Point (surveyor's notch, etc.): _____ Purge Time (from/to): <u>09:45 - 10:10</u>
Date/Time Sampled: <u>1030</u>

Purge Volume Calculation: $(\pi^2 h)(7.48 \text{ gal/ft}^3)(\# \text{ Casing volumes})$ Purge Volume (gallons) for: 2" = $(0.16)(h)(\#Cv)$; 4" = $(0.653)(h)(\#Cv)$; 6" = $(1.48)(h)(\#Cv)$

Calculated Purge Volume (gallons): _____ Actual Purge Volume (gallons): _____

TIME (2400 hr)	WATER LEVEL (feet)	pH (units)	COND (mS/cm)	DO (mg/L)	TEMP °C	TURB (NTU) SAL %	REDOX (mv)
<u>0948</u>	<u>14.16</u>	<u>6.35</u>	<u>38.8</u>	<u>1.55</u>	<u>16.72</u>	<u>—</u>	<u>-48</u>
<u>0952</u>	<u>14.22</u>	<u>6.53</u>	<u>38.7</u>	<u>1.79</u>	<u>16.63</u>	<u>—</u>	<u>-62</u>
<u>10:00</u>	<u>14.00</u>	<u>6.62</u>	<u>39.0</u>	<u>2.1</u>	<u>15.22</u>	<u>12.1</u>	<u>-79</u>
<u>10:01</u>	<u>14.01</u>	<u>6.65</u>	<u>38.4</u>	<u>2.23</u>	<u>15.18</u>	<u>1.8</u>	<u>-89</u>
<u>10:09</u>	<u>14.01</u>	<u>6.68</u>	<u>38.0</u>	<u>2.11</u>	<u>15.14</u>	<u>0.0</u>	<u>-88</u>
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____	_____

Purge Equipment: _____	Sampling Equipment: _____
Laboratory: _____	Date Sent to Lab: _____
Chain-of-Custody (yes/no): _____	Field QC Sample Number: _____
Shipment Method: _____	Split With (names[s]/organization): _____

Well Integrity: _____
Remarks: <u>LOW RECOVERY ~ 0.09 LPM</u>
Signature: <u>[Signature]</u>

TUBING TIP @ 15'

Well #: MW-27
Sample #: _____

SL. CLOUDY
~ 4/2 AL'S PURGED

TUBING DEPTH 10 FT

4660 KITSAP WAY, SUITE A
BREMERTON, WA 98312-2357
T. 360.377.0014 F. 360.479.5961
www.parametrix.com

TECHNICAL MEMORANDUM

Date: November 7, 2013
To: Project File
From: Lisa Gilbert
Subject: Quality Assurance/Quality Control Review for Former Chevron Property
cc: David Dinkuhn
Project Number: 233-1896-107
Project Name: Former Chevron Property Remediation Performance Monitoring July 2013

INTRODUCTION

This technical memorandum summarizes the results of an internal quality assurance/quality control (QA/QC) review of analytical results for groundwater samples collected on July 30 and 31, 2013. Twelve groundwater samples, including one field duplicate (CHEV-GW-MW21R-0130), were submitted to OnSite Environmental, Inc. (Redmond, WA) for analysis. The samples were accompanied by one gasoline/BTEX trip blank (CHEV-GW-MW21R-2130). Ferrous iron analyses were subcontracted to Analytical Resources, Inc. due to the short holding time.

All samples were analyzed for gasoline/BTEX, diesel/lube oil, dissolved manganese, nitrate, sulfate, alkalinity, chloride and dissolved methane, with the following exceptions:

- CHEV-GW-MW10R-0000 was analyzed for gasoline/BTEX only,
- CHEV-GW-MW13R-0130 and CHEV-GW-MW21R-1130 were analyzed for gasoline/BTEX and diesel/lube oil only
- CHEV-GW-MW09R-0150 was also analyzed for dissolved and total lead.
- The trip blank (CHEV-GW-MW21R-2130) was analyzed for gasoline/BTEX only.

Final laboratory data were submitted to Parametrix via a Tier II-type data report and EIM EDDs (OnSite Laboratory Reference Number 1303-003). All data and analytical QC elements were reviewed against laboratory and method QC criteria, and qualifiers were applied where judged appropriate.

DATA REVIEW SUMMARY

All samples collected were prepared and analyzed using standard methods. All analyses requested on the COC were conducted. No laboratory method or trip blank contamination was reported.

On-Site Environmental, Inc. noted the following:

- Analyses for Nitrate (as Nitrogen) were conducted past the holding time for Samples CHEV-GW-MW27-0100, CHEV-GW-MW11-0100 and CHEV-GW-MW25-0150. Parametrix noted that the other samples were also analyzed on August 5, past the 48-hour holding time.
- Sulfate PQLs were elevated (10 mg/L instead of 5.0 mg/L) for samples CHEV-GW-MW27-0100 and CHEV-GW-MW20R-0120. Sulfate was non-detected in these samples.

- Some diesel results were qualified with “U1” indicating an elevated practical quantitation limit due to interferences present in the sample. These results were not qualified based on this data review since all other analytical QC results were in control, indicating acceptable analytical accuracy and precision.
- Results for CHEV-GW-MW25-0150 were qualified with “N1” indicating that hydrocarbons in the diesel range are impacting lube oil range results.

Analytical Resources Inc. noted the following:

- Analyses for ferrous iron were conducted past the holding time for all samples.
- The cooler temperature at receipt for the ferrous iron samples was above the recommended 6 degrees C.

A comparison of results between the sample and duplicate for BTEX/gasoline and diesel/lube oil were within acceptable ranges of precision.

CONCLUSION

Appropriate standard methods were used. No laboratory method blank contamination was observed. Analytical accuracy and precision were determined to be generally acceptable based on this review.

Nitrate data for all samples should be qualified “J” as estimated due to preparation and analysis beyond the recommended holding time.

Ferrous iron data for all samples should be qualified “J” due to analysis beyond the recommended holding time.

All data reported should be considered valid as qualified and acceptable for further use.



14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

August 19, 2013

David Dinkuhn
Parametrix, Inc.
4660 Kitsap Way, Suite A
Bremerton, WA 98312

Re: Analytical Data for Project 233-1896-107
Laboratory Reference No. 1308-003

Dear David:

Enclosed are the analytical results and associated quality control data for samples submitted on August 1, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

A handwritten signature in black ink, appearing to read "DB", with a long horizontal line extending to the right.

