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November 2015

2015 4th Quarter Groundwater Monitoring Report:

Chevron Isleta Site
3401 Isleta Boulevard
Albuquerque, New Mexico
Bernalillo County

NMED PSTB Facility No. 30681

Table of Contents

List of Tables

List of Figures

List of Graphs

List of Appendices

2015 4th QUARTER GROUNDWATER MONITORING REPORT

Site Name:	Chevron Isleta
Site Address:	3401 Isleta Boulevard SW Albuquerque, New Mexico
Facility Number:	30681
Author/Consulting Company:	AECOM One Park Square 6501 Americas Parkway, N.E. Suite 900 Albuquerque, NM 87110
Date of Confirmation of Release:	Unknown
Date of Report:	November 2015

STATEMENT OF FAMILIARITY

I am familiar with the information submitted in this report and the attached documents and attest that it is true and complete to the best of my knowledge.

Sincerely,

AECOM

Dale J. Flores

Dale Flores
Project Manager

1 Introduction

This report describes the sampling activities and results from the groundwater monitoring event that occurred on October 30, 2015 at the Chevron Isleta site in Albuquerque, New Mexico.

1.1 Background

The Chevron Isleta Site (Site) is located at 3401 Isleta Boulevard southwest in the Albuquerque South Valley (Figure 1). A Walgreens store was built at the Site in 2012. Previously, remedial activities at the Site have included dig-and-haul followed by operation of a sparge/vent system. Groundwater monitoring has been on-going since 2007. The last sampling event at the Site was performed in July 2015. A total of ten monitor wells have been plugged and abandoned between 2005 and 2007. Two replacement wells (MW-8A and MW-11A) were installed at the Site in August 2012. Currently there are three active monitor wells at the Site (MW-8A, MW-11A, and MW-26) (Figure 2).

The volatile organic compounds dissolved benzene and total naphthalenes were found in groundwater above New Mexico Water Quality Control Commission (NMWQCC) groundwater standards during the last monitoring event in July 2015. The benzene concentration from monitor well MW-8A exceeded the NMWQCC groundwater standard of 10 micrograms per liter (µg/L) with a concentration of 85 µg/L. Total naphthalenes concentrations in monitor well MW-8A and MW-11A exceeded the NMWQCC groundwater standard (30 µg/L) with a concentrations of 185 and 106 µg/L, respectively. Depth to water at the Site ranges from approximately 6 to 8 feet below top of casing (toc) and groundwater flow is to the south.

1.2 Scope of Work

This groundwater monitoring report has been completed in accordance with a workplan prepared by AECOM (formerly URS Corporation) and submitted to the NMED Petroleum Storage Tank Bureau (NMED-PSTB) on September 3, 2014. The workplan was approved in a letter to URS on October 27, 2014.

The scope of work performed during this quarterly event consisted of the following activities:

- Location and evaluation of conditions of three existing monitor wells
- Gauging, purging, and sampling of three monitor wells

1.3 Summary of Observations

Upon arrival at the site, all three monitor wells were found to be in good condition and in plain sight. Groundwater was observed at an average depth of 6.59 feet below toc.

2 Previous Groundwater Monitoring Event

The previous groundwater monitoring event was performed on July 20, 2015 during which it was determined that groundwater flowed to the south at a gradient of 0.001 foot/foot (ft/ft).

Field and laboratory measurements taken during the previous groundwater monitoring event indicated the following:

- MW-8A, MW-11A, and MW-26 were gauged, purged, and sampled.
- The groundwater sample from MW-8A exceeded NMWQCC standards with 85 µg/L of dissolved benzene and 185 µg/L of total naphthalenes detected.
- The groundwater sample from MW-11A exceeded NMWQCC standards for total naphthalenes with 106 µg/L detected. Dissolved benzene declined to below the NMWQCC standard with 6.6 µg/L detected.
- Between April 2014 and January 2015, water levels rose by an average of 0.50 foot.

3 Groundwater Monitoring Activities

3.1 Fluid Level Measurements

On October 30, 2015, prior to monitor well purging and sampling, fluid levels and total depths were measured in each well with an electronic oil/water interface probe. Monitor wells were gauged in order of increasing contamination to minimize cross contamination and the interface probe was decontaminated prior to each use. During this event, groundwater elevations rose by an average of 0.01 foot and groundwater flowed at an approximate gradient of 0.001 ft/ft to the south (Figure 3), relatively consistent with historic conditions. Historic fluid level data are summarized in Table 1.

Hydraulic Gradient Calculation

MW-8A groundwater elevation = 4853.32

MW-26 groundwater elevation = 4853.17

Distance between MW-8A and MW-26 = 325 feet

(4853.32-4853.17)/325 = 0.15/325 = **0.0004 ft/ft**

3.2 Groundwater Sampling and Analyses

AECOM performed a groundwater monitoring event on October 30, 2015. Groundwater samples were collected from monitor wells MW-8A, MW-11A, and MW-26.

After monitor well gauging was completed, an initial set of field parameters were collected using a calibrated YSI/556 water parameter probe. After initial well water quality parameters were collected, monitor wells were purged of three well volumes with a new disposable bailer. During purging, water quality measurements were collected approximately every half gallon for temperature, pH, specific conductance, dissolved oxygen, and oxidation reduction potential. Purge water was temporarily contained in a 5 gallon bucket and observed for the presence of hydrocarbon sheen or non-aqueous phase liquid (NAPL), odors, and any other notable characteristics. Purge water was then discharged onsite to evaporate.

Following well purging, groundwater samples were collected by slowly lowering a new disposable bailer into the well and decanting the sample into laboratory prepared, pre-cleaned, acid-preserved sample containers. Each sample was labeled with respect to date, time, site, monitor well number, and analytical method requested. Groundwater samples were immediately placed on ice and shipped to the laboratory for analysis within the required hold times. Complete chain-of-custody records accompanied groundwater samples at all times. Each groundwater sample was analyzed by the following Environmental Protection Agency (EPA) Method:

Chevron Isleta Groundwater Analytical Requirements

Analysis	Analytical Method	Container / Preservation
Volatile Organic Compounds	EPA 8260B	3x40 ml, $HgCl_2$, 4˚C

$HgCl_2$ – mercuric chloride, ml – milliliter

Both historic and current groundwater analytical data are summarized on Table 2. Groundwater sampling procedures are attached as Appendix A. Groundwater field sampling forms are attached as Appendix B. The laboratory report from Hall Environmental Analytical Laboratory is attached as Appendix C.

3.3 Discussion of Trends and Changes

On October 30, 2015, water levels were near their historic highs. Since July 2015, water levels have risen by an average of 0.01 foot (Table 1). Dissolved benzene and/or naphthalenes at monitor wells MW-8A and MW-11A continue to be the primary contaminants of concern at the site (Figure 4).

MW-8A – From August 2012 to October 2015, dissolved benzene, total xylenes and/or total naphthalenes have exceeded NMWQCC standards at MW-8A with concentrations ranging from10 to 100 µg/L; 83 to 7,800 µg/L; and 21 to 1,300 µg/L, respectively. Total xylenes and total naphthalenes have fluctuated above and below their respective NMWQCC standards (Graph 1). Between July 20 and October 30, 2015, dissolved benzene decreased from 85 to 60 µg/L. During the same period, total naphthalenes also decreased slightly from 185 to 86 µg/L (Graph 1).

Ethylbenzene (53 µg/L), toluene (3.8 µg/L) and total xylenes (83 µg/L) were also detected, but at concentrations below their respective NMWQCC standards (Figure 4). Both contaminants of concern at MW-8A have exhibited a generally decreasing trend over time with intermittent periods of seasonal rebound.

MW-11A – Dissolved benzene concentrations have exceeded the NMWQCC standard three times since August 2012. Since August 2012, dissolved napthalenes have consistently exceeded the NMWQCC standard ranging from 40.5 to 1,060 µg/L. Between July 20, 2015 and October 30, 2015, dissolved benzene at MW-11A decreased from 6.6 to 2.9 µg/L, and remains below the NMWQCC standard. The total naphthalenes concentration (45.7 µg/L) decreased from the July 2015 (106 µg/L) and continues to exceed the NMWQCC standard of 30 µg/L (Graph 2). Both contaminants of concern at MW-11A have exhibited a generally decreasing trend over time with intermittent periods of seasonal rebound.

MW-26 – During this groundwater monitoring event, dissolved organic contaminants were not detected at monitor well MW-26. Organic contaminants have not been detected at MW-26 since at least October 1999 (Table 2).

3.4 Containment of Release

Based on groundwater flow direction and laboratory data, the dissolved phase hydrocarbon plume of contamination appears to have migrated off-site underneath the southbound turn lane of Isleta Boulevard, but have not migrated underneath Rio Bravo Boulevard. Historical data, as well as data from this monitoring event, indicate that the plume is generally stable to shrinking over time (Figure 5).

4 Summary and Conclusion

Groundwater elevations at the site have risen by an average of approximately 0.01 foot since July 2015 and are near their historical high. On October 30, 2015, dissolved benzene and total naphthalenes were the only remaining contaminants that exceed NMWQCC standards at the site. Water quality measurements of dissolved oxygen (1.62 - 2.14 mg/L) and oxidation reduction potential (-33.7 to -121.7 millivolts), along with concentration trends, indicate that there may still be contaminant loading from adsorbed phase hydrocarbons in the vicinity of MW-8A; furthermore, substantial rebound has been observed during periods of high water levels in July 2013, April 2014, April 2015, July 2015 and again during this event (Tables 1 and 2).

5 Recommendations

Relatively high dissolved oxygen and oxidation reduction potential, within the dissolved phase plume, indicate an aerobic environment which is favorable for natural attenuation processes of petroleum hydrocarbons. Furthermore, contaminant concentration trends appear to be generally decreasing over time and are within the same order of magnitude of their respective NMWQCC standards.

Adsorbed phase hydrocarbon contamination at the top of the water table appears to persist as a source of groundwater contamination, especially during periods of rising water levels. While an injection application near MW-8A may be an effective means to reduce contaminant concentrations, both economical and logistical factors are prohibitive.

Therefore, based on the data and observations found in this report and correspondence with NMED-PSTB personnel, AECOM recommends continued quarterly monitoring of natural attenuation at the site. Remedial action is not recommended.

6 References

AECOM 3rd Quarter Groundwater Monitoring Report Chevron Isleta PSTB # 30681, 3401 Isleta Boulevard, Albuquerque, New Mexico, August 2015

AECOM 2nd Quarter Groundwater Monitoring Report Chevron Isleta PSTB # 30681, 3401 Isleta Boulevard, Albuquerque, New Mexico, June 2015

AECOM 1st Quarter Groundwater Monitoring Report Chevron Isleta PSTB # 30681, 3401 Isleta Boulevard, Albuquerque, New Mexico, March 2015

Haller and Associates Inc. Groundwater Monitoring Report Chevron Isleta PSTB # 30681, 3401 Isleta Boulevard, Albuquerque, New Mexico, April 22, 2014

URS Corporation, Work Plan Submittal for Chevron Isleta (Facility ID No. 30681), Albuquerque, New Mexico, Professional Services Contract # 14-667-2000-0032, September 3, 2014

New Mexico Environment Department Petroleum Storage Tank Bureau Regulations, 20.5 NMAC, December 2003

Tables

Table 1. Groundwater Elevation

Chevron Isleta (NMED-PSTB Facility # 30681)

3401 Isleta Boulevard SW, Albuquerque, New Mexico

Well ID	Date	Casing Elevation	Depth to NAPL	Depth to Groundwater	NAPL Thickness	Groundwater Elevation
MW-8	12/10/1999	4928.80	---	7.96	---	4920.84
	11/16/2000		---	7.60	---	4921.20
	12/18/2000		---	7.91	---	4920.89
	2/20/2001		---	8.14	---	4920.66
	5/30/2001		---	7.73	---	4921.07
	8/20/2001		---	7.75	---	4921.05
	12/6/2001		---	7.95	---	4920.85
	3/8/2002		---	8.23	---	4920.57
	5/30/2002		---	7.78	---	4921.02
	9/9/2002		---	8.04	---	4920.76
	8/26/2003		---	7.96	---	4920.84
	1/29/2004		---	8.38	---	4920.42
MW-8R	4/16/2004	4928.62	---	7.63	---	4920.99
	5/10/2007		---	7.25	---	4921.37
	11/12/2007		---	7.85	---	4920.77
	9/16/2011	4860.66	---	7.62	---	4853.04
MW-8A	8/29/2012	4860.53	---	7.62	---	4852.91
	1/11/2013		---	7.95	---	4852.58
	7/15/2013		---	7.32	---	4853.21
	1/15/2014		---	7.71	---	4852.82
	4/14/2014		---	7.50	---	4853.03
	1/30/2015		---	7.80	---	4852.73
	4/29/2015		---	7.68	---	4852.85
	7/20/2015		---	7.20	---	4853.33
	10/30/2015		---	7.21	---	4853.32
MW-11	12/10/1999	4929.20	---	8.43	---	4920.77
	11/16/2000		---	8.31	---	4920.89
	12/18/2000		---	8.38	---	4920.82
	2/20/2001		---	8.61	---	4920.59
	5/30/2001		---	8.21	---	4920.99
	8/20/2001		---	8.19	---	4921.01
	12/6/2001		---	8.41	---	4920.79
	3/8/2002		---	8.71	---	4920.49
	5/30/2002		---	8.24	---	4920.96
	9/9/2002		---	8.51	---	4920.69
	8/26/2003		---	8.44	---	4920.76
	1/29/2004		---	8.86	---	4920.34
MW-11R	4/16/2004	4928.99	---	8.09	---	4920.90
	5/10/2007		---	7.77	---	4921.22
	11/12/2007		---	7.07	---	4921.92
	9/16/2011	4861.09	---	8.12	---	4920.87
MW-11A	8/29/2012	4859.69	---	6.74	---	4852.95
	1/11/2013		---	7.07	---	4852.62
	7/15/2013		---	6.49	---	4853.20
	1/15/2014		---	6.89	---	4852.80
	4/14/2014		---	6.62	---	4853.07
	1/30/2015		---	6.94	---	4852.75
	4/29/2015		---	6.87	---	4852.82
	7/20/2015		---	6.32	---	4853.37
	10/30/2015		---	6.31	---	4853.38

--- not detected

NAPL non-aqueous phase liquid

All depths recorded relative to top of casing

All elevations recorded relative to mean sea level

Table 1. Groundwater Elevation
Chevron Isleta (NMED-PSTB Facility # 30681)
3401 Isleta Boulevard SW, Albuquerque, New Mexico

Well ID	Date	Casing Elevation	Depth to NAPL	Depth to Groundwater	NAPL Thickness	Groundwater Elevation
MW-26	12/10/1999	4927.33	---	7.03	---	4920.30
	12/18/2000		---	6.77	---	4920.56
	2/20/2001		---	6.99	---	4920.34
	5/30/2001		---	6.53	---	4920.80
	8/20/2001		---	6.53	---	4920.80
	12/6/2001		---	6.79	---	4920.54
	3/8/2002		---	7.09	---	4920.24
	5/30/2002		---	6.54	---	4920.79
	9/9/2002		---	7.82	---	4919.51
	8/26/2003		---	6.74	---	4920.59
	1/29/2004		---	7.23	---	4920.10
	4/16/2004		---	6.40	---	4920.93
	5/10/2007		---	6.24	---	4921.09
	11/12/2007		---	6.60	---	4920.73
	9/16/2011	4859.41	---	6.67	---	4852.74
	8/29/2012		---	6.67	---	4852.74
	1/11/2013		---	7.06	---	4852.35
	7/15/2013		---	6.51	---	4852.90
	1/15/2014		---	6.90	---	4852.51
	4/14/2014		---	6.65	---	4852.76
	1/30/2015		---	6.95	---	4852.46
	4/29/2015		---	6.75	---	4852.66
	7/20/2015		---	6.28	---	4853.13
	10/30/2015		---	6.24	---	4853.17

--- not detected
NAPL non-aqueous phase liquid
All depths recorded relative to top of casing
All elevations recorded relative to mean sea level

Table 2. Groundwater Organics Results
Chevron Isleta (NMED-PSTB Faciltiy # 30681)
3401 Isleta Boulevard SW, Albuquerque, New Mexico

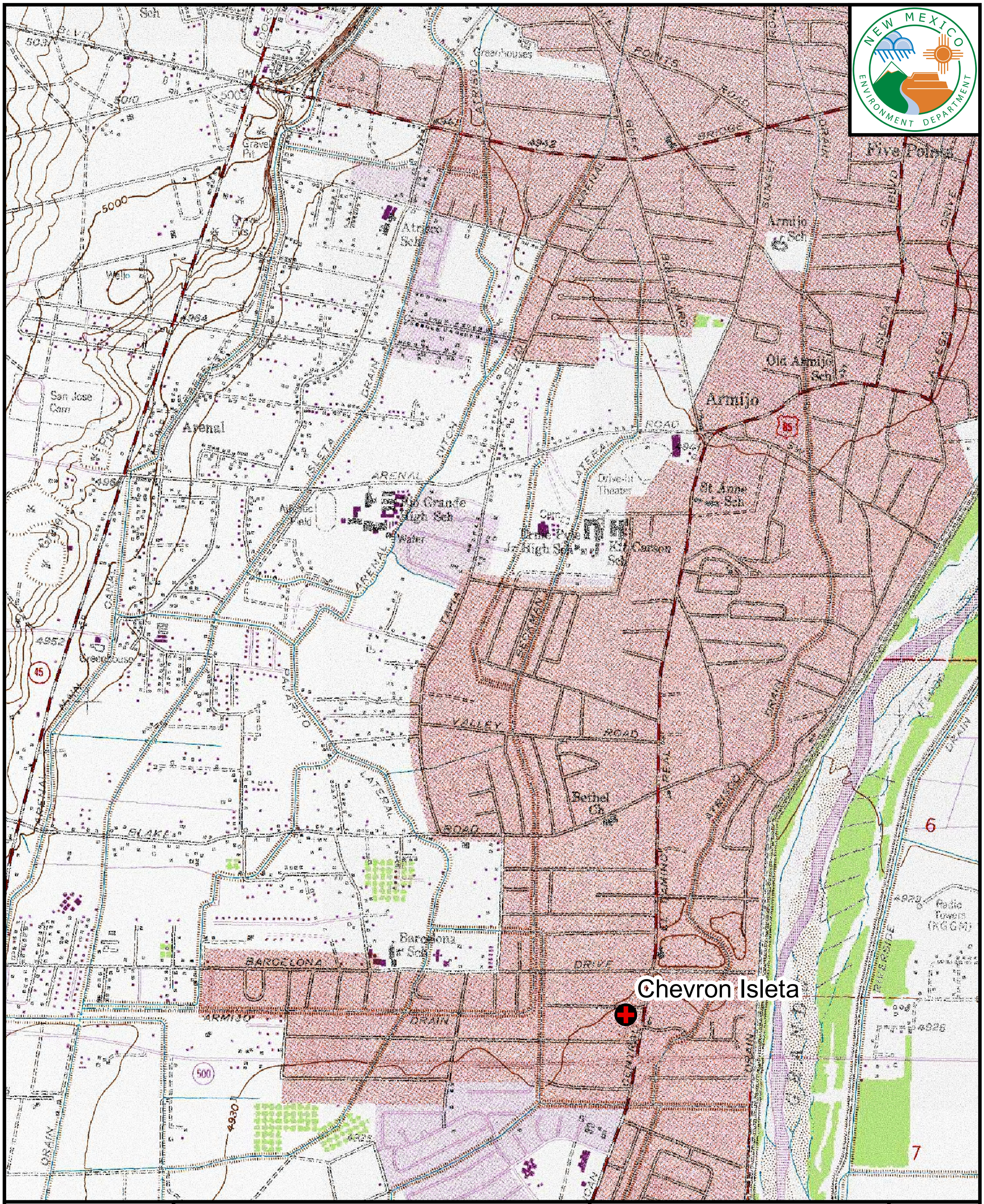
Well ID	Sample Date	Benzene	Toluene	Ethylbenzene	Xylenes	Ethylene Dibromide	Ethylene Dichloride	Methyl Tert Butyl Ether	Total Naphthalenes
NMWQCC/EIB Standards (ug/L)		**10**	**750**	**750**	**620**	**0.1**	**10**	**100**	**30**
MW-8	10/26/1995	**1800**	87	440	510	NA	NA	BDL	NA
	6/24/1997	**1100**	74	430	**820**	NA	NA	BDL	NA
	10/8/1999	**2100**	BDL	180	350	NA	NA	BDL	BDL
	12/10/1999	**3700**	90	580	**1147**	NA	NA	BDL	BDL
	11/16/2000	**1600**	99	730	**2020**	NA	NA	BDL	BDL
	12/18/2000	**3200**	**1300**	**2100**	**10900**	NA	NA	BDL	BDL
	2/21/2001	**4000**	**870**	**2600**	**12800**	NA	NA	BDL	1.5
	5/30/2001	**2000**	690	**1900**	**10700**	NA	NA	BDL	BDL
	8/20/2001	**2600**	**780**	**2200**	**13600**	NA	NA	BDL	BDL
	12/6/2001	**2500**	610	**1900**	**11900**	NA	NA	BDL	3.1
	3/8/2002	**630**	150	610	**3600**	NA	NA	BDL	BDL
	5/30/2002	**1200**	290	**1500**	**9400**	NA	NA	BDL	2.01
	9/9/2002	**490**	74	560	**3220**	NA	NA	BDL	BDL
	8/26/2003	**2400**	79	**2000**	**6810**	NA	NA	BDL	BDL
	1/29/2004	**1200**	17	**830**	**2121**	NA	NA	BDL	BDL
MW-8R	4/16/2004	**1100**	**2600**	**3800**	**19100**	NA	NA	BDL	**2290**
	5/10/2007	**440**	BDL	**1000**	**2200**	BDL	NA	BDL	**460**
	11/12/2007	**790**	BDL	**1700**	**1600**	BDL	NA	BDL	**540**
	9/16/2011	**360**	2.8	72	5.6	<1.0	<1.0	<1.0	**582**
MW-8A	8/29/2012	**64**	95	**2100**	**7800**	<10	<10	<10	**1300**
	1/11/2013	**22**	14	340	**1200**	<1.0	<1.0	<1.0	**250**
	7/15/2013	**40**	12	260	**890**	<10	<10	<10	**100**
	1/15/2014	**19**	<10	230	**1000**	<10	<10	<10	**76**
	4/14/2014	**65**	<10	190	**810**	<10	<10	<10	**87**
	1/30/2015	**10**	0.81	40	120	<0.50	<0.50	<0.50	21
	4/29/2015	**100**	14	110	200	<1.0	<1.0	<1.0	**195**
	7/20/2015	**85**	7.0	53	120	<1.0	<1.0	<1.0	**185**
	10/30/2015	**60**	3.8	53	83	<1.0	<1.0	<1.0	**86**
MW-11	10/8/1999	**610**	BDL	150	130	NA	NA	BDL	**32**
	12/10/1999	**700**	BDL	260	280	NA	NA	BDL	**73**
	11/16/2000	**680**	32	300	377	NA	NA	BDL	**120**
	12/20/2000	**600**	7.7	330	414	NA	NA	BDL	**110**
	2/21/2001	**1000**	17	460	**740**	NA	NA	BDL	**120**
	5/30/2001	**1100**	9.2	480	548	NA	NA	BDL	**160**
	8/20/2001	**710**	BDL	290	240	NA	NA	BDL	**189**
	12/6/2001	**680**	1.5	160	160	NA	NA	BDL	**121**
	3/8/2002	**610**	BDL	250	290	NA	NA	BDL	**156**
	5/30/2002	**430**	1.2	200	151	NA	NA	BDL	**571**
	9/9/2002	**50**	BDL	28	14	NA	NA	BDL	**42**
	8/26/2003	**590**	1.8	200	171	NA	NA	BDL	**275**
	1/29/2004	**490**	1.1	120	77	NA	NA	BDL	**181**
MW-11R	4/16/2004	**1200**	690	**4100**	**14700**	NA	NA	BDL	**2310**
	5/10/2007	**16**	5.2	45	120	BDL	NA	BDL	5.1
	11/12/2007	**23**	BDL	7	BDL	BDL	NA	BDL	BDL
	9/16/2011	**39**	<1.0	15	2.4	<1.0	<1.0	<1.0	**105**
MW-11A	8/29/2012	**26**	<10	230	40	<10	<10	<10	**1060**
	1/11/2013	2.5	<1.0	9.7	<1.5	<1.0	<1.0	<1.0	**126**
	7/15/2013	**13**	<1.0	9.3	<1.5	<1.0	<1.0	<1.0	**81**
	1/15/2014	4.3	<1.0	7.2	<1.5	<1.0	<1.0	<1.0	**58**
	4/14/2014	1.6	<1.0	13	3.3	<1.0	<1.0	<1.0	**40.5**
	1/30/2015	5.4	<0.50	4.7	<1.5	<0.50	<0.50	<0.50	**43**
	4/29/2015	**13**	1.3	27	15	<1.0	<1.0	<1.0	**86**
	7/20/2015	6.6	1.1	7.1	3.9	<1.0	<1.0	<1.0	**106**
	10/30/2015	2.9	<1.0	3.4	<1.5	<1.0	<1.0	<1.0	**45.7**
MW-26	10/8/1999	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	12/10/1999	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	12/18/2000	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	2/20/2001	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	5/30/2001	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	8/20/2001	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	12/6/2001	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	3/8/2002	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	5/30/2002	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	9/9/2002	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	8/26/2003	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	1/29/2004	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	4/16/2004	NS	NS	NS	NS	NS	NS	NS	NS
	5/10/2007	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	11/12/2007	BDL	BDL	BDL	BDL	NA	NA	BDL	BDL
	9/16/2011	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
	8/29/2012	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
	1/11/2013	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
	7/15/2013	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
	1/15/2014	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
	4/14/2014	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<4.0
	1/30/2015	<0.50	<0.50	<0.50	<1.5	<0.50	<0.50	<0.50	<2..5
	4/29/2015	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<10.0
	7/20/2015	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<10.0
	10/30/2015	<1.0	<1.0	<1.0	<1.5	<1.0	<1.0	<1.0	<10.0

ug/L	**micrograms per liter**
NAPL	**non-aqueous phase liquid**
NMWQCC	**New Mexico Water Quality Control Board**
EIB	**Environmental Improvment Board**