David Baumeister
Project Manager

Enclosures

Date of Report: August 19, 2013
Samples Submitted: August 1, 2013
Laboratory Reference: 1308-003
Project: 233-1896-107

Case Narrative

Samples were collected on July 30 and 31, 2013 and received by the laboratory on August 1, 2013. They were maintained at the laboratory at a temperature of 2°C to 6°C.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Nitrate (as Nitrogen) EPA 353.2 Analysis

Samples, CHEV-GW-MW27-0100, CHEV-GW-MW11-0100 and CHEV-GW-Mw25-0150 (08-003-01-013) were analyzed out of holding time for Nitrite.

Sulfate ASTM D516-02 Analysis

Samples CHEV-GW-MW27-0100 and CHEV-GW-MW20R-0120 (08-003-01,07) PQL's were increased due to sample interference.

Please note that any other QA/QC issues associated with these extractions and analyses will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: August 19, 2013
 Samples Submitted: August 1, 2013
 Laboratory Reference: 1308-003
 Project: 233-1896-107

NWTPH-Gx/BTEX

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: CHEV-GW-MW27-0100						
Laboratory ID:	08-003-01					
Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	100	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	93	71-112				
Client ID: CHEV-GW-MW11-0110						
Laboratory ID:	08-003-02					
Benzene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	96	71-112				
Client ID: CHEV-GW-MW25-0150						
Laboratory ID:	08-003-03					
Benzene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	5.0	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	9.0	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	1200	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	102	71-112				

Date of Report: August 19, 2013
 Samples Submitted: August 1, 2013
 Laboratory Reference: 1308-003
 Project: 233-1896-107

NWTPH-Gx/BTEX

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: CHEV-GW-MW10R-0000						
Laboratory ID: 08-003-04						
Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	360	100	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	92	71-112				
Client ID: CHEV-GW-MW04R-0150						
Laboratory ID: 08-003-05						
Benzene	59	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	5.9	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	9.1	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	760	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	105	71-112				
Client ID: CHEV-GW-MW13R-0150						
Laboratory ID: 08-003-06						
Benzene	7.4	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	8.8	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	79	71-112				

Date of Report: August 19, 2013
 Samples Submitted: August 1, 2013
 Laboratory Reference: 1308-003
 Project: 233-1896-107

NWTPH-Gx/BTEX

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: CHEV-GW-MW20R-0120						
Laboratory ID:	08-003-07					
Benzene	23	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	40	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	790	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	97	71-112				
Client ID: CHEV-GW-MW26R-0150						
Laboratory ID:	08-003-08					
Benzene	5.0	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	91	71-112				
Client ID: CHEV-GW-MW22R-0150						
Laboratory ID:	08-003-09					
Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	100	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	93	71-112				

Date of Report: August 19, 2013
 Samples Submitted: August 1, 2013
 Laboratory Reference: 1308-003
 Project: 233-1896-107

NWTPH-Gx/BTEX

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: CHEV-GW-MW09R-0150						
Laboratory ID: 08-003-10						
Benzene	370	10	EPA 8021B	8-7-13	8-7-13	
Toluene	7.4	1.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	25	1.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	6.9	1.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	2.5	1.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	930	100	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	100	71-112				
Client ID: CHEV-GW-MW21R-0130						
Laboratory ID: 08-003-11						
Benzene	39	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	7.3	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	98	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	59	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	2300	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	106	71-112				
Client ID: CHEV-GW-MW21R-1130						
Laboratory ID: 08-003-12						
Benzene	33	4.0	EPA 8021B	8-2-13	8-2-13	
Toluene	6.7	4.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	82	4.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	48	4.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	4.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	2000	400	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	98	71-112				
Client ID: CHEV-GW-MW21R-2130						
Laboratory ID: 08-003-13						
Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	100	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	97	71-112				

Date of Report: August 19, 2013
 Samples Submitted: August 1, 2013
 Laboratory Reference: 1308-003
 Project: 233-1896-107

**NWTPH-Gx/BTEX
 METHOD BLANK QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0802W1					
Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	100	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	100	71-112				
Laboratory ID:	MB0802W2					
Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Toluene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Ethyl Benzene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
m,p-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
o-Xylene	ND	1.0	EPA 8021B	8-2-13	8-2-13	
Gasoline	ND	100	NWTPH-Gx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	97	71-112				
Laboratory ID:	MB0807W1					
Benzene	ND	1.0	EPA 8021B	8-7-13	8-7-13	
Toluene	ND	1.0	EPA 8021B	8-7-13	8-7-13	
Ethyl Benzene	ND	1.0	EPA 8021B	8-7-13	8-7-13	
m,p-Xylene	ND	1.0	EPA 8021B	8-7-13	8-7-13	
o-Xylene	ND	1.0	EPA 8021B	8-7-13	8-7-13	
Gasoline	ND	100	NWTPH-Gx	8-7-13	8-7-13	
Surrogate:	Percent Recovery	Control Limits				
Fluorobenzene	84	71-112				

Date of Report: August 19, 2013
 Samples Submitted: August 1, 2013
 Laboratory Reference: 1308-003
 Project: 233-1896-107

**NWTPH-Gx/BTEX
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	08-003-01							
	ORIG	DUP						
Benzene	ND	ND	NA	NA	NA	NA	NA	30
Toluene	ND	ND	NA	NA	NA	NA	NA	30
Ethyl Benzene	ND	ND	NA	NA	NA	NA	NA	30
m,p-Xylene	ND	ND	NA	NA	NA	NA	NA	30
o-Xylene	ND	ND	NA	NA	NA	NA	NA	30
Gasoline	ND	ND	NA	NA	NA	NA	NA	30
<i>Surrogate:</i>								
Fluorobenzene				93	91	71-112		
DUPLICATE								
Laboratory ID:	08-007-37							
	ORIG	DUP						
Benzene	ND	ND	NA	NA	NA	NA	NA	30
Toluene	ND	ND	NA	NA	NA	NA	NA	30
Ethyl Benzene	ND	ND	NA	NA	NA	NA	NA	30
m,p-Xylene	ND	ND	NA	NA	NA	NA	NA	30
o-Xylene	ND	ND	NA	NA	NA	NA	NA	30
Gasoline	ND	ND	NA	NA	NA	NA	NA	30
<i>Surrogate:</i>								
Fluorobenzene				93	92	71-112		
MATRIX SPIKES								
Laboratory ID:	08-003-01							
	MS	MSD	MS	MSD		MS	MSD	
Benzene	50.0	52.7	50.0	50.0	ND	100	105	78-120 5 12
Toluene	51.0	53.5	50.0	50.0	ND	102	107	80-121 5 12
Ethyl Benzene	51.5	54.0	50.0	50.0	ND	103	108	81-120 5 13
m,p-Xylene	52.0	54.3	50.0	50.0	ND	104	109	81-119 4 13
o-Xylene	52.2	54.4	50.0	50.0	ND	104	109	79-117 4 13
<i>Surrogate:</i>								
Fluorobenzene						91	97	71-112

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NWTPH-Dx

Matrix: Water
 Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags	
Client ID: CHEV-GW-MW27-0100							
Laboratory ID:	08-003-01						
Diesel Range Organics	ND	0.27	NWTPH-Dx	8-2-13	8-19-13	X1	
Lube Oil Range Organics	ND	0.43	NWTPH-Dx	8-2-13	8-19-13	X1	
Surrogate: o-Terphenyl	Percent Recovery 90	Control Limits 50-150					
Client ID: CHEV-GW-MW11-0110							
Laboratory ID:	08-003-02						
Diesel Range Organics	ND	0.27	NWTPH-Dx	8-2-13	8-19-13	X1	
Lube Oil Range Organics	ND	0.44	NWTPH-Dx	8-2-13	8-19-13	X1	
Surrogate: o-Terphenyl	Percent Recovery 89	Control Limits 50-150					
Client ID: CHEV-GW-MW25-0150							
Laboratory ID:	08-003-03						
Diesel Range Organics	2.0	0.26	NWTPH-Dx	8-2-13	8-2-13	N1	
Lube Oil	0.48	0.41	NWTPH-Dx	8-2-13	8-2-13		
Surrogate: o-Terphenyl	Percent Recovery 90	Control Limits 50-150					
Client ID: CHEV-GW-MW04R-0150							
Laboratory ID:	08-003-05						
Diesel Range Organics	ND	0.30	NWTPH-Dx	8-2-13	8-20-13		U1,X1
Lube Oil Range Organics	ND	0.41	NWTPH-Dx	8-2-13	8-20-13	X1	
Surrogate: o-Terphenyl	Percent Recovery 84	Control Limits 50-150					
Client ID: CHEV-GW-MW13R-0150							
Laboratory ID:	08-003-06						
Diesel Range Organics	0.35	0.26	NWTPH-Dx	8-2-13	8-20-13	X1	
Lube Oil Range Organics	0.64	0.42	NWTPH-Dx	8-2-13	8-20-13	X1	
Surrogate: o-Terphenyl	Percent Recovery 87	Control Limits 50-150					
Client ID: CHEV-GW-MW20R-0120							
Laboratory ID:	08-003-07						
Diesel Range Organics	ND	0.27	NWTPH-Dx	8-2-13	8-19-13	X1	
Lube Oil Range Organics	ND	0.43	NWTPH-Dx	8-2-13	8-19-13	X1	
Surrogate: o-Terphenyl	Percent Recovery 90	Control Limits 50-150					

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NWTPH-Dx

Matrix: Water
 Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: CHEV-GW-MW26R-0150						
Laboratory ID:	08-003-08					
Diesel Range Organics	ND	0.26	NWTPH-Dx	8-2-13	8-19-13	X1
Lube Oil Range Organics	ND	0.42	NWTPH-Dx	8-2-13	8-19-13	X1
Surrogate: o-Terphenyl	Percent Recovery 96	Control Limits 50-150				
Client ID: CHEV-GW-MW22R-0150						
Laboratory ID:	08-003-09					
Diesel Range Organics	ND	0.27	NWTPH-Dx	8-2-13	8-19-13	X1
Lube Oil Range Organics	ND	0.44	NWTPH-Dx	8-2-13	8-19-13	X1
Surrogate: o-Terphenyl	Percent Recovery 99	Control Limits 50-150				
Client ID: CHEV-GW-MW09R-0150						
Laboratory ID:	08-003-10					
Diesel Range Organics	ND	0.54	NWTPH-Dx	8-2-13	8-19-13	U1,X1
Lube Oil Range Organics	0.54	0.42	NWTPH-Dx	8-2-13	8-19-13	X1
Surrogate: o-Terphenyl	Percent Recovery 89	Control Limits 50-150				
Client ID: CHEV-GW-MW21R-0130						
Laboratory ID:	08-003-11					
Diesel Range Organics	ND	0.59	NWTPH-Dx	8-2-13	8-19-13	U1,X1
Lube Oil Range Organics	ND	0.43	NWTPH-Dx	8-2-13	8-19-13	X1
Surrogate: o-Terphenyl	Percent Recovery 88	Control Limits 50-150				
Client ID: CHEV-GW-MW21R-1130						
Laboratory ID:	08-003-12					
Diesel Range Organics	ND	0.65	NWTPH-Dx	8-2-13	8-19-13	U1,X1
Lube Oil Range Organics	ND	0.42	NWTPH-Dx	8-2-13	8-19-13	X1
Surrogate: o-Terphenyl	Percent Recovery 94	Control Limits 50-150				

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**NWTPH-Dx
QUALITY CONTROL**

Matrix: Water
 Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0802W1					
Diesel Range Organics	ND	0.25	NWTPH-Dx	8-2-13	8-19-13	X1
Lube Oil Range Organics	ND	0.40	NWTPH-Dx	8-2-13	8-19-13	X1
Surrogate:	Percent Recovery	Control Limits				
<i>o</i> -Terphenyl	90	50-150				
Laboratory ID:	MB0802W1					
Diesel Range Organics	ND	0.25	NWTPH-Dx	8-2-13	8-2-13	
Lube Oil Range Organics	ND	0.40	NWTPH-Dx	8-2-13	8-2-13	
Surrogate:	Percent Recovery	Control Limits				
<i>o</i> -Terphenyl	77	50-150				