Data presented in bold exceeds NMWQCC/EIB standards

Figures

NEW MEXICO ENVIRONMENT DEPARTMENT



AECOM

6501 Americas Pkwy NE
Suite 900
Albuquerque, NM 87110

N

Source: USGS Albuquerque West 7.5 Minute Topo
http://rgis.unm.edu/

0 0.35 0.7 Miles

SITE LOCATION

CHEVRON ISLETA
3401 ISLETA BOULEVARD SW
ALBUQUERQUE, NM

FIGURE 1

Legend

▲ Monitoring Well Location

● Utility Locations

AECOM

6501 Americas Pkwy NE
Suite 900
Albuquerque, NM 87110

N

Source: MRCOG 2014 Digital OrthoImagery
http://www.bernco.gov/gis-program/

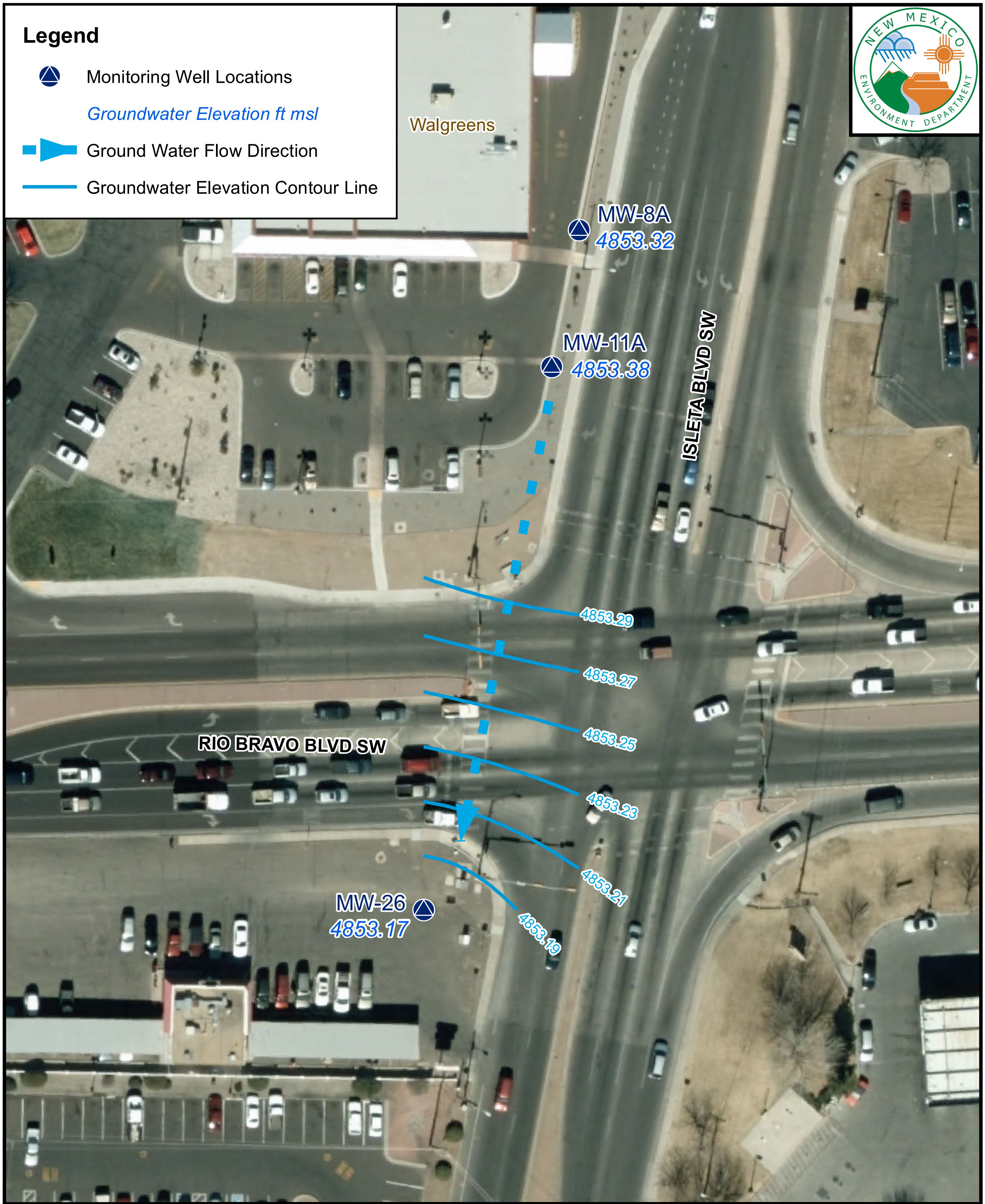
1 inch = 60 feet

0 30 60 120 Feet

SITE MAP

CHEVRON ISLETA
3401 ISLETA BOULEVARD SW
ALBUQUERQUE, NM

FIGURE 2



Legend

- ▲ Monitoring Well Locations
- *Groundwater Elevation ft msl*
- ➤ Ground Water Flow Direction
- — Groundwater Elevation Contour Line

AECOM
6501 Americas Pkwy NE
Suite 900
Albuquerque, NM 87110

Source: MRCOG 2014 Digital OrthoImagery
http://www.bernco.gov/gis-program/

1 inch = 60 feet

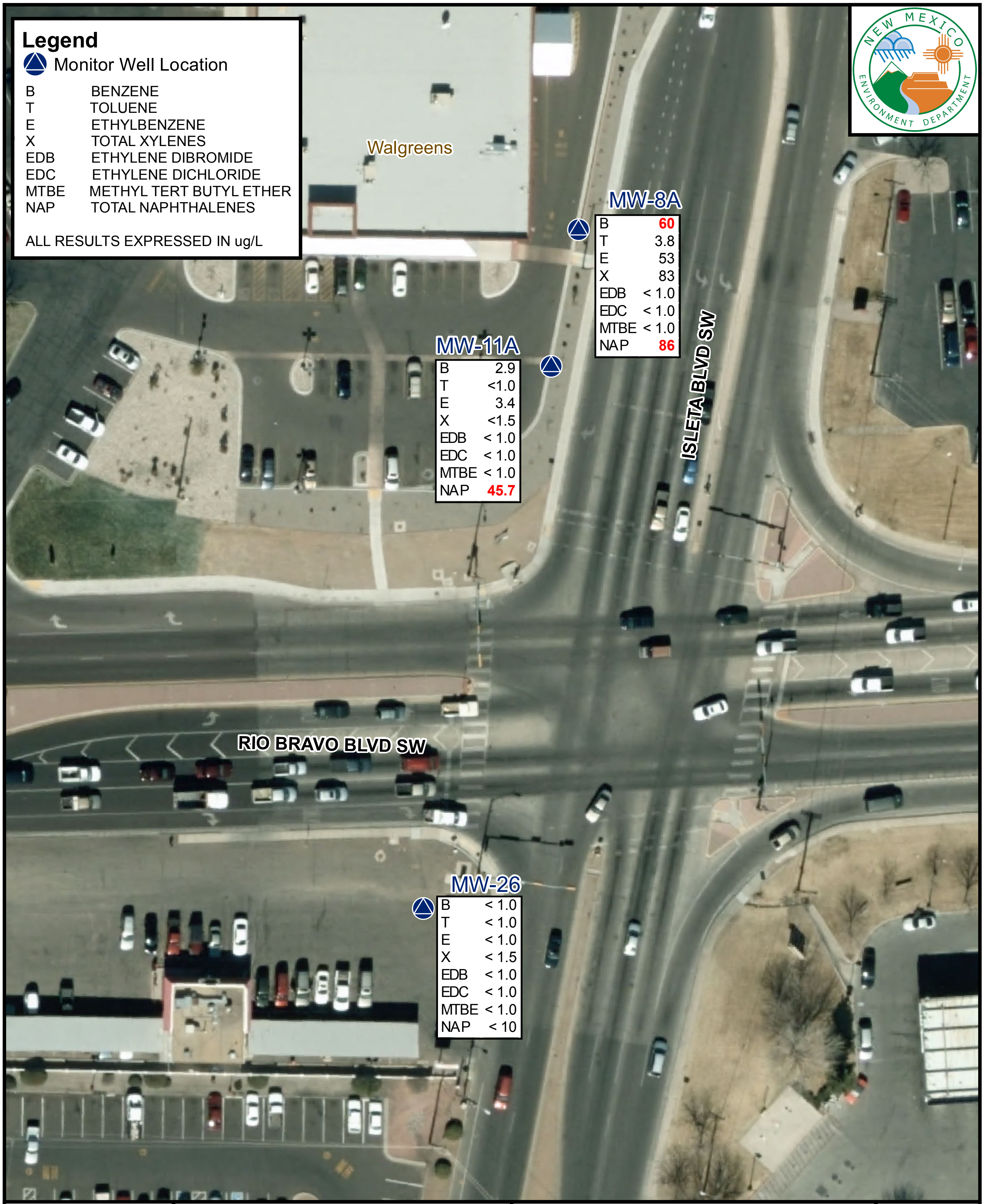
0 30 60 120 Feet

WATER TABLE MAP

CHEVRON ISLETA
3401 ISLETA BOULEVARD SW
ALBUQUERQUE, NM

FIGURE 3
11/6/2015

Sample Date
10/30/2015



Legend

▲ Monitor Well Location

B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
EDB	ETHYLENE DIBROMIDE
EDC	ETHYLENE DICHLORIDE
MTBE	METHYL TERT BUTYL ETHER
NAP	TOTAL NAPHTHALENES

ALL RESULTS EXPRESSED IN ug/L

MW-8A

B	**60**
T	3.8
E	53
X	83
EDB	< 1.0
EDC	< 1.0
MTBE	< 1.0
NAP	**86**

MW-11A

B	2.9
T	<1.0
E	3.4
X	<1.5
EDB	< 1.0
EDC	< 1.0
MTBE	< 1.0
NAP	**45.7**

MW-26

B	< 1.0
T	< 1.0
E	< 1.0
X	< 1.5
EDB	< 1.0
EDC	< 1.0
MTBE	< 1.0
NAP	< 10

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Source: MRCOG 2014 Digital OrthoImagery
http://www.bernco.gov/gis-program/
1 inch = 60 feet
N
0 30 60 120
Feet

DISSOLVED ORGANIC RESULTS
CHEVRON ISLETA
3401 ISLETA BOULEVARD SW
ALBUQUERQUE, NM

FIGURE 4
11/6/2015
Sample Date
10/30/2015

Legend

▲ Monitoring Well Location

Naphthalene Concentration (ug/L)

-·-·- Dissolved Naphthalenes Isoconcentration Line (Inferred, ug/L)