Analyte	Result		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags	
DUPLICATE									
Laboratory ID:	08-003-01								
	ORIG	DUP							
Diesel Range Organics	ND	ND					NA	NA	X1
Lube Oil Range Organics	ND	ND					NA	NA	X1
Surrogate:									
o-Terphenyl			90	84	50-150				
Laboratory ID:	08-003-10								
	ORIG	DUP							
Diesel Range Organics	ND	ND					NA	NA	U1,X1
Lube Oil Range Organics	0.535	ND					NA	NA	X1
Surrogate:									
o-Terphenyl			89	93	50-150				

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NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
 Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	CHEV-GW-MW27-0100					
Laboratory ID:	08-003-01					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW11-0110					
Laboratory ID:	08-003-02					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW25-0150					
Laboratory ID:	08-003-03					
Nitrate	ND	0.050	EPA 353.2	8-9-13	8-9-13	
Client ID:	CHEV-GW-MW04R-0150					
Laboratory ID:	08-003-05					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW20R-0120					
Laboratory ID:	08-003-07					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW26R-0150					
Laboratory ID:	08-003-08					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW22R-0150					
Laboratory ID:	08-003-09					
Nitrate	0.22	0.050	EPA 353.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW09R-0150					
Laboratory ID:	08-003-10					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW21R-0130					
Laboratory ID:	08-003-11					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	

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NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
 Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0805W2					
Nitrate	ND	0.050	EPA 353.2	8-5-13	8-5-13	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	07-207-01							
	ORIG	DUP						
Nitrate	1.19	1.18	NA	NA	NA	NA	1	16

MATRIX SPIKE								
Laboratory ID:	07-207-01							
	MS	MS		MS				
Nitrate	3.39	2.00	1.19	110	84-119	NA	NA	

SPIKE BLANK								
Laboratory ID:	SB0805W1							
	SB	SB		SB				
Nitrate	2.06	2.00	NA	103	86-114	NA	NA	

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NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
 Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0809W1					
Nitrate	ND	0.050	EPA 353.2	8-9-13	8-9-13	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	08-042-01							
	ORIG	DUP						
Nitrate	ND	ND	NA	NA	NA	NA	16	

MATRIX SPIKE								
Laboratory ID:	08-042-01							
	MS	MS		MS				
Nitrate	2.16	2.00	ND	108	84-119	NA	NA	

SPIKE BLANK								
Laboratory ID:	SB0809W1							
	SB	SB		SB				
Nitrate	2.09	2.00	NA	105	86-114	NA	NA	

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SULFATE
ASTM D516-02

Matrix: Water
 Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	CHEV-GW-MW27-0100					
Laboratory ID:	08-003-01					
Sulfate	ND	10	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW11-0110					
Laboratory ID:	08-003-02					
Sulfate	ND	5.0	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW25-0150					
Laboratory ID:	08-003-03					
Sulfate	1100	250	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW04R-0150					
Laboratory ID:	08-003-05					
Sulfate	ND	5.0	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW20R-0120					
Laboratory ID:	08-003-07					
Sulfate	ND	10	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW26R-0150					
Laboratory ID:	08-003-08					
Sulfate	2000	500	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW22R-0150					
Laboratory ID:	08-003-09					
Sulfate	510	130	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW09R-0150					
Laboratory ID:	08-003-10					
Sulfate	ND	5.0	ASTM D516-02	8-8-13	8-8-13	
Client ID:	CHEV-GW-MW21R-0130					
Laboratory ID:	08-003-11					
Sulfate	ND	5.0	ASTM D516-02	8-8-13	8-8-13	

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**SULFATE
 ASTM D516-02
 QUALITY CONTROL**

Matrix: Water

Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0808W1					
Sulfate	ND	5.0	ASTM D516-02	8-8-13	8-8-13	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	08-042-01							
	ORIG	DUP						
Sulfate	63.3	60.4	NA	NA	NA	NA	5	10

MATRIX SPIKE

Laboratory ID:	08-042-01							
	MS	MS		MS				
Sulfate	109	50.0	63.3	91	82-123	NA	NA	

SPIKE BLANK

Laboratory ID:	SB0808W1							
	SB	SB		SB				
Sulfate	10.0	10.0	NA	100	91-114	NA	NA	

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**SULFATE
 ASTM D516-02
 QUALITY CONTROL**

Matrix: Water
 Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0806F1					
Sulfate	ND	5.0	ASTM D516-02	8-8-13	8-8-13	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	08-003-10							
	ORIG	DUP						
Sulfate	ND	ND	NA	NA	NA	NA	10	

MATRIX SPIKE								
Laboratory ID:	08-003-10							
	MS	MS		MS				
Sulfate	11.1	10.0	ND	111	82-123	NA	NA	

SPIKE BLANK								
Laboratory ID:	SB0806F1							
	SB	SB		SB				
Sulfate	10.9	10.0	NA	109	91-114	NA	NA	

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TOTAL ALKALINITY
EPA 310.2

Matrix: Water
 Units: mg CaCO₃/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	CHEV-GW-MW27-0100					
Laboratory ID:	08-003-01					
Alkalinity	310	50	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW11-0110					
Laboratory ID:	08-003-02					
Alkalinity	160	50	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW25-0150					
Laboratory ID:	08-003-03					
Alkalinity	130	20	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW04R-0150					
Laboratory ID:	08-003-05					
Alkalinity	3300	500	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW20R-0120					
Laboratory ID:	08-003-07					
Alkalinity	270	50	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW26R-0150					
Laboratory ID:	08-003-08					
Alkalinity	200	20	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW22R-0150					
Laboratory ID:	08-003-09					
Alkalinity	200	20	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW09R-0150					
Laboratory ID:	08-003-10					
Alkalinity	85	10	EPA 310.2	8-5-13	8-5-13	
Client ID:	CHEV-GW-MW21R-0130					
Laboratory ID:	08-003-11					
Alkalinity	1800	250	EPA 310.2	8-5-13	8-5-13	

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**TOTAL ALKALINITY
 EPA 310.2
 QUALITY CONTROL**

Matrix: Water
 Units: mg CaCO₃/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0805W1					
Alkalinity	ND	10	EPA 310.2	8-5-13	8-5-13	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	08-003-02							
	ORIG	DUP						
Alkalinity	161	169	NA	NA	NA	NA	5	26

MATRIX SPIKE

Laboratory ID:	08-003-02							
	MS	MS		MS				
Alkalinity	431	250	161	108	71-124	NA	NA	

SPIKE BLANK

Laboratory ID:	SB0805W1							
	SB	SB		SB				
Alkalinity	49.0	50.0	NA	98	82-112	NA	NA	

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CHLORIDE
SM 4500-Cl E

Matrix: Water
 Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	CHEV-GW-MW27-0100					
Laboratory ID:	08-003-01					
Chloride	20	2.0	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW11-0110					
Laboratory ID:	08-003-02					
Chloride	9.7	2.0	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW25-0150					
Laboratory ID:	08-003-03					
Chloride	8000	400	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW04R-0150					
Laboratory ID:	08-003-05					
Chloride	520	20	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW20R-0120					
Laboratory ID:	08-003-07					
Chloride	28	2.0	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW26R-0150					
Laboratory ID:	08-003-08					
Chloride	14000	400	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW22R-0150					
Laboratory ID:	08-003-09					
Chloride	4100	100	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW09R-0150					
Laboratory ID:	08-003-10					
Chloride	35	2.0	SM 4500-Cl E	8-1-13	8-1-13	
Client ID:	CHEV-GW-MW21R-0130					
Laboratory ID:	08-003-11					
Chloride	120	4.0	SM 4500-Cl E	8-1-13	8-1-13	

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**CHLORIDE
 SM 4500-Cl E
 QUALITY CONTROL**

Matrix: Water

Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0801W1					
Chloride	ND	2.0	SM 4500-Cl E	8-1-13	8-1-13	

Analyte	Result	Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	07-207-01							
	ORIG	DUP						
Chloride	5.76	5.49	NA	NA	NA	NA	5	11

MATRIX SPIKE

Laboratory ID:	07-207-01							
	MS	MS		MS				
Chloride	54.7	50.0	5.76	98	94-126	NA	NA	

SPIKE BLANK

Laboratory ID:	SB0801W1							
	SB	SB		SB				
Chloride	50.8	50.0	NA	102	94-124	NA	NA	

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**DISSOLVED METHANE
RSK 175**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID: CHEV-GW-MW27-0100						
Laboratory ID:	08-003-01					
Methane	5200	1000	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW11-0110						
Laboratory ID:	08-003-02					
Methane	390	100	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW25-0150						
Laboratory ID:	08-003-03					
Methane	57	10	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW04R-0150						
Laboratory ID:	08-003-05					
Methane	540	100	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW20R-0120						
Laboratory ID:	08-003-07					
Methane	2000	500	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW26R-0150						
Laboratory ID:	08-003-08					
Methane	16	2.0	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW22R-0150						
Laboratory ID:	08-003-09					
Methane	3.3	1.0	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW09R-0150						
Laboratory ID:	08-003-10					
Methane	7100	1000	RSK 175	8-8-13	8-8-13	
Client ID: CHEV-GW-MW21R-0130						
Laboratory ID:	08-003-11					
Methane	2200	1000	RSK 175	8-8-13	8-8-13	

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**DISSOLVED METHANE
 RSK 175
 QUALITY CONTROL**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0808W1					
Methane	ND	1.0	RSK 175	8-8-13	8-8-13	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS											
Laboratory ID:	SB0808W1										
	SB	SBD	SB	SBD		SB	SBD				
Methane	3.77	3.82	4.42	4.42	N/A	85	86	70-130	1	25	

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TOTAL LEAD
EPA 200.8

Matrix: Water
Units: ug/L (ppb)

				Date	Date	
Analyte	Result	PQL	EPA Method	Prepared	Analyzed	Flags
Lab ID:	08-003-10					
Client ID:	CHEV-GW-MW09R-0150					
Lead	3.9	1.1	200.8	8-2-13	8-8-13	

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**TOTAL LEAD
EPA 200.8
METHOD BLANK QUALITY CONTROL**

Date Extracted: 8-2-13
Date Analyzed: 8-8-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: MB0802WM1

Analyte	Method	Result	PQL
Lead	200.8	ND	1.1

Date of Report: August 19, 2013
Samples Submitted: August 1, 2013
Laboratory Reference: 1308-003
Project: 233-1896-107

**TOTAL LEAD
EPA 200.8
DUPLICATE QUALITY CONTROL**

Date Extracted: 8-2-13
Date Analyzed: 8-8-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 07-222-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Lead	ND	ND	NA	1.1	

Date of Report: August 19, 2013
Samples Submitted: August 1, 2013
Laboratory Reference: 1308-003
Project: 233-1896-107

**TOTAL LEAD
EPA 200.8
MS/MSD QUALITY CONTROL**

Date Extracted: 8-2-13

Date Analyzed: 8-8-13

Matrix: Water

Units: ug/L (ppb)

Lab ID: 07-222-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Lead	111	108	97	107	97	1	

Date of Report: August 19, 2013
 Samples Submitted: August 1, 2013
 Laboratory Reference: 1308-003
 Project: 233-1896-107

**DISSOLVED METALS
 EPA 200.8/6010C**

Matrix: Water
 Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	08-003-01					
Client ID:	CHEV-GW-MW27-0100					
Manganese	6500	110	6010C		8-6-13	
Lab ID:	08-003-02					
Client ID:	CHEV-GW-MW11-0110					
Manganese	3800	110	6010C		8-6-13	
Lab ID:	08-003-03					
Client ID:	CHEV-GW-MW25-0150					
Manganese	2700	110	6010C		8-6-13	
Lab ID:	08-003-05					
Client ID:	CHEV-GW-MW04R-0150					
Manganese	6500	110	6010C		8-6-13	
Lab ID:	08-003-07					
Client ID:	CHEV-GW-MW20R-0120					
Manganese	2600	110	6010C		8-6-13	
Lab ID:	08-003-08					
Client ID:	CHEV-GW-MW26R-0150					
Manganese	260	110	6010C		8-6-13	
Lab ID:	08-003-09					
Client ID:	CHEV-GW-MW22R-0150					
Manganese	770	110	6010C		8-6-13	
Lab ID:	08-003-10					
Client ID:	CHEV-GW-MW09R-0150					
Lead	ND	1.1	200.8		8-2-13	
Manganese	4500	11	6010C		8-6-13	
Lab ID:	08-003-11					
Client ID:	CHEV-GW-MW21R-0130					
Manganese	3400	110	6010C		8-6-13	