AECOM

6501 Americas Pkwy NE
Suite 900
Albuquerque, NM 87110

N

Source: MRCOG 2014 Digital OrthoImagery
http://www.bernco.gov/gis-program/

1 inch = 60 feet

0 30 60 120 Feet

DISSOLVED NAPHTHALENES MAP

CHEVRON ISLETA
3401 ISLETA BOULEVARD SW
ALBUQUERQUE, NM

FIGURE 5
11/10/2015

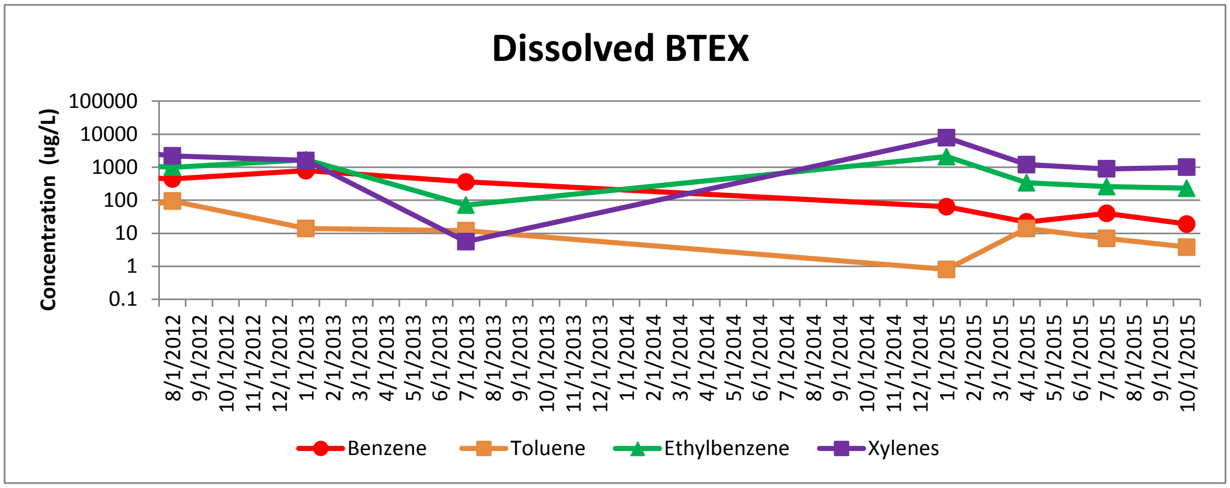
Sample Date
10/30/2015

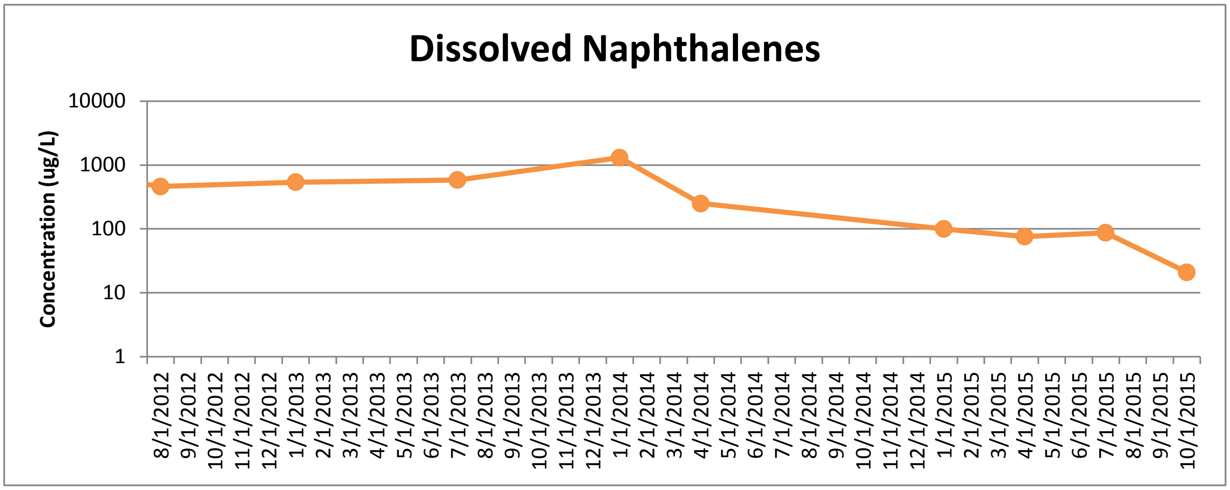
Graphs

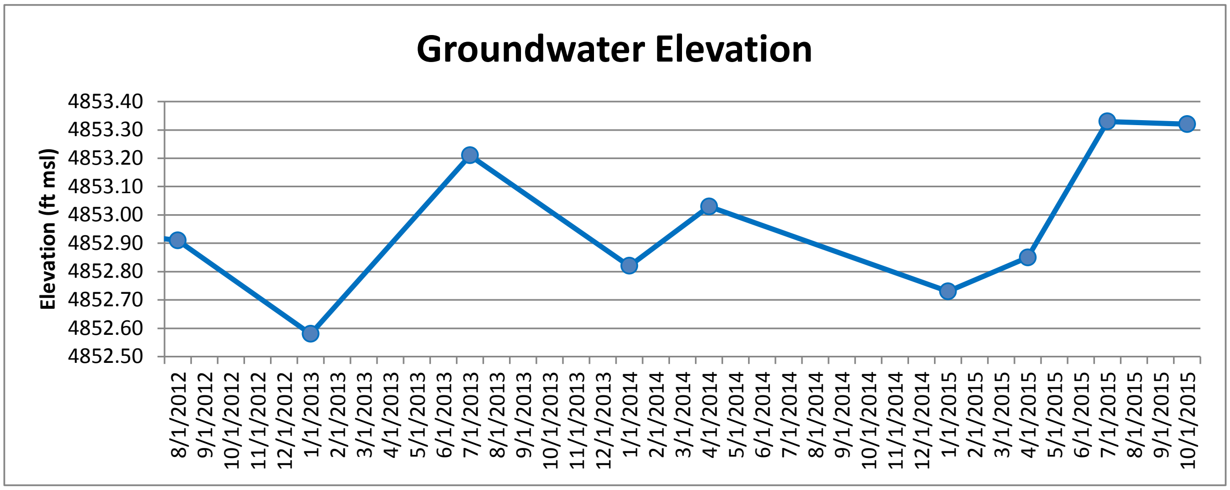
Graph 1

MW-8/MW-8R/MW-8A Dissolved BTEX and Naphthalenes Concentrations Vs Time

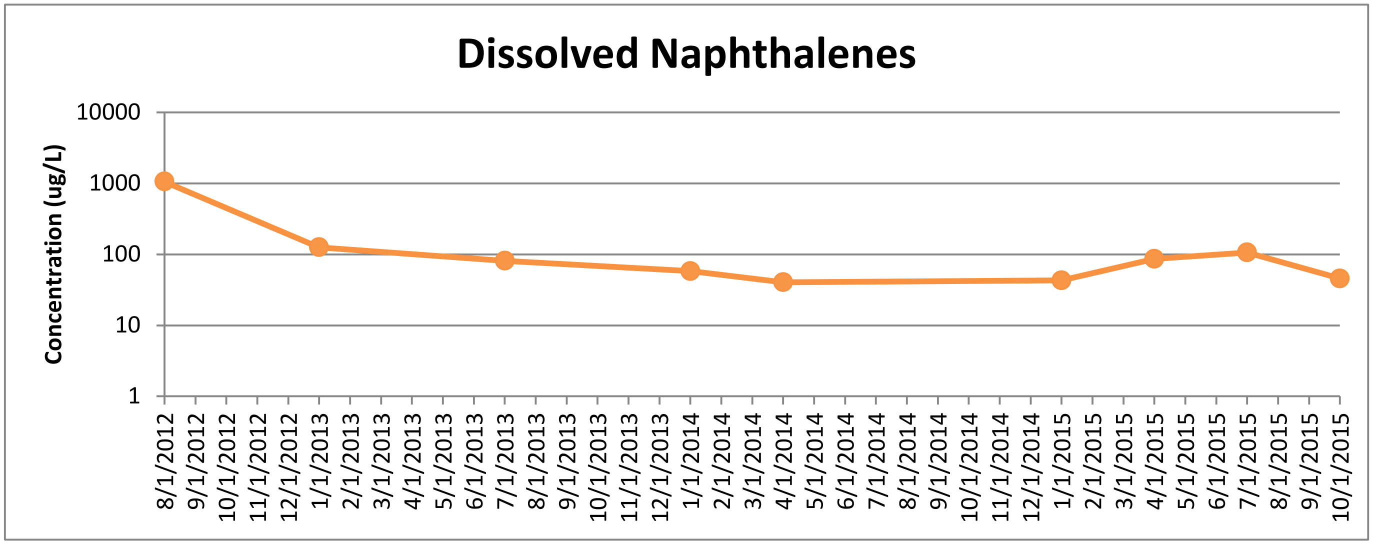
Chevron Isleta Site, Albuquerque, New Mexico

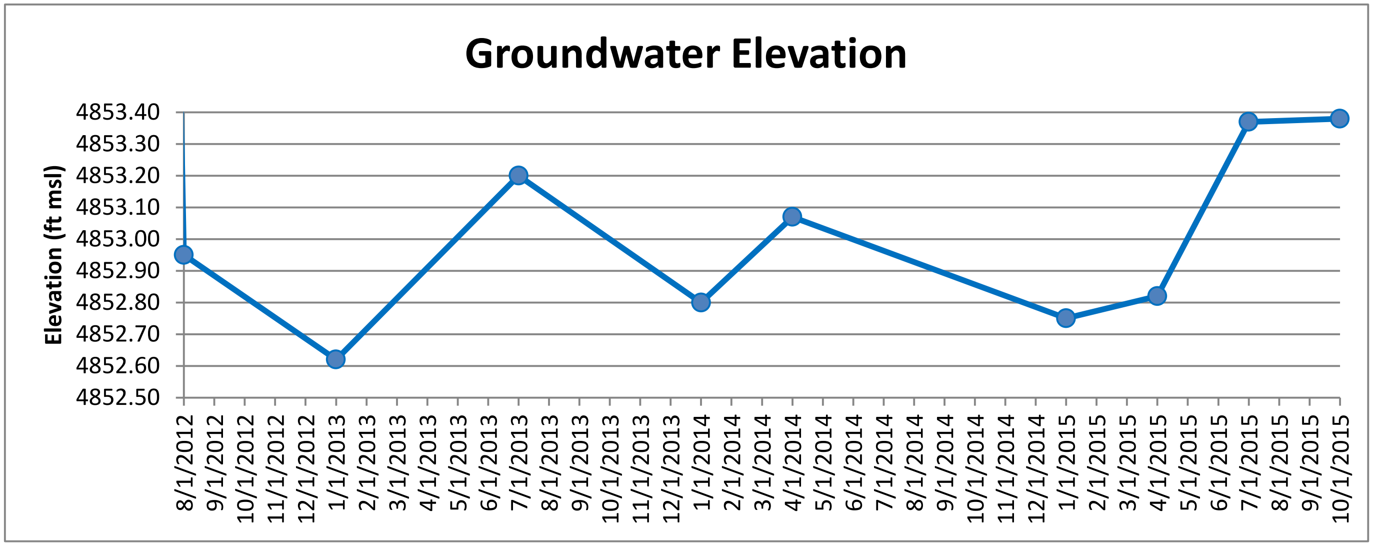

Dissolved BTEX


Dissolved Naphthalenes


Groundwater Elevation

Graph 2
MW-11/MW-11R/MW-11A Dissolved Naphthalenes Concentrations Vs Time
Chevron Isleta Site, Albuquerque, New Mexico





Appendix A. Groundwater Sampling Procedures

1.0 PURPOSE AND SCOPE

The purpose and scope of this Standard Operating Procedure (SOP) is to describe the equipment and methods used to accurately determine static water level and total depth in a groundwater monitoring well, pumping well, or piezometer.

2.0 RESPONSIBILITIES AND QUALIFICATIONS

The Project Manager has the overall responsibility for implementing this SOP. The Project Manager will be responsible for assigning staff to implement this SOP and for ensuring that the procedures are followed by all personnel.

All personnel performing this procedure are required to have the appropriate health and safety training as described in either the project-specific Health and Safety Plan or the Safe Work Plan, as applicable. In addition, all personnel are required to have a complete understanding of the procedures described within this SOP and receive specific training to these procedures, if necessary.

All project staff are responsible for reporting deviations from this SOP to the Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

This procedure is intended to be used with the following SOPs:

- SOP-1 – Use and Maintenance of Field Log Books
- SOP-20 – Decontamination

4.0 EQUIPMENT

The equipment and supplies that may be necessary to measure water levels include:

- Water level indicator with an audible alarm and a cable marked in 0.01-foot increments. The point on the probe that triggers the alarm corresponds to the zero point.
- If free-phase product is present, an interface probe capable of distinguishing between product and water
- Decontamination supplies
- Field logbook or field data sheets.

5.0 PROCEDURES

This procedure requires the use of an electronic water level device that employs a battery-powered probe assembly attached to a cable marked in 0.01-foot increments. When the probe makes contact with the water surface, a circuit is closed and energy is transmitted through the cable to sound an audible alarm. This equipment will have a sensitivity adjustment switch that enables the operator to distinguish between actual and false readings. The manufacturer's operating manual should be consulted for instructions on use of the sensitivity adjustment.

If there is the potential for free-phase product to be present on the surface of the water table in a well, then an oil-water interface probe will be used to collect water level measurements. Interface probes are used in the same manner as a water level indicator. The difference is that the interface probes have two different audible signals to differentiate between water and oil. If a layer of free-phase product is present, the probe will emit a different signal than for water. Most probes emit an intermittent beep when product is encountered, as opposed to a constant tone for water. The alarm codes for individual probes are marked on the reel casing.

The measurements must be taken at an established reference point, generally from the top of the well casing at the surveyor's mark. The mark should be permanent, such as a notch or mark on the top of the casing. If the surveyor's point is not marked at the time of water level measurement, the north side of the casing should be used and marked.

5.1 Calibration

The water level indicator or interface probe should be calibrated in accordance with the manufacturer's procedure prior to use.

1. Place the end of the probe in a bucket of water to ensure that the audible alarm is in working condition and responds when the electrical contacts encounter water.

2. Verify the marked length units on the probe line for accuracy by comparing to a standard steel tape measure. If there is any noted discrepancy between the water level indicator and the measuring tape, the difference in length will be noted on the field log and identified on the water level indicator. All subsequent water level measurements will be corrected as necessary.

5.2 Static Water Level Measurement

The static water level will be measured each time a well is sampled. This must be done before any fluids are withdrawn and before any purging or sampling equipment enters a well.

1. Before mobilization, obtain previous water level data, a description of the measuring point for water level measurements for all wells, and the appropriate well keys (if the wells are locked).

2. Test the water level probe to ensure that it is working properly by pushing the circuit test button or as specified in the instrument manufacturer's instructions.

3. Decontaminate the water level indicator probe according to SOP-20, *Decontamination,* before the first measurement, between wells, and after measuring the water level in the last well.

4. Unlock and open the well. Follow the health and safety procedures specified in the project health and safety plan or safe work plan, as applicable. If necessary, let the well vent any gases that may be present in the well casing. Also, this allows the water to equilibrate to barometric changes.

5. After opening the well cover, locate the water level measuring point. If a measuring point is not marked, the measurement should be taken from the north side of the well casing, if possible.

6. With the water level indicator switched on, slowly lower the probe until it contacts the water surface as indicated by the audible alarm.

7. Raise the probe out of the water until the alarm turns off. Three or more measurements will be taken at each well until two measurements agree to within +/- 0.01 feet.

8. Record the reading on the cable at the established reference point to the nearest 0.01 foot in the field logbook and/or on a field data sheet. In addition, document the measuring point location. Compare the most recent measurement with past measurements to verify that the new measurement is reasonable before leaving the well. If the measurement does not seem reasonable, repeat the water level measurement.

9. If the water level indicator fails to activate and is operating properly, lower the water level probe to the bottom of the well to ensure that the well is dry. Document that the well is dry, measure the total depth in accordance with the following method.

5.3 Total Depth Measurement

Depending on the type of instrument used, the total depth measurement may need to be adjusted for the offset between the bottom of the probe and the water level sensor. Some instruments have the sensor at the bottom of the probe so the depth reading is accurate without an adjustment. However, the water indicator sensor on some probes is not located at the bottom of the probe. To get a true total depth reading, the distance from the water indicator sensors to the bottom of the probe housing must be added to the depth reading.

1. Slowly lower the water level indicator, with weight attached if necessary, until the cable goes slack.

2. Raise and lower the probe until the precise location of the bottom is determined.

3. Account for the length of the probe tip in determining the total depth.

4. Record the reading on the cable at the established reference point to the nearest 0.01 foot.

If it is not possible to measure the depth of a well in which pumping equipment is installed, then the as-built well construction diagram will provide the total depth.

5.4 Interface Probe Measurement

1. Before mobilization, obtain previous water level data, a description of the measuring point for water level measurements for all wells, and the appropriate well keys (if the wells are locked).

2. Test the interface probe to ensure that it is working properly by pushing the circuit test button or as specified in the instrument manufacturer's instructions.

3. Decontaminate the interface probe according to SOP-20, *Decontamination*, before the first measurement, between wells, and after measuring the water level is the last well.

4. Unlock and open the well. Follow the health and safety procedures specified in the project health and safety plan or safe work plan, as applicable. If necessary, let the well vent any gases that may be present in the well casing. Also, this allows the water to equilibrate to barometric changes.

5. After opening the well cover, locate the water level measuring point. If a measuring point is not marked, the measurement should be taken from the north side of the well casing, if possible.

6. With the interface probe indicator switched on, slowly lower the probe until it contacts the liquid surface as indicated by the audible alarm.

7. If product is encountered, continue to raise and lower the probe until a precise level (within 0.01 foot) is determined.

8. Record the measurement in the field logbook and/or on the field data sheet to the nearest 0.01 foot and identify it as a product measurement.

9. Lower the interface probe until the water interface is encountered. Repeat the level measurement process a minimum of three or more measurements until two measurements agree to within +/- 0.01 feet.

NOTE: CARE SHOULD BE TAKEN DURING THE MEASUREMENT PROCESS TO MINIMIZE DISTURBANCE OF THE PRODUCT/WATER INTERFACE.

10. Record the measurement in the field logbook and/or on the field data sheet to the nearest 0.01 foot and identify it as the water level measurement. In addition, document the measuring point location. Compare the most recent measurements with past measurements to verify that the new measurements are reasonable before leaving the well. If the product and/or water level measurements do not seem reasonable, repeat both measurements.

6.0 RECORDS

All field notes for water level, product level (if applicable), and well depth measurements will be recorded in the field logbook and/or the field data sheets in accordance with SOP-1, *Use and Maintenance of Field Log Books*. Entries shall be legible, signed or initialed, and dated. Documented information shall include, as appropriate:

- Personnel who performed the measurement
- Date of measurement
- Time of measurement
- Well number
- Depth to water from the measuring point
- Description of the measuring point location for the well
- Water-level or interface probe manufacturer and serial/identification number
- Calculations performed (if any)
- Other observations (i.e., well condition, evidence of tampering, artesian conditions).

7.0 REFERENCES

Driscoll, F.G., 1986. *Groundwater and Wells*, 2nd Edition, Johnson Division, St. Paul, MN, pp. 1089.

Thornhill, J.T., 1989. *Accuracy of Depth to Ground Water Measurements*, from U.S. Environmental Protection Agency (USEPA) Superfund Ground Water Issue, USEPA/540/4-89/002.

U.S. Department of the Interior, 1981. *Groundwater Manual, A Water Resource Technical Publication*, Water and Power Resources Services, U.S. Government Printing Office, Denver, CO, pp. 480.

1.0 PURPOSE AND SCOPE

The purpose and scope of this Standard Operating Procedure (SOP) is to describe the equipment and methods used for collecting groundwater samples in the field using the low-flow purge, the conventional purge, and the passive diffusion sampler methods.

2.0 RESPONSIBILITIES AND QUALIFICATIONS

The Project Manager has the overall responsibility for implementing this SOP. The Project Manager will be responsible for assigning staff to implement this SOP and for ensuring that the procedures are followed by all personnel.

All personnel performing this procedure are required to have the appropriate health and safety training as described in either the project-specific Health and Safety Plan or the Safe Work Plan, as applicable. In addition, all personnel are required to have a complete understanding of the procedures described within this SOP and receive specific training to these procedures, if necessary.

All project staff are responsible for reporting deviations from this SOP to the Project Manager.

3.0 RELATED STANDARD OPERATING PROCEDURES

This procedure is intended to be used with the following SOPs:

- SOP-1 – Use and Maintenance of Field Log Books
- SOP-13 – Static Water Level and Total Depth Measurement
- SOP-16 – Water Quality Measurements Using a Multiple Parameter Water Quality Meter
- SOP-20 – Decontamination
- SOP-26 – Chain-of-Custody
- SOP-33 – Organic Vapor Measurements
- SOP-49 – IDW Management

4.0 EQUIPMENT

The equipment and supplies that may be necessary to collect groundwater samples include:

<u>Major Equipment Items</u>

- Variable-rate, submersible pump and hose assembly with control limit, electrical generator (if required) and extension cord, and air compressor or other air supply (if required)
- Gasoline and oil (for generator, if used)
- Teflon or Teflon-line polyethylene tubing
- Plastic sheeting

- Drums or other large container for capturing and storing purge water
- Weighted tape measure

Equipment Support Items

- Drum liners
- Trash bags
- Decontamination tub
- Low-phosphate detergent (e.g., Liquinox)
- Gloves (nitrile rubber)
- Graduated five-gallon buckets and/or graduated cylinder for measuring flow rate and volumes
- Folding table
- Folding chairs
- Paper towels
- Calculator
- Digital watch with stopwatch function.

Sampling Supplies

- Well logs, written description of wells including identification numbers, maps, well locations, elevations, well construction details, and (if available) records of previous development and/or purging and sampling
- Well keys
- Sample containers and applicable preservative
- Passive Diffusion Bags and related equipment (if required for VOC samples)
- pH testing paper.
- Chain-of-custody forms
- Sample labels
- Field data forms
- Cooler with ice for sample preservation
- Ziploc bags
- Field logbook
- Pen and waterproof permanent marker.

Monitoring Equipment

- Electronic water level indicator and, when necessary, oil/water interface probe
- Water quality sampling field instrumentation (e.g., pH, temperature, specific conductance [conductivity], turbidity, dissolved oxygen, oxidation/reduction potential probes)
- Photoionization detector or flame ionization detector if sampling wells with volatile organic contamination

Health and Safety Items

- First aid kit and emergency eye-wash kit
- Fire extinguisher
- Material Safety Data Sheets
- Emergency information packet, including route map to hospital and phone contacts
- Field radio or cell phone
- Personal protective equipment as specified in the project-specific Health and Safety Plan or Safe Work Plan, as applicable.

5.0 PROCEDURES

5.1 Decontamination

Before purging or sampling, all pumps and hoses, water level measurement devices, and any other sampling equipment that may come in contact with the sample will be decontaminated in accordance with SOP-20, *Decontamination*. If new dedicated equipment is used, it should be thoroughly decontaminated and rinsed with distilled water before placement in the well. While decontamination of the pump/hose assembly may generally be performed at a central decontamination area, mobile decontamination supplies will be available so that accessory equipment (e.g., electronic water level indicators) can be decontaminated in the field.

Each piece of purging or sampling equipment will be decontaminated prior to and in between sampling operations and wells. Depending on site conditions, the decontamination solutions may be replaced with clean solutions between wells. Decontamination solutions will be handled and disposed of in accordance with SOP-49, *IDW Management*.

5.2 Well Monitoring

Electronic equipment used during purging and sampling may include a photoionization detector, flame ionization detector, multi-gas meter, water level indicator, oil/water interface probe, and water quality measurement devices for temperature, pH, conductivity, turbidity, dissolved oxygen, and oxidation/reduction potential. Before going into the field, the Field Team Leader will verify that the instruments are operating properly. The instruments will be calibrated in accordance with the requirements outlined in the corresponding procedures.

5.3 Well Purging

The purpose of well purging is to remove stagnant from the well and obtain a representative water sample from the geologic formation being sampled while minimizing disturbance of the water column during sample collection.

5.3.1 Low-Flow Purge Methodology

1. Verify calibration checks on field monitoring equipment have been performed.

2. Inspect the well and surrounding area for security, damage, and evidence of tampering.

3. Establish the exclusion zone around the work area, using traffic cones and caution tape where necessary.

4. Don personal protective equipment as specified in the project-specific Health and Safety Plan or Safe Work Plan, as applicable.

5. If volatile organic compound (VOC) contamination is present or suspected, determine the ambient VOC background levels in the immediate vicinity of the well with an appropriate instrument.

6. Remove the well cap and immediately measure VOCs at the rim of the well and record the reading in the field logbook and/or field data sheet.

7. Locate the well survey reference point. This is usually an indelible mark or V-notch cut in the top of the well casing. If this point is missing, make one on the north side of the well casing.

8. Measure the static water level in the well in accordance with SOP-13, *Static Water Level and Total Depth Measurement.*

9. If a high concentration or organic vapors are detected in the well, use an oil/water interface probe to measure both the water level and level of the immiscible phase light non-aqueous phase liquids or dense non-aqueous phase liquids in accordance with SOP-13, *Static Water Level and Total Depth Measurement.*

10. Measure the total depth of the well in accordance with SOP-13, *Static Water Level and Total Depth Measurement*.

11. Containerize wastewater until analytical data are available to determine the proper disposal process in accordance with SOP-49, *IDW Management*.

12. Install the pump to the depth prescribed in the sampling documentation. This depth should correspond to the middle of the screened interval, five feet below the water table or in instance where the well screen is submerged, 5 feet below the top of the screen.

13. Reinsert the water level (or oil/water interface probe, as appropriate) to monitor water levels during purging.

14. Start the pump at a low flow rate until surface discharge occurs. Check the water level, if no drawdown occurs, gradually increase the pump rate until the flow is optimized with minimal drawdown. The maximum allowable drawdown is 0.3 feet.

15. Connect the pump discharge tubing directly to the flow-through-cell of the multi-parameter meter.

16. Using a stopwatch and appropriate volume measuring device (e.g., graduated cylinder), monitor and record water level and pumping rate every three to five minutes (or as appropriate) during purging.

17. During well purging, monitor selected indicator field parameters (e.g., turbidity, temperature, conductivity, pH, oxidation-reduction potential, dissolved oxygen) every three to five minutes in accordance with SOP-16, *Water Quality Measurements Using a Multiple Parameter Water Quality Meter*..

18. When the field parameters have stabilized, disconnect the flow cell from the water path before collecting samples. Water samples for laboratory analyses must be collected before the water has passed through the cell to prevent cross-contamination or chemistry changes. Stabilization is achieved when three consecutive readings show the following:

    - Temperature - ± 1 degree Celsius
    - pH - ± 0.1 pH unit
    - Turbidity - ≤ 10 NTU or ± 10%
    - Conductivity - ± 5%
    - Dissolved Oxygen - ± 10%
    - Oxidation-Reduction Potential - ± 10 millivolts

5.3.2 Total Well Volume Purge Methodology

If water level drawdown greater than 0.3 feet occurs at a purge rate of 0.1 L/min or less, or if it is deemed necessary, the total well volume purge methodology will be used.

1. Verify calibration checks on field monitoring equipment have been performed.

2. Inspect the well and surrounding area for security, damage, and evidence of tampering.

3. Establish the exclusion zone around the work area, using traffic cones and caution tape where necessary.

4. Don personal protective equipment as specified in the project-specific Health and Safety Plan or Safe Work Plan, as applicable.

5. If VOC contamination is present or suspected, determine the ambient VOC background levels in the immediate vicinity of the well with an appropriate instrument.

6. Remove the well cap and immediately measure VOCs at the rim of the well and record the reading in the field logbook and/or field data sheet.

7. Locate the well survey reference point. This is usually an indelible mark or V-notch cut in the top of the well casing. If this point is missing, make one on the north side of the well casing.

8. Measure the static water level in the well in accordance with SOP-13, *Static Water Level and Total Depth Measurement.*

9. If a high concentration or organic vapors are detected in the well, use an oil/water interface probe to measure both the water level and level of the immiscible phase light non-aqueous phase liquids or dense non-aqueous phase liquids in accordance with SOP-13, *Static Water Level and Total Depth Measurement.*

10. Measure the total depth of the well in accordance with SOP-13, *Static Water Level and Total Depth Measurement*.

11. Containerize wastewater until analytical data are available to determine the proper disposal process in accordance with SOP-49, *IDW Management*.

12. Install the pump to the depth prescribed in the sampling documentation. This depth should correspond to the middle of the screened interval, five feet below the water table or in instance where the well screen is submerged, 5 feet below the top of the screen.

13. Reinsert the water level (or oil/water interface probe, as appropriate) to monitor water levels during purging.

14. Start the pump at a low flow rate until surface discharge occurs. Check the water level, if no drawdown occurs, gradually increase the pump rate until the flow is optimized with minimal drawdown. The pumping rate should never exceed 2 L/min.

15. Connect the pump discharge tubing directly to the flow-through-cell of the multi-parameter meter.

16. Using a stopwatch and appropriate volume measuring device (e.g., graduated cylinder), monitor and record water level and pumping rate every three to five minutes (or as appropriate) during purging.

17. During well purging, monitor selected indicator field parameters (e.g., turbidity, temperature, conductivity, pH, oxidation-reduction potential, dissolved oxygen) every three to five minutes in accordance with SOP-16, *Water Quality Measurements Using a Multiple Parameter Water Quality Meter*.