Date of Report: August 19, 2013
Samples Submitted: August 1, 2013
Laboratory Reference: 1308-003
Project: 233-1896-107

**DISSOLVED METALS
EPA 200.8/6010C
METHOD BLANK QUALITY CONTROL**

Date Analyzed: 8-2&6-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: MB0802D1

Analyte	Method	Result	PQL
Lead	200.8	ND	1.0
Manganese	6010C	ND	11

Date of Report: August 19, 2013
Samples Submitted: August 1, 2013
Laboratory Reference: 1308-003
Project: 233-1896-107

**DISSOLVED METALS
EPA 200.8/6010C
DUPLICATE QUALITY CONTROL**

Date Analyzed: 8-2&6-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 08-003-10

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Lead	ND	ND	NA	1.1	
Manganese	4550	4520	1	11	

Date of Report: August 19, 2013
Samples Submitted: August 1, 2013
Laboratory Reference: 1308-003
Project: 233-1896-107

**DISSOLVED METALS
EPA 200.8/6010C
MS/MSD QUALITY CONTROL**

Date Analyzed: 8-2&6-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 08-003-10

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Lead	111	109	98	118	106	8	
Manganese	111	4640	83	4650	91	0	



Data Qualifiers and Abbreviations

- A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.
- B - The analyte indicated was also found in the blank sample.
- C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.
- E - The value reported exceeds the quantitation range and is an estimate.
- F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.
- H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.
- I - Compound recovery is outside of the control limits.
- J - The value reported was below the practical quantitation limit. The value is an estimate.
- K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.
- L - The RPD is outside of the control limits.
- M - Hydrocarbons in the gasoline range are impacting the diesel range result.
- M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.
- N - Hydrocarbons in the lube oil range are impacting the diesel range result.
- N1 - Hydrocarbons in diesel range are impacting lube oil range results.
- O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.
- P - The RPD of the detected concentrations between the two columns is greater than 40.
- Q - Surrogate recovery is outside of the control limits.
- S - Surrogate recovery data is not available due to the necessary dilution of the sample.
- T - The sample chromatogram is not similar to a typical _____.
- U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
- U1 - The practical quantitation limit is elevated due to interferences present in the sample.
- V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.
- W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.
- X - Sample extract treated with a mercury cleanup procedure.
- X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.
- Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.
- Z -
- ND - Not Detected at PQL
- PQL - Practical Quantitation Limit
- RPD - Relative Percent Difference



Analytical Resources, Incorporated
Analytical Chemists and Consultants

2 August 2013

David Baumeister
OnSite Environmental, Inc.
14648 NE 95th
Redmond, WA 98052

RE: Client Project: Chevron Property
ARI Job No: WZ49

Dear David:

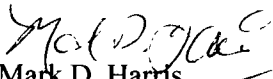
Please find enclosed the chain-of-custody (COC) records and the final results for the samples from the project referenced above. Analytical Resources, Inc. (ARI) accepted nine water samples on August 1, 2013. The samples were analyzed for ferrous iron as requested. It was noted upon sample receipt that the holding time for all samples had expired. Per Blair Goodrow, all samples were analyzed as quickly as possible.

These analyses proceeded without incident of note.

An electronic copy of these reports will remain on file at ARI. Should you have any questions, please contact me at your convenience.

Sincerely,

ANALYTICAL RESOURCES, INC.


Mark D. Harris
Project Manager
206/695-6210
markh@arilabs.com

Enclosures

cc: file WZ49

MDH/mdh



Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page 1 of 2

WZL

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Chain of Custody

[illegible]



Cooler Receipt Form

ARI Client Parametrix

Project Name: Chevron Property

COC No(s): _____ (NA)

Delivered by Fed-Ex UPS Courier Hand Delivered Other Thunderdog

Assigned ARI Job No. _____

Tracking No. _____ NA

Preliminary Examination Phase.

Were intact, properly signed and dated custody seals attached to the outside of to cooler? YES (NO)
Were custody papers included with the cooler? YES NO
Were custody papers properly filled out (ink, signed, etc) . YES NO
Temperature of Cooler(s) (°C) (recommended 2 0-6 0 °C for chemistry) . 14.8
If cooler temperature is out of compliance fill out form 00070F
Cooler Accepted by: JM Date: 8/1/13 Time: 1030 Temp Gun ID# 90877952

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler? YES (NO)
What kind of packing material was used? ... Bubble Wrap (Wet Ice) Gel Packs Baggies Foam Block Paper Other: _____
Was sufficient ice used (if appropriate)? NA YES (NO)
Were all bottles sealed in individual plastic bags? YES (NO)
Did all bottles arrive in good condition (unbroken)? YES NO
Were all bottle labels complete and legible? YES NO
Did the number of containers listed on COC match with the number of containers received? YES NO
Did all bottle labels and tags agree with custody papers? YES NO
Were all bottles used correct for the requested analyses? YES NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) . NA YES NO
Were all VOC vials free of air bubbles? NA YES NO
Was sufficient amount of sample sent in each bottle? YES NO
Date VOC Trip Blank was made at ARI.... NA
Was Sample Split by ARI: (NA) YES Date/Time: _____ Equipment _____ Split by: _____

Samples Logged by: JM Date: 8/1/13 Time: 1042

** Notify Project Manager of discrepancies or concerns **

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

Small Air Bubbles ≤ 2mm	Peabubbles 2-4 mm	LARGE Air Bubbles ≥ 4 mm

Small → "sm"
Peabubbles → "pb"
Large → "lg"
Headspace → "hs"



**Analytical Resources,
Incorporated**
Analytical Chemists and
Consultants

Cooler Temperature Compliance Form

[illegible]

Completed by M Date: 8/1/13 Time: 1142

00070F

Cooler Temperature Compliance Form

Version 000
3/3/09





ARI Job No: WZ49

PC: Mark
VTSR: 08/01/13

Inquiry Number: NONE
Analysis Requested: 08/01/13
Contact: Baumeister, David
Client: OnSite Environmental, Inc.
Logged by: JM
Sample Set Used: Yes-481
Validatable Package: No
Deliverables:

Project #: 233 1896 107
Project: Chevron Property
Sample Site:
SDG No:
Analytical Protocol: In-house