18. At a minimum, three total volumes must be purged for this method if the well is not purged dry with a pumping rate less than 2 L/min. If the well is purged dry with a pumping rate less than 2 L/min, then the sample will be collected after a sufficient volume of water has recharged the well regardless of total volume purges and field parameter stabilization. When purging by this methodology, if parameters have not stabilized after six well casing volumes, then purging will cease and samples collected.

    The well volume can be calculated in gallons using the following equation:

    Well Volume V (in gallons) = H x F

    Where:

    V = one well volume

    H = the difference between the depth of the well and depth of water

    F = factor for volume of one foot section of casing (gallons) as below:

Diameter of Casing (inches)	F Factor (gallons)
1.5	0.09
2.0	0.16
3.0	0.37
4.0	0.65
6.0	1.47

Alternatively:

$F = H \times (D/2)^2 \times 7.48\ \text{gal/ft}^3$

Where:

D = the inside diameter of the well casing (ft)

19. When the field parameters have stabilized, disconnect the flow cell from the water path before collecting samples. Water samples for laboratory analyses must be collected before

the water has passed through the cell to prevent cross-contamination or chemistry changes. Stabilization is achieved when three consecutive readings show the following:

- Temperature - ± 1 degree Celsius
- pH - ± 0.1 pH unit
- Turbidity - ≤ 10 NTU or ± 10%
- Conductivity - ± 5%
- Dissolved Oxygen - ± 10%
- Oxidation-Reduction Potential - ± 10 millivolts

5.4 Sample Collection

Regardless of the purging methodology, samples for laboratory analyses will be collected immediately following purging. For wells that were purged dry, samples will be collected as soon as possible after a sufficient volume of groundwater is available in the well. The following sampling procedure will be used at each well.

1. Immediately following purging, the pump will be used to collect the groundwater sample. The pump should not be removed between purging and sampling, unless a peristaltic pump is used.
2. Fill out identification labels for samples bottles for each well.
3. The individual sample bottles should be filled in the order given below:
    - Volatile organic compounds
    - Semi-volatile organic compounds
    - Other organic parameters
    - Metals (inorganics)
    - Anions
    - Other parameters
    - Field test parameters (e.g., pH, conductivity, and temperature).
4. The VOC vials should be completely filled so the water forms a convex meniscus at the top, then capped so that no air space exists in the vial. Turn the vial over and tap it to check for bubbles in the vial. If air bubbles are observed in the sample vial, discard the vial and collect another sample. To verify the VOC sample pH, fill an extra vial during

sample collection, ensuring that it is not overfilled, then dip a pH strip into the sample vial to check that the sample is at or below the maximum pH allowed. This vial will be disposed of as investigation-derived waste.

5. For all other laboratory samples, fill containers until almost full. Samples will be preserved and managed as detailed in the sampling documentation. When collecting preserved samples, the pH should be periodically checked. For non-VOC samples, pour a small amount of the preserved sample directly from the sample container onto the pH strip rather than dipping the strip into the container which can contaminate the sample.

6. Record the sampling information in the field logbook and/or the field data sheets.

7. After samples have been collected, immediately place the samples in an ice-filled cooler for transport to the analytical laboratory in accordance with SOP-23, *Sample Handling, Shipping and Documentation*.

8. Complete all chain-of-custody information in accordance with SOP-26, *Chain-of-Custody*.

9. Remove the pump and equipment from the well, replace the well cap, and secure the lock.

5.5 Passive Diffusion Bags

Sampling for VOCs may be accomplished through the use of passive diffusion bags. A passive diffusion bag is made of low-density polyethylene lay-flat tubing that is closed at both ends. Tubes can be 18 to 24 inches long and from 1 to 1.5 inches in diameter.

1. Prior to deployment to the field, fill the passive diffusion bags with laboratory-grade deionized water using a funnel. Fill the sampler until water rises and stands at least two inches up the funnel to expand the sampler to its maximum capacity. Gently squeeze and add more water to expand the membrane and remove air pockets. Repeat as needed until completely full.

2. Insert the plug provided with the sampler firmly into the sampler until the rim of the plug is as close to the nozzle as possible.

3. Inspect the well and surrounding area for security, damage, and evidence of tampering.

4. Establish the exclusion zone around the work area, using traffic cones and caution tape where necessary.

5. Don personal protective equipment as specified in the project-specific Health and Safety Plan or Safe Work Plan, as applicable.

6. Determine the ambient VOC background levels in the immediate vicinity of the well with an appropriate instrument.

7. Remove the well cap and immediately measure VOCs at the rim of the well and record the reading in the field logbook and/or field data sheet.

8. Locate the well survey reference point. This is usually an indelible mark or V-notch cut in the top of the well casing. If this point is missing, make one on the north side of the well casing.

9. Measure the static water level in the well in accordance with SOP-13, *Static Water Level and Total Depth Measurement.*

10. If a high concentration or organic vapors are detected in the well, use an oil/water interface probe to measure both the water level and level of the immiscible phase light non-aqueous phase liquids or dense non-aqueous phase liquids in accordance with SOP-13, *Static Water Level and Total Depth Measurement.*

11. Measure the total depth of the well in accordance with SOP-13, *Static Water Level and Total Depth Measurement*.

12. Attach a weight to the bottom of tether line. For shallow wells (less than 150 ft depth), use a 8 ounce stainless steel weight. For deeper wells, or if deploying multiple samplers in a single well, use a 20 ounce stainless steel weight.

13. Attach the sampler to the tether line.

14. Lower the tether with the sampler(s) attached into the well. Locate the sampler(s) below the water surface at the prescribed depth(s) in the screen flow zone of the well.

15. Attach the top of the tether line to the well cap or other secure location at the top of the well.

16. Leave the sampler in the well for a sufficient period of time to allow for contaminant concentrations in the sampler to come into equilibrium with the contaminant concentrations in the groundwater (a three-week deployment is recommended).

17. Retrieve the sampler from the well.

18. Upon retrieval, discharge the sample immediately into the sample containers to avoid loss of VOCs. Select a point on the sampler near the handle/bottom of the sampler. Press one end of the provided discharge tube firmly into the polyethylene membrane at a downward angle until it pierces the membrane. Discharge a small amount to waste to purge the discharge tube prior to filling the sample vials.

19. The VOC vials should be completely filled so the water forms a convex meniscus at the top, then capped so that no air space exists in the vial. Turn the vial over and tap it to check for bubbles in the vial. If air bubbles are observed in the sample vial, discard the vial and collect another sample. To verify the VOC sample pH, fill an extra vial during

sample collection, ensuring that it is not overfilled, then dip a pH strip into the sample vial to check that the sample is at or below the maximum pH allowed. This vial will be disposed of as investigation-derived waste.

20. Record the sampling information in the field logbook and/or the field data sheets.

21. After samples have been collected, immediately place the sample containers in an ice-filled cooler for transport to the analytical laboratory in accordance with SOP-23, *Sample Handling, Shipping and Documentation*.

22. Complete all chain-of-custody information in accordance with SOP-26, *Chain-of-Custody*.

23. Remove any remaining equipment from the well, replace the well cap, and secure the lock.

6.0 RECORDS

All field notes for groundwater purging and sampling will be recorded in the field logbook and/or the field data sheets in accordance with SOP-1, *Use and Maintenance of Field Log Books*. Entries shall be legible, signed or initialed, and dated. Documented information shall include, as appropriate:

- Personnel who performed the sampling
- Date of sample collection
- Time of sample collection
- Well number
- Purge volume calculations performed
- Weather conditions
- Condition of the well
- Decontamination information
- Initial and final static water level
- Equipment calibration information
- Method of purging
- Volume of purge water
- Purge start and stop times
- Pumping rate, if applicable
- Field parameter measurements during purging
- Method of sample collection
- Sample identification numbers
- Photo documentation, if applicable

- QA/QC samples collected
- Other observations.

7.0 REFERENCES

Driscoll, F.G., 1986. *Groundwater and Wells*, 2nd Edition, Johnson Division, St. Paul, MN, pp. 1089.

U.S. EPA, 1996. *Ground Water Issue, Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*, EPA/540/S-95/504, April.

U.S. Department of the Interior, 1981. *Groundwater Manual, A Water Resource Technical Publication*, Water and Power Resources Services, U.S. Government Printing Office, Denver, CO, pp. 480.

1.0 PURPOSE

The purpose of this Standard Operating Procedure is to establish guidelines for the use of a multiple parameter water quality meter such as the Horiba or U-22 or equivalent. Multiple parameter meters measuring water quality parameters including pH, temperature, salinity, turbidity, dissolved oxygen (DO), oxidation reduction potential (ORP), and specific conductance (conductivity) in water during well purging, well development, and surface water sampling for chemical analysis.

2.0 SCOPE

This Standard Operating Procedure applies to all personnel who measure water quality parameters using a multiple parameter water quality meter.

3.0 METHOD

Water quality parameters such as pH, temperature, turbidity, DO, conductivity, ORP, and salinity are collected to determine conditions in surface or groundwater at a given location. A series of such determinations can be used to evaluate a variety of situations, from the performance of a groundwater treatment system to the spread of contaminant plume in groundwater. A multiple parameter water quality meter measures each of these parameters digitally. The pH is a primary parameter measured in the field to determine hydrogen-ion activity. It is measured using a glass electrode in combination with a reference potential. Temperature is measured because many water quality parameters vary with temperature. The solubility of oxygen is temperature dependent, as are all electrochemically determined water quality parameters (pH, conductivity).

Turbidity serves as a measure of suspended solids in a water sample. Since these suspended solids might result in elevated apparent concentrations of some contaminants (especially metals) to above levels of concern, the measurement of turbidity is a critical determination before collection of groundwater samples. Turbidity above acceptable levels will typically result in additional efforts to reduce the turbidity of the well water before collecting samples, since samples will be collected unfiltered unless otherwise approved.

DO is an indicator of the oxygen-consuming and oxygen-providing process taking place. It is an indicator of the biochemical processes occurring in the water and is related to the ORP. The most common membrane electrode (ME) meters for determining the DO in water are dependent upon electrochemical reactions. Under steady-state conditions, the current or potential can be correlated with DO concentration. Interfacial dynamics at the ME/sample interface are a factor in probe response and a significant degree of interfacial turbulence is necessary to avoid a “stagnant layer” at the interface and resulting biased determinations. For acceptable precision to be obtained, flow over the DO membrane should be constant, as in the case of a flow-through cell used for groundwater sampling or a flowing stream for stream sampling.

Specific conductance is the ability of a volume of a solution to conduct an electrical current as compared to the same volume of pure water. Chemically pure water has a very low electrical conductance, indicating that it is a good insulator. However, minute amounts of dissolved mineral matter (total dissolved solids, TDS) in water increase the electrical conductance of water. In dilute solutions, the specific conductance varies almost directly with the TDS content of the samples. Salinity of the sample is computed from conductivity data.

3.1 Materials and Equipment

Equipment that will be used to collect water quality measurements using a multiple parameter water quality meter includes, but is not limited to, the following items:

- Multiple parameter water quality meter with power supply;
- Calibration solutions, as specified by the manufacturer;
- Calibration log form and field logbook for recording calibration;
- Clean sample containers (glass, plastic);
- Distilled or deionized water in wash bottle; and
- Operating manual for the multiple parameter water quality meter.

3.2 Calibration

The multiple parameter water quality meter may be calibrated in the field by using calibration solutions supplied by a commercial laboratory supply house. The specific calibration procedures in the owner’s manual for the multiple parameter water quality meter should be followed. Generally, the calibration procedure involves measuring the value of a specific parameter in a standard calibration solution of a known value. The meter is typically calibrated to read the known value to within the acceptance criteria. The instrument should be calibrated prior to each workday of use. The initial instrument response and the final (calibrated) response will be recorded on the calibration log, along with the date and time of calibration. Calibration will be performed in accordance with the manufacturers’ instructions..

3.3 Taking Measurements

After the unit is calibrated, it is ready for use. To take measurements, turn the unit on and gently place the probe in the water sample. Typically, a select button can be pressed to toggle between the different parameters, if they are not all displayed on screen simultaneously.

Care should be exercised when handling the probes. The multiple parameter water quality meter should be lowered gently into the sample. The water quality meter should be allowed to stabilize for at least several seconds before collecting water quality parameter data. When conducting groundwater sampling, a flow-through cell should be used whenever possible to minimize wear and tear on the probes, eliminate the need for stabilization (since the electrode is constantly immersed in groundwater flowing over the probes), and improve the consistency of the readings. Multiple determinations as an indication of field precision should be conducted more frequently than every tenth reading if precision problems are apparent.

3.4 Storage

After using the water quality meter, thoroughly wash all probes with analyte free water. The turbidity sensor tube should be periodically washed out with a test tube brush and analyte free water, or according to the manufacturer's instructions. The conductivity guard should be periodically removed to brush away any dirt from the sensor unit. If storing the unit for a week or less, fill the calibration cup with tap water (*not distilled or deionized water, which can damage the probes*) and fit the cap over it. For long-term storage, follow the manufacturer's instructions.

3.5 Additional Considerations

Operators of field equipment should refer to the manufacturer's instructions for step-by-step calibration and usage guidelines. Additional considerations of a general nature include:

- The water quality meter must be checked for mechanical and electrical failures, weak batteries, and cracked or fouled electrodes before field activities.
- Perform calibration using the appropriate solutions as described in the manufacturer's instructions.
- Clean and rinse probes thoroughly using distilled or deionized water in a wash bottle between all samples and at the end of the day. Each time the electrodes are cleaned, they should be examined for damage.
- Some electrodes (e.g., pH and DO electrodes) must NOT be allowed to dry completely, as this may permanently alter the physical or electrochemical properties of the electrode surface.
- Note that oily samples are likely to result in fouling of the electrodes and more aggressive cleaning procedures (such as mild acid washing) will be required, as described in the manufacturer's instruction manual. After such cleaning, a calibration check must be performed; typically such cleaning will necessitate recalibration.

4.0 REFERENCES

American Society for Testing and Materials (ASTM). *Tests for Dissolved Oxygen in Water,* Annual Book of ASTM Standards; Part 31, “Water,” Standard D888-92(A). Philadelphia, PA.

Instruction Manual, Horiba U-10 Water Quality Checker, Horiba Instruments, Inc.

USEPA, 1991. *Environmental Branch Standard Operating Procedures and Quality Assurance Manual*. EPA Region IV, Athens, GA.

USEPA, 1983. *Methods for Chemical Analyses of Water and Wastes.* Environmental Monitoring and Support Laboratory, Cincinnati, OH.

5.0 RECORDS

Documentation, including field survey measurements and QC measurements, will be recorded in the field log book in accordance with the project SAP and appropriate SOP. Personnel collecting field measurements are responsible for documenting sampling activities in the field logbook. The observations and data will be recorded with waterproof ink in a permanently bound weatherproof field logbook with consecutively numbered pages.

6.0 ATTACHMENTS

Not applicable.

Appendix B. Groundwater Field Sampling Forms

AECOM

6501 Americas Pkwy
Albuquerque, NM 87110
Tel: 505.855.7500
Fax: 505.855.7555

Groundwater Sample Field Data Form

Well Identification MW-8A

Page 1 of 1

Project Name: Chevron Isleta
Project Number: 60393656
Location: Albuquerque, NM
Date: 10/30/15

Sampled By: A. Bisogno
Sample ID: MW-8A
Sample Date: 10/30/15
Sample Time: 1112

Equipment

Purging Method/Equipment: Bailer
Sampling Equipment: Bailer
Filtering Equipment: —

Field Parameters

Initial Water Temp. (C): 23.49
Initial pH: 6.92
Initial Conductance (mS/cm): 1.021
Reference Point

Purging Information

Casing ID (in): 2
Unit Casing Volume (gal/ft): 0.16
Depth to Water (ft below TOC): 7.21
Total Depth (ft below TOC): 14.52

Length of Static Water Column (ft): 7.31
Casing Water Volume (gal): 1.16
Total Purge Volume
Number of Purge Volumes

Volume Purged (gal)	Temp (C)	pH	Conductance (mS/cm)	Orp millivolts	DO (mg/L)	Time	Water Description
0	23.49	6.92	1.021	-101.4	2.44	1104	Clear, slight HC odor
1.0	23.42	6.88	1.029	-117.2	2.28	1106	"
2.0	23.04	6.89	1.023	-121.1	2.09	1109	"
3.0	22.94	6.85	1.021	-121.5	1.79	1111	Slightly opaque, "
3.5	22.66	6.82	1.038	-121.7	2.14	1113	"

Total Volumes Removed (gallons): 3.5 **Time:** 1112 **Purged Dry (Y/N):** N

Casing Volume

Casing I.D. (in.)	Unit Casing Volume Gal/Lin. Ft.)
1.0	0.04
1.5	0.09
2.0	0.16
2.2	0.20
3.0	0.37
4.0	0.65
4.3	0.75
5.0	1.00
6.0	1.55
7.0	2.00
8.0	2.60

Additional Remarks

AECOM

6501 Americas Pkwy
Albuquerque, NM 87110
Tel: 505.855.7500
Fax: 505.855.7555

Groundwater Sample Field Data Form

Well Identification MW-11A

Page 1 of 1

Project Name: Chevron Isleta
Project Number: 60393656
Location: Albuquerque, NM
Date: 10/30/15

Sampled By: A. Bisoglio
Sample ID: MW-11A
Sample Date: 10/30/15
Sample Time: 1050

Equipment

Purging Method/Equipment: Bailer
Sampling Equipment: Bailer
Filtering Equipment: —

Field Parameters

Initial Water Temp. (C): 22.05
Initial pH: 6.04
Initial Conductance (mS/cm): 0.825
Reference Point

Purging Information

Casing ID (in): 2
Unit Casing Volume (gal/ft): 0.16
Depth to Water (ft below TOC): 6.31
Total Depth (ft below TOC): 14.96

Length of Static Water Column (ft): 8.65
Casing Water Volume (gal): 1.38
Total Purge Volume: 4.5
Number of Purge Volumes: 3

Volume Purged (gal)	Temp (C)	pH	Conductance (mS/cm)	Orp millivolts	DO (mg/L)	Time	Water Description
0	22.05	6.04	0.825	-2.9	2.21	1037	Slightly opaque, NO HC odor
1.0	22.04	6.61	0.832	-56.4	1.48	1040	"
2.0	21.80	6.81	0.840	-87.5	1.36	1042	"
3.0	22.77	6.89	0.847	-106.5	1.61	1045	"
4.0	22.74	6.40	0.846	-110.3	1.80	1047	"
4.5	21.89	6.94	0.854	-113.1	1.62	1051	"

Total Volumes Removed (gallons): 4.5 **Time:** 1050 **Purged Dry (Y/N):** N

Casing Volume

Casing I.D. (in.)	Unit Casing Volume Gal/Lin. Ft.)
1.0	0.04
1.5	0.09
2.0	0.16
2.2	0.20
3.0	0.37
4.0	0.65
4.3	0.75
5.0	1.00
6.0	1.55
7.0	2.00
8.0	2.60

Additional Remarks

AECOM

6501 Americas Pkwy
Albuquerque, NM 87110
Tel: 505.855.7500
Fax: 505.855.7555

Groundwater Sample Field Data Form

Well Identification MW-26

Page 1 of 1

Project Name: Chevron Isleta
Project Number: 60393656
Location: Albuquerque, NM
Date: 10/30/15

Sampled By: A. Bisoglio
Sample ID: MW-26
Sample Date: 10/30/15
Sample Time: 1148

Equipment

Purging Method/Equipment: Bailer
Sampling Equipment: Bailer
Filtering Equipment:

Field Parameters

Initial Water Temp. (C): 22.52
Initial pH: 7.07
Initial Conductance (mS/cm): 0.675
Reference Point

Purging Information

Casing ID (in): 2
Unit Casing Volume (gal/ft): 0.16
Depth to Water (ft below TOC): 6.24
Total Depth (ft below TOC): 13.20

Length of Static Water Column (ft): 6.96
Casing Water Volume (gal): 1.11
Total Purge Volume: 3.5
Number of Purge Volumes: 3

Volume Purged (gal)	Temp (C)	pH	Conductance (mS/cm)	Orp millivolts	DO (mg/L)	Time	Water Description
0	22.52	7.07	0.675	-36.7	2.86	1137	Slightly orange, No Hc odor
1.0	22.37	7.02	0.701	-34.6	2.24	1139	"
2.0	22.50	7.00	0.722	-34.6	1.67	1142	"
3.0	23.14	6.46	0.749	-35.0	1.43	1144	"
3.5	22.03	6.46	0.743	-33.7	1.83	1149	"

Total Volumes Removed (gallons): 3.5 **Time:** 1148 **Purged Dry (Y/N):** N

Casing Volume

Casing I.D. (in.)	Unit Casing Volume Gal/Lin. Ft.)
1.0	0.04
1.5	0.09
2.0	0.16
2.2	0.20
3.0	0.37
4.0	0.65
4.3	0.75
5.0	1.00
6.0	1.55
7.0	2.00
8.0	2.60

Additional Remarks

Appendix C. Laboratory Analytical Report

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

November 05, 2015

Edward Hubbert
AECOM ABQ
6501 Americas Parkway NE Suite 900
Albuquerque, NM 87110
TEL:
FAX

RE: Chevron Isleta OrderNo.: 1510E68

Dear Edward Hubbert:

Hall Environmental Analysis Laboratory received 4 sample(s) on 10/30/2015 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1510E68**
Date Reported: **11/5/2015**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: AECOM ABQ
Project: Chevron Isleta
Lab ID: 1510E68-001
Matrix: AQUEOUS
Client Sample ID: MW-8A
Collection Date: 10/30/2015 11:12:00 AM
Received Date: 10/30/2015 12:30:00 PM

EPA METHOD 8260B: VOLATILES Analyst: **DJF**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
Benzene	60	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Toluene	3.8	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Ethylbenzene	53	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2,4-Trimethylbenzene	31	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,3,5-Trimethylbenzene	6.9	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Naphthalene	59	2.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1-Methylnaphthalene	13	4.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
2-Methylnaphthalene	14	4.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Acetone	ND	10		µg/L	1	11/4/2015 8:49:12 PM	R30012
Bromobenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Bromodichloromethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Bromoform	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Bromomethane	ND	3.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
2-Butanone	ND	10		µg/L	1	11/4/2015 8:49:12 PM	R30012
Carbon disulfide	ND	10		µg/L	1	11/4/2015 8:49:12 PM	R30012
Carbon Tetrachloride	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Chlorobenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Chloroethane	ND	2.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Chloroform	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Chloromethane	ND	3.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
2-Chlorotoluene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
4-Chlorotoluene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
cis-1,2-DCE	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Dibromochloromethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Dibromomethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2-Dichlorobenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,3-Dichlorobenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,4-Dichlorobenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Dichlorodifluoromethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,1-Dichloroethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,1-Dichloroethene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2-Dichloropropane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,3-Dichloropropane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
2,2-Dichloropropane	ND	2.0		µg/L	1	11/4/2015 8:49:12 PM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

CLIENT:	AECOM ABQ			**Client Sample ID:**	MW-8A
Project:	Chevron Isleta			**Collection Date:**	10/30/2015 11:12:00 AM
Lab ID:	1510E68-001	**Matrix:**	AQUEOUS	**Received Date:**	10/30/2015 12:30:00 PM

Analyses	**Result**	**RL**	**Qual**	**Units**	**DF**	**Date Analyzed**	**Batch**
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
1,1-Dichloropropene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Hexachlorobutadiene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
2-Hexanone	ND	10		µg/L	1	11/4/2015 8:49:12 PM	R30012
Isopropylbenzene	15	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
4-Isopropyltoluene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
4-Methyl-2-pentanone	ND	10		µg/L	1	11/4/2015 8:49:12 PM	R30012
Methylene Chloride	ND	3.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
n-Butylbenzene	ND	3.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
n-Propylbenzene	34	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
sec-Butylbenzene	3.3	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Styrene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
tert-Butylbenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
trans-1,2-DCE	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,1,1-Trichloroethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,1,2-Trichloroethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Trichloroethene (TCE)	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Trichlorofluoromethane	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
1,2,3-Trichloropropane	ND	2.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Vinyl chloride	ND	1.0		µg/L	1	11/4/2015 8:49:12 PM	R30012
Xylenes, Total	83	1.5		µg/L	1	11/4/2015 8:49:12 PM	R30012
Surr: 1,2-Dichloroethane-d4	98.2	70-130		%REC	1	11/4/2015 8:49:12 PM	R30012
Surr: 4-Bromofluorobenzene	102	70-130		%REC	1	11/4/2015 8:49:12 PM	R30012
Surr: Dibromofluoromethane	107	70-130		%REC	1	11/4/2015 8:49:12 PM	R30012
Surr: Toluene-d8	99.9	70-130		%REC	1	11/4/2015 8:49:12 PM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix		

CLIENT:	AECOM ABQ			**Client Sample ID:**	MW-11A
Project:	Chevron Isleta			**Collection Date:**	10/30/2015 10:50:00 AM
Lab ID:	1510E68-002	**Matrix:**	AQUEOUS	**Received Date:**	10/30/2015 12:30:00 PM

Analyses	**Result**	**RL**	**Qual**	**Units**	**DF**	**Date Analyzed**	**Batch**
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	2.9	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Toluene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Ethylbenzene	3.4	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Naphthalene	29	2.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1-Methylnaphthalene	9.1	4.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
2-Methylnaphthalene	7.6	4.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Acetone	ND	10		µg/L	1	11/4/2015 9:16:26 PM	R30012
Bromobenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Bromodichloromethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Bromoform	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Bromomethane	ND	3.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
2-Butanone	ND	10		µg/L	1	11/4/2015 9:16:26 PM	R30012
Carbon disulfide	ND	10		µg/L	1	11/4/2015 9:16:26 PM	R30012
Carbon Tetrachloride	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Chlorobenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Chloroethane	ND	2.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Chloroform	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Chloromethane	ND	3.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
2-Chlorotoluene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
4-Chlorotoluene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
cis-1,2-DCE	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Dibromochloromethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Dibromomethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2-Dichlorobenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,3-Dichlorobenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,4-Dichlorobenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Dichlorodifluoromethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,1-Dichloroethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,1-Dichloroethene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2-Dichloropropane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,3-Dichloropropane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
2,2-Dichloropropane	ND	2.0		µg/L	1	11/4/2015 9:16:26 PM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix		

CLIENT: AECOM ABQ
Project: Chevron Isleta
Lab ID: 1510E68-002 **Matrix:** AQUEOUS