LOGNUM ARI ID	CLIENT ID	CN >12	WAD >12	NH3 <2	COD <2	FOG <2	MET <2	PHEN <2	PHOS <2	TKN <2	NO23 <2	TOC <2	S2 >9	TPHD <2	Fe2+ <2	DMET DOC FLT FLT	PARAMETER	ADJUSTED TO	LOT NUMBER	AMOUNT ADDED	DATE/BY
13-16007 WZ49A	CHEV-GW-MW27-0100															N/C					
13-16008 WZ49B	CHEV-GW-MW11-0110																				
13-16009 WZ49C	CHEV-GW-MW25-01500																				
13-16010 WZ49D	CHEV-GW-MW04R-0150																				
13-16011 WZ49E	CHEV-GW-MW20R-0120																				
13-16012 WZ49F	CHEV-GW-MW26R-0150																				
13-16013 WZ49G	CHEV-GW-MW22R-0150																				
13-16014 WZ49H	CHEV-GW-MW09R-0150																				
13-16015 WZ49I	CHEV-GW-MW21R-0130															T					

Checked By JW Date 5/1/13

Subject: RE: Chevron
From: David Baumeister <dbaumeister@onsite-env.com>
Date: 8/1/2013 11:10 AM
To: Mark Harris <markh@arilabs.com>

Hi Mark, This is Blair - David's out. Yes, please run the samples, even though they are out of hold time.

Please call or e-mail me with any questions.
 Thank you,
 Blair (for David)

Also note that we have implemented paperless reporting. If you are in need of a hardcopy of your report or your invoice, please let me know.

David A. Baumeister
 Project Manager

Celebrating 20 years in business

14648 NE 95th Street, Redmond, WA 98052
 T: 425.883.3881 C: 206.550.2483
dbaumeister@onsite-env.com
www.onsite-env.com

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This email has been scanned by AppRiver's SecureTide® virus protection system.
 For more information please visit <http://www.appriver.com>

-----Original Message-----

From: Mark Harris [<mailto:markh@arilabs.com>]
 Sent: Thursday, August 01, 2013 10:37 AM
 To: David Baumeister
 Subject: Chevron

David:

FYI: These are all out of holding. We can do them if you wish. \$45.00 each.

Mark H.

--

Mark Harris
 Project Manager
 Analytical Resources, Inc.
 206/695-6210

Sample ID Cross Reference Report



ARI Job No: WZ49
Client: OnSite Environmental, Inc.
Project Event: 233 1896 107
Project Name: Chevron Property

Sample ID	ARI Lab ID	ARI LIMS ID	Matrix	Sample Date/Time	VTSR
1. CHEV-GW-MW27-0100	WZ49A	13-16007	Water	07/30/13 10:25	08/01/13 10:30
2. CHEV-GW-MW11-0110	WZ49B	13-16008	Water	07/30/13 11:30	08/01/13 10:30
3. CHEV-GW-MW25-01500	WZ49C	13-16009	Water	07/30/13 12:30	08/01/13 10:30
4. CHEV-GW-MW04R-0150	WZ49D	13-16010	Water	07/30/13 14:45	08/01/13 10:30
5. CHEV-GW-MW20R-0120	WZ49E	13-16011	Water	07/31/13 09:00	08/01/13 10:30
6. CHEV-GW-MW26R-0150	WZ49F	13-16012	Water	07/31/13 10:30	08/01/13 10:30
7. CHEV-GW-MW22R-0150	WZ49G	13-16013	Water	07/31/13 11:45	08/01/13 10:30
8. CHEV-GW-MW09R-0150	WZ49H	13-16014	Water	07/31/13 14:00	08/01/13 10:30
9. CHEV-GW-MW21R-0130	WZ49I	13-16015	Water	07/31/13 15:00	08/01/13 10:30



Data Reporting Qualifiers

Effective 2/14/2011

Inorganic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Duplicate RPD is not within established control limits
- B Reported value is less than the CRDL but $\geq$ the Reporting Limit
- N Matrix Spike recovery not within established control limits
- NA Not Applicable, analyte not spiked
- H The natural concentration of the spiked element is so much greater than the concentration spiked that an accurate determination of spike recovery is not possible
- L Analyte concentration is ≤ 5 times the Reporting Limit and the replicate control limit defaults to ± 1 RL instead of the normal 20% RPD

Organic Data

- U Indicates that the target analyte was not detected at the reported concentration
- * Flagged value is not within established control limits
- B Analyte detected in an associated Method Blank at a concentration greater than one-half of ARI's Reporting Limit or 5% of the regulatory limit or 5% of the analyte concentration in the sample.
- J Estimated concentration when the value is less than ARI's established reporting limits
- D The spiked compound was not detected due to sample extract dilution
- E Estimated concentration calculated for an analyte response above the valid instrument calibration range. A dilution is required to obtain an accurate quantification of the analyte.
- Q Indicates a detected analyte with an initial or continuing calibration that does not meet established acceptance criteria ($<20\%$ RSD, $<20\%$ Drift or minimum RRF).



- S Indicates an analyte response that has saturated the detector. The calculated concentration is not valid; a dilution is required to obtain valid quantification of the analyte
- NA The flagged analyte was not analyzed for
- NR Spiked compound recovery is not reported due to chromatographic interference
- NS The flagged analyte was not spiked into the sample
- M Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
- M2 The sample contains PCB congeners that do not match any standard Aroclor pattern. The PCBs are identified and quantified as the Aroclor whose pattern most closely matches that of the sample. The reported value is an estimate.
- N The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification"
- Y The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.
- EMPC Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmation ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria" **(Dioxin/Furan analysis only)**
- C The analyte was positively identified on only one of two chromatographic columns. Chromatographic interference prevented a positive identification on the second column
- P The analyte was detected on both chromatographic columns but the quantified values differ by $\geq 40\%$ RPD with no obvious chromatographic interference
- X Analyte signal includes interference from polychlorinated diphenyl ethers. **(Dioxin/Furan analysis only)**
- Z Analyte signal includes interference from the sample matrix or perfluorokerosene ions. **(Dioxin/Furan analysis only)**



Geotechnical Data

- A The total of all fines fractions. This flag is used to report total fines when only sieve analysis is requested and balances total grain size with sample weight.
- F Samples were frozen prior to particle size determination
- SM Sample matrix was not appropriate for the requested analysis. This normally refers to samples contaminated with an organic product that interferes with the sieving process and/or moisture content, porosity and saturation calculations
- SS Sample did not contain the proportion of "fines" required to perform the pipette portion of the grain size analysis
- W Weight of sample in some pipette aliquots was below the level required for accurate weighting

INORGANICS ANALYSIS DATA SHEET
Ferrous Iron by Method SM3500 FeD



Data Release Authorized: *[Signature]*
Reported: 08/02/13
Date Received: 08/01/13
Page 1 of 1

QC Report No: WZ49-OnSite Environmental, Inc.
Project: Chevron Property
233 1896 107

Client/ ARI ID	Date Sampled	Matrix	Analysis Date & Batch	RL	Result
CHEV-GW-MW27-0100 WZ49A 13-16007	07/30/13	Water	08/01/13 080113#1	2.00	42.6
CHEV-GW-MW11-0110 WZ49B 13-16008	07/30/13	Water	08/01/13 080113#1	2.00	35.9
CHEV-GW-MW25-01500 WZ49C 13-16009	07/30/13	Water	08/01/13 080113#1	4.00	108
CHEV-GW-MW04R-0150 WZ49D 13-16010	07/30/13	Water	08/01/13 080113#1	0.200	9.70
CHEV-GW-MW20R-0120 WZ49E 13-16011	07/31/13	Water	08/01/13 080113#1	0.800	29.2
CHEV-GW-MW26R-0150 WZ49F 13-16012	07/31/13	Water	08/01/13 080113#1	0.040	0.706
CHEV-GW-MW22R-0150 WZ49G 13-16013	07/31/13	Water	08/01/13 080113#1	0.040	< 0.040 U
CHEV-GW-MW09R-0150 WZ49H 13-16014	07/31/13	Water	08/01/13 080113#1	0.800	36.2
CHEV-GW-MW21R-0130 WZ49I 13-16015	07/31/13	Water	08/01/13 080113#1	0.200	7.10

Reported in mg/L

RL-Analytical reporting limit
U-Undetected at reported detection limit

METHOD BLANK RESULTS-CONVENTIONALS
WZ49-OnSite Environmental, Inc.



Matrix: Water
Data Release Authorized: 
Reported: 08/02/13

Project: Chevron Property
Event: 233 1896 107
Date Sampled: NA
Date Received: NA

Analyte	Date/Time	Units	Blank
Ferrous Iron	08/01/13 12:00	mg/L	< 0.040 U

**ANALYTICAL
RESOURCES
INCORPORATED**

Project: Chevron Property
Event: 233 1896 107
Date Sampled: NA
Date Received: NA

Water Lab Control Report-WZ49

REPLICATE RESULTS-CONVENTIONALS
WZ49-OnSite Environmental, Inc.



Matrix: Water
Data Release Authorized:
Reported: 08/02/13

A handwritten signature in black ink, appearing to be 'M. J.' or similar, written over the 'Data Release Authorized' line.

Project: Chevron Property
Event: 233 1896 107
Date Sampled: 07/30/13
Date Received: 08/01/13

Analyte	Date	Units	Sample	Replicate(s)	RPD/RSD
ARI ID: WZ49A	Client ID: CHEV-GW-MW27-0100				
Ferrous Iron	08/01/13	mg/L	42.6	42.8	0.5%

MS/MSD RESULTS-CONVENTIONALS
WZ49-OnSite Environmental, Inc.



Matrix: Water
Data Release Authorized: 
Reported: 08/02/13

Project: Chevron Property
Event: 233 1896 107
Date Sampled: 07/30/13
Date Received: 08/01/13

Analyte	Date	Units	Sample	Spike	Spike Added	Recovery
ARI ID: WZ49A Client ID: CHEV-GW-MW27-0100						
Ferrous Iron	08/01/13	mg/L	42.6	58.3	20.0	78.5%



**Onsite
Environmental Inc.**

Analytical Laboratory Testing Services
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Chain of Custody

Page 1 of 2

Turnaround Request (in working days)

(Check One)

☐ Same Day ☐ 1 Day

☐ 2 Days ☐ 3 Days

☒ Standard (7 Days)
(TPH analysis 5 Days)

☐ (other) _____

Laboratory Number:

08-003

Company: PARAMETRIX

Project Number: 233 1896 107

Project Name: CHEVRON PROPERTY

Project Manager: D. DINKUHN

Sampled by: D. DINKUHN

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix
1	CHEV-GW-MW07-0100	7/30/13	10:25	GW
2	CHEV-GW-MW11-0110		11:30	
3	CHEV-GW-MW25-0150		12:30	
4	CHEV-GW-MW10R-0000		13:45	
5	CHEV-GW-MW04R-0150		14:45	
6	CHEV-GW-MW13R-0150		16:00	
7	CHEV-GW-MW20R-0120	7/31/13	09:00	
8	CHEV-GW-MWZGR-0150		10:30	
9	CHEV-GW-MW22R-0150		11:45	
10	CHEV-GW-MW09R-0150		14:00	

Number of Containers	
NWTPH-HCID	
NWTPH-Gx/BTEX	
NWTPH-Gx	
NWTPH-Dx	
Volatiles 8260C	
Halogenated Volatiles 8260C	
Semivolatiles 8270D/SIM (with low-level PAHs)	
PAHs 8270D/SIM (low-level)	
PCBs 8082A	
Organochlorine Pesticides 8081B	
Organophosphorus Pesticides 8270D/SIM	
Chlorinated Acid Herbicides 8151A	
Total RCRA Metals/ MTCA Metals (circle one)	
TCLP Metals	
HEM (oil and grease) 1664A	
CONVENTIONALS*	
DISS. METHANE	
DISS. LEAD	
TOTAL LEAD	
DISS. MANGANESE	
TOTAL FERROUS Fe	
% Moisture	

Signature	Company	Date	Time	Comments/Special Instructions
	PMX	8/1/13	08:00	* Nitrate, Sulfate, alkalinity, Chloride
	Thunderside	8/1/13	08:00	
	Thunderside	8/1/13	12:57	
	0825	8/1/13	12:07	

Relinquished

Received

Relinquished

Received

Relinquished

Received

Relinquished

Reviewed/Date

Reviewed/Date

Data Package: Level III ☐ Level IV ☐

Electronic Data Deliverables (EDDs) ☒

Chromatograms with final report ☐

Chain of Custody

[illegible]