Client Sample ID: MW-11A
Collection Date: 10/30/2015 10:50:00 AM
Received Date: 10/30/2015 12:30:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	**DJF**
1,1-Dichloropropene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Hexachlorobutadiene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
2-Hexanone	ND	10		µg/L	1	11/4/2015 9:16:26 PM	R30012
Isopropylbenzene	20	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
4-Isopropyltoluene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
4-Methyl-2-pentanone	ND	10		µg/L	1	11/4/2015 9:16:26 PM	R30012
Methylene Chloride	ND	3.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
n-Butylbenzene	ND	3.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
n-Propylbenzene	26	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
sec-Butylbenzene	4.4	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Styrene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
tert-Butylbenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
trans-1,2-DCE	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,1,1-Trichloroethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,1,2-Trichloroethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Trichloroethene (TCE)	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Trichlorofluoromethane	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
1,2,3-Trichloropropane	ND	2.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Vinyl chloride	ND	1.0		µg/L	1	11/4/2015 9:16:26 PM	R30012
Xylenes, Total	ND	1.5		µg/L	1	11/4/2015 9:16:26 PM	R30012
Surr: 1,2-Dichloroethane-d4	94.5	70-130		%REC	1	11/4/2015 9:16:26 PM	R30012
Surr: 4-Bromofluorobenzene	105	70-130		%REC	1	11/4/2015 9:16:26 PM	R30012
Surr: Dibromofluoromethane	109	70-130		%REC	1	11/4/2015 9:16:26 PM	R30012
Surr: Toluene-d8	100	70-130		%REC	1	11/4/2015 9:16:26 PM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

CLIENT:	AECOM ABQ			**Client Sample ID:**	MW-26
Project:	Chevron Isleta			**Collection Date:**	10/30/2015 11:48:00 AM
Lab ID:	1510E68-003	**Matrix:**	AQUEOUS	**Received Date:**	10/30/2015 12:30:00 PM

Analyses	**Result**	**RL**	**Qual**	**Units**	**DF**	**Date Analyzed**	**Batch**
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Toluene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Ethylbenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Naphthalene	ND	2.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1-Methylnaphthalene	ND	4.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
2-Methylnaphthalene	ND	4.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Acetone	ND	10		µg/L	1	11/5/2015 1:22:48 AM	R30012
Bromobenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Bromodichloromethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Bromoform	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Bromomethane	ND	3.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
2-Butanone	ND	10		µg/L	1	11/5/2015 1:22:48 AM	R30012
Carbon disulfide	ND	10		µg/L	1	11/5/2015 1:22:48 AM	R30012
Carbon Tetrachloride	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Chlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Chloroethane	ND	2.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Chloroform	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Chloromethane	ND	3.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
2-Chlorotoluene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
4-Chlorotoluene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
cis-1,2-DCE	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Dibromochloromethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Dibromomethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2-Dichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,3-Dichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,4-Dichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Dichlorodifluoromethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,1-Dichloroethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,1-Dichloroethene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2-Dichloropropane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,3-Dichloropropane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
2,2-Dichloropropane	ND	2.0		µg/L	1	11/5/2015 1:22:48 AM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:				
*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

CLIENT:	AECOM ABQ	**Client Sample ID:**	MW-26
Project:	Chevron Isleta	**Collection Date:**	10/30/2015 11:48:00 AM
Lab ID:	1510E68-003 **Matrix:** AQUEOUS	**Received Date:**	10/30/2015 12:30:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	**DJF**
1,1-Dichloropropene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Hexachlorobutadiene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
2-Hexanone	ND	10		µg/L	1	11/5/2015 1:22:48 AM	R30012
Isopropylbenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
4-Isopropyltoluene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
4-Methyl-2-pentanone	ND	10		µg/L	1	11/5/2015 1:22:48 AM	R30012
Methylene Chloride	ND	3.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
n-Butylbenzene	ND	3.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
n-Propylbenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
sec-Butylbenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Styrene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
tert-Butylbenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
trans-1,2-DCE	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,1,1-Trichloroethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,1,2-Trichloroethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Trichloroethene (TCE)	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Trichlorofluoromethane	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
1,2,3-Trichloropropane	ND	2.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Vinyl chloride	ND	1.0		µg/L	1	11/5/2015 1:22:48 AM	R30012
Xylenes, Total	ND	1.5		µg/L	1	11/5/2015 1:22:48 AM	R30012
Surr: 1,2-Dichloroethane-d4	89.3	70-130		%REC	1	11/5/2015 1:22:48 AM	R30012
Surr: 4-Bromofluorobenzene	106	70-130		%REC	1	11/5/2015 1:22:48 AM	R30012
Surr: Dibromofluoromethane	108	70-130		%REC	1	11/5/2015 1:22:48 AM	R30012
Surr: Toluene-d8	101	70-130		%REC	1	11/5/2015 1:22:48 AM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix		

CLIENT: AECOM ABQ **Client Sample ID:** Trip Blank
Project: Chevron Isleta **Collection Date:**
Lab ID: 1510E68-004 **Matrix:** TRIP BLANK **Received Date:** 10/30/2015 12:30:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **DJF**	
Benzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Toluene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Ethylbenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Naphthalene	ND	2.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1-Methylnaphthalene	ND	4.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
2-Methylnaphthalene	ND	4.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Acetone	ND	10		µg/L	1	11/5/2015 1:49:58 AM	R30012
Bromobenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Bromodichloromethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Bromoform	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Bromomethane	ND	3.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
2-Butanone	ND	10		µg/L	1	11/5/2015 1:49:58 AM	R30012
Carbon disulfide	ND	10		µg/L	1	11/5/2015 1:49:58 AM	R30012
Carbon Tetrachloride	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Chlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Chloroethane	ND	2.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Chloroform	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Chloromethane	ND	3.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
2-Chlorotoluene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
4-Chlorotoluene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
cis-1,2-DCE	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Dibromochloromethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Dibromomethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2-Dichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,3-Dichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,4-Dichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Dichlorodifluoromethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,1-Dichloroethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,1-Dichloroethene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2-Dichloropropane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,3-Dichloropropane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
2,2-Dichloropropane	ND	2.0		µg/L	1	11/5/2015 1:49:58 AM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:				
	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix		

Page 7 of 11

CLIENT: AECOM ABQ
Client Sample ID: Trip Blank
Project: Chevron Isleta
Collection Date:
Lab ID: 1510E68-004
Matrix: TRIP BLANK
Received Date: 10/30/2015 12:30:00 PM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst:	**DJF**
1,1-Dichloropropene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Hexachlorobutadiene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
2-Hexanone	ND	10		µg/L	1	11/5/2015 1:49:58 AM	R30012
Isopropylbenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
4-Isopropyltoluene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
4-Methyl-2-pentanone	ND	10		µg/L	1	11/5/2015 1:49:58 AM	R30012
Methylene Chloride	ND	3.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
n-Butylbenzene	ND	3.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
n-Propylbenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
sec-Butylbenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Styrene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
tert-Butylbenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
trans-1,2-DCE	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,1,1-Trichloroethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,1,2-Trichloroethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Trichloroethene (TCE)	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Trichlorofluoromethane	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
1,2,3-Trichloropropane	ND	2.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Vinyl chloride	ND	1.0		µg/L	1	11/5/2015 1:49:58 AM	R30012
Xylenes, Total	ND	1.5		µg/L	1	11/5/2015 1:49:58 AM	R30012
Surr: 1,2-Dichloroethane-d4	92.3	70-130		%REC	1	11/5/2015 1:49:58 AM	R30012
Surr: 4-Bromofluorobenzene	107	70-130		%REC	1	11/5/2015 1:49:58 AM	R30012
Surr: Dibromofluoromethane	112	70-130		%REC	1	11/5/2015 1:49:58 AM	R30012
Surr: Toluene-d8	101	70-130		%REC	1	11/5/2015 1:49:58 AM	R30012

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:	*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
	D	Sample Diluted Due to Matrix	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
	ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
	R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
	S	% Recovery outside of range due to dilution or matrix		

Client: AECOM ABQ
Project: Chevron Isleta

Sample ID	**rb**	SampType:	**MBLK**	TestCode:	**EPA Method 8260B: VOLATILES**
Client ID:	**PBW**	Batch ID:	**R30012**	RunNo:	**30012**
Prep Date:		Analysis Date:	**11/4/2015**	SeqNo:	**914165** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
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S	% Recovery outside of range due to dilution or matrix		

Client: AECOM ABQ

Project: Chevron Isleta

Sample ID	**rb**	SampType:	**MBLK**	TestCode:	**EPA Method 8260B: VOLATILES**
Client ID:	**PBW**	Batch ID:	**R30012**	RunNo:	**30012**
Prep Date:		Analysis Date:	**11/4/2015**	SeqNo:	**914165** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.4		10.00		94.4	70	130			
Surr: 4-Bromofluorobenzene	11		10.00		106	70	130			
Surr: Dibromofluoromethane	10		10.00		105	70	130			
Surr: Toluene-d8	10		10.00		100	70	130			

Sample ID	**100 lcs**	SampType:	**LCS**	TestCode:	**EPA Method 8260B: VOLATILES**
Client ID:	**LCSW**	Batch ID:	**R30012**	RunNo:	**30012**
Prep Date:		Analysis Date:	**11/4/2015**	SeqNo:	**914166** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	20	1.0	20.00	0	101	70	130			
Toluene	20	1.0	20.00	0	99.1	70	130			
Chlorobenzene	19	1.0	20.00	0	96.8	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1510E68**

05-Nov-15

Client: AECOM ABQ

Project: Chevron Isleta

Sample ID	**100 lcs**	SampType:	**LCS**	TestCode:	**EPA Method 8260B: VOLATILES**
Client ID:	**LCSW**	Batch ID:	**R30012**	RunNo:	**30012**
Prep Date:		Analysis Date:	**11/4/2015**	SeqNo:	**914166** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloroethene	17	1.0	20.00	0	83.4	70	130			
Trichloroethene (TCE)	19	1.0	20.00	0	95.1	70	130			
Surr: 1,2-Dichloroethane-d4	10		10.00		101	70	130			
Surr: 4-Bromofluorobenzene	11		10.00		105	70	130			
Surr: Dibromofluoromethane	11		10.00		112	70	130			
Surr: Toluene-d8	10		10.00		100	70	130			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix		

Chain-of-Custody Record

lient: AEcom

ailing Address: 6501 Americas pky
900 Albuquerque, NM 87110

hone #:

mail or Fax#:

A/QC Package:
☑ Standard ☐ Level 4 (Full Validation)

ccreditation
☑ NELAP ☐ Other ____________

☐ EDD (Type) ____________

Turn-Around Time:
☑ Standard ☐ Rush ____________

Project Name: Chevron Foleta

Project #: 60383656

Project Manager: Edward Hubbert

Sampler: A. Bisoglio

On Ice: ☑ Yes ☐ No

Sample Temperature: 8.3

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1510E68	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)					Air Bubbles (Y or N)
/30	1112	GW	MW-8A	3-40ml voas	HgCl2	-001										X						
↓	1050	↓	MW-11A	↓	↓	-002										X						
	1148		MW-26			-003										X						
↓		↓	Trip Blank	↓	↓	-004										X						

AB 10/30/15

ate: /30/15	Time: 1230	Relinquished by: Arielle	Received by:	Date 10/30/15	Time 1230
ate:	Time:	Relinquished by:	Received by:	Date	Time

Remarks:

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: AECOM ABQ

Work Order Number: 1510E68

RcptNo: 1

Received by/date: 10/30/15

Logged By: Lindsay Mangin 10/30/2015 12:30:00 PM

Completed By: Lindsay Mangin 10/30/2015 12:59:49 PM

Reviewed By: 11/02/15

Chain of Custody

1. Custody seals intact on sample bottles? Yes ☐ No ☐ Not Present ☑
2. Is Chain of Custody complete? Yes ☑ No ☐ Not Present ☐
3. How was the sample delivered?

Log In

4. Was an attempt made to cool the samples? Yes ☑ No ☐ NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C Yes ☐ No ☑ NA ☐

Samples were collected the same day and chilled.

6. Sample(s) in proper container(s)? Yes ☑ No ☐
7. Sufficient sample volume for indicated test(s)? Yes ☑ No ☐
8. Are samples (except VOA and ONG) properly preserved? Yes ☑ No ☐
9. Was preservative added to bottles? Yes ☐ No ☑ NA ☐
10. VOA vials have zero headspace? Yes ☑ No ☐ No VOA Vials ☐
11. Were any sample containers received broken? Yes ☐ No ☑
12. Does paperwork match bottle labels? Yes ☑ No ☐
(Note discrepancies on chain of custody)
13. Are matrices correctly identified on Chain of Custody? Yes ☑ No ☐
14. Is it clear what analyses were requested? Yes ☑ No ☐
15. Were all holding times able to be met? Yes ☑ No ☐
(If no, notify customer for authorization.)

# of preserved bottles checked for pH: ____________
(<2 or >12 unless noted)
Adjusted? ____________
Checked by: ____________

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: ____________ Date ____________
By Whom: ____________ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding: ____________
Client Instructions: ____________

17. Additional remarks:

18. **Cooler Information**

Cooler No	Temp ºC	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	8.3	Good	Not Present			

About AECOM

AECOM (NYSE: ACM) is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government. With approximately 45,000 employees around the world, AECOM is a leader in all of the key markets that it serves. AECOM provides a blend of global reach, local knowledge, innovation, and collaborative technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. A Fortune 500 company, AECOM serves clients in more than 100 countries and has annual revenue in excess of $6 billion.

More information on AECOM and its services can be found at www.aecom.com.

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