1R – 1594

2014 GWMR

07 / 30 / 2014

July 30, 2014

NMOCD

1220 South St. Francis Dr.

Santa Fe, New Mexico 87505

Effective June 1, 2014 Legacy Reserves Operating LP took over operations of certain properties in the state of New Mexico from Celero Energy. Along with this acquisition Legacy Reserves Operating LP assumed seven sites that had existing case numbers, they are listed below.

Rock Queen Unit Tract Battery #11	1RP-1595
Rock Queen Saltwater Plant #1	1RP-1594
Rock Queen Unit Tract Battery #13	1RP-1614
Rock Queen Unit Tract Battery #33	1RP-1664
Rock Queen Unit Tract Battery #1	1RP-1554
Rock Queen Unit Tract Battery #7	1RP-1645
Drickey Queen Saltwater Plant #3	1RP-1648

As per the included studies, Legacy Reserves recommends all cases to be closed.

Sincerely,

Gregg Skelton

Operations Manager

Legacy Reserves Operating LP

Legacy Reserves
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OFFICE 432-689-5200 • FAX 432-689-5297

TETRA TECH

July 11, 2014

Mr. Glenn von Gonten
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87504

Re: Groundwater Aquifer Evaluation/Determination for the Legacy Reserves (Formerly Celero Energy II, LP), Rock Queen Unit Saltwater Plant #1, Located in Unit Letter D, Section 26, Township 13 South, Range 31 East, Chaves Country, New Mexico (NMOCD 1RP#1594)

Mr. Von Gonten:

This report details the results of the Groundwater Aquifer Slug Test Evaluation for the Rock Queen Unit Saltwater Plant #1, located in Chaves County, New Mexico.

Additional Monitor Well Installation

Between February 18 and February 19, 2014, Tetra Tech was onsite to oversee the installation of four additional monitor wells (MW-8 through MW-11) for delineation purposes. Each of the four monitor wells were installed with 2-inch PVC casing. The lithology of the newly installed wells was relatively consistent with limestone, sand/sandstone, and calcareous sand to approximately 20 to 30 feet below ground surface (bgs). From approximately 20 to 135 to 150 feet bgs the soils were comprised of tan fine grain sand with some sandstone intermixed. From 150 feet bgs to the terminus of the borings the soils consisted of gray to red clays with minor gravels in MW-9. See Figures 1 and 2 for site locations and Appendix A soil boring logs.

During the investigation, groundwater was encountered at depths of approximately 139 to 140 feet bgs. The monitor wells were extended to depths of 148 feet bgs in MW-10, 157 feet bgs in MW-8 and MW-11, and 158 feet bgs in MW-9. Monitor wells MW-8, MW-9, and MW-11 had 30 feet of 0.02" screen installed at the base. Monitor well MW-10 had 20 feet of 0.02" screen installed at the base. From the top of the screens to the surface of the boring, the wells were

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completed with blank schedule 40 PVC casing. A sand pack, bentonite, and cement were installed in the annulus of the wells. See Figure 3 detailing monitor well locations and Appendix B monitor well completion diagrams.

2014 Groundwater Gauging and Sampling Results

Tetra Tech was onsite March 26, 2014 to gauge all monitor wells. No PSH was measured in any of the monitor wells. Utilizing water level elevation calculations, a groundwater gradient map was generated for the sampling event with a hydraulic gradient to the south. Groundwater gradient map for the sampling event is included as Figure 4. Gauging data is summarized as Table 1.

On March 3, 2014, each of the monitor wells was sampled for BTEX utilizing Method SW8021B, chlorides and sulfates utilizing Method E 300.0, TDS utilizing Method SM2540C, and general chemistry. The samples were collected and submitted to Trace Analysis (Trace) of Midland, Texas. All samples collected and submitted were below the NMWQCC standard of 0.01 milligrams per Liter (mg/L) benzene. Chlorides for the sampling period ranged from 36.6 mg/L in monitor well MW-11 to 124,000 mg/L in monitor well MW-1. Monitor wells MW-9 and MW-11 were the only wells with chlorides below the NMWQCC standard of 250 mg/L. The general chemistry and BTEX analyses are shown in Tables 2 and 3, respectively. Chloride concentration map for the sampling event is included as Figure 5. See Appendix C for Laboratory Analytical Reports.

Aquifer Evaluation/Determination

Between March 25 and March 27, 2014, Tetra Tech was onsite to perform slug tests on monitor wells MW-5, MW-6, MW-11, and RW-1. Due to low volumes at the site, a pump test was not feasible for performing aquifer characteristic testing on the underlying formation. In order to determine hydraulic conductivity (K) and Transmissivity values (T) for the underlying groundwater, an In-Situ Level Troll 700 Data Logger was placed in each of the tested wells along with a 3-foot slug consisting of 1 ½" PVC with sand packing in MW-5, MW-6, and MW-11, and 1 ¾ " PVC with sand packing in RW-1. Upon collection of the data, the information was evaluated based upon the Bouwer-Rice Method.

Based on the collected data, monitor well MW-5 had a K value of 4.267E-5 m/day and a T value of 1.774E-4 m^2/day. Monitor well MW-6 had a K value of 1.629E-5 m/day and a T value of 4.917E-5 m^2/day. Monitor well MW-11 had a K value of 7.639E-5 m/day and a T value of 2.696E-4 m^2/day. Recovery well RW-1 had a K value of 3.996E-4 m/day and a T value of 9.744E-4 m^2/day. From *Groundwater Hydrology*, by David Keith Todd, the K values for the four wells indicate characteristics of a tight clay/shale with extremely low Transmissivity. Based on this data, it appears the underlying groundwater is not a viable aquifer

and will not render much water. As such, remediation of the underlying groundwater would be neither technically nor economically feasible. See Appendix D for slug test results.

CONCLUSIONS AND RECOMMENDATIONS

Based on the low hydraulic conductivity and transmissivity of the groundwater bearing unit at the site presented in this report, coupled with the infeasibility of remediating the site due to the poor aquifer characteristics, Legacy respectfully requests that the NMOCD consider closure of the site based on deed recordation/restriction of the impacted area. Upon closure of the site all monitor/recovery wells located onsite will be plugged and abandoned (P&A) in accordance to New Mexico Office of the State Engineer (OSE). Upon completion of the P&A of the wells, a final report detailing the removal of the wells along with the drillers plugging reports will be submitted to the NMOCD for final closure.

If you have any questions or comments concerning the assessment or the activities performed at the Site, please call me at (432) 682-4559.

Respectfully submitted,
Tetra Tech, Inc.

Jeffrey Kindley, P.G.
Senior Environmental Geologist

Greg W. Pope, P.G.
Senior Project Manager

cc: Gregg Skelton – Legacy Reserves

FIGURES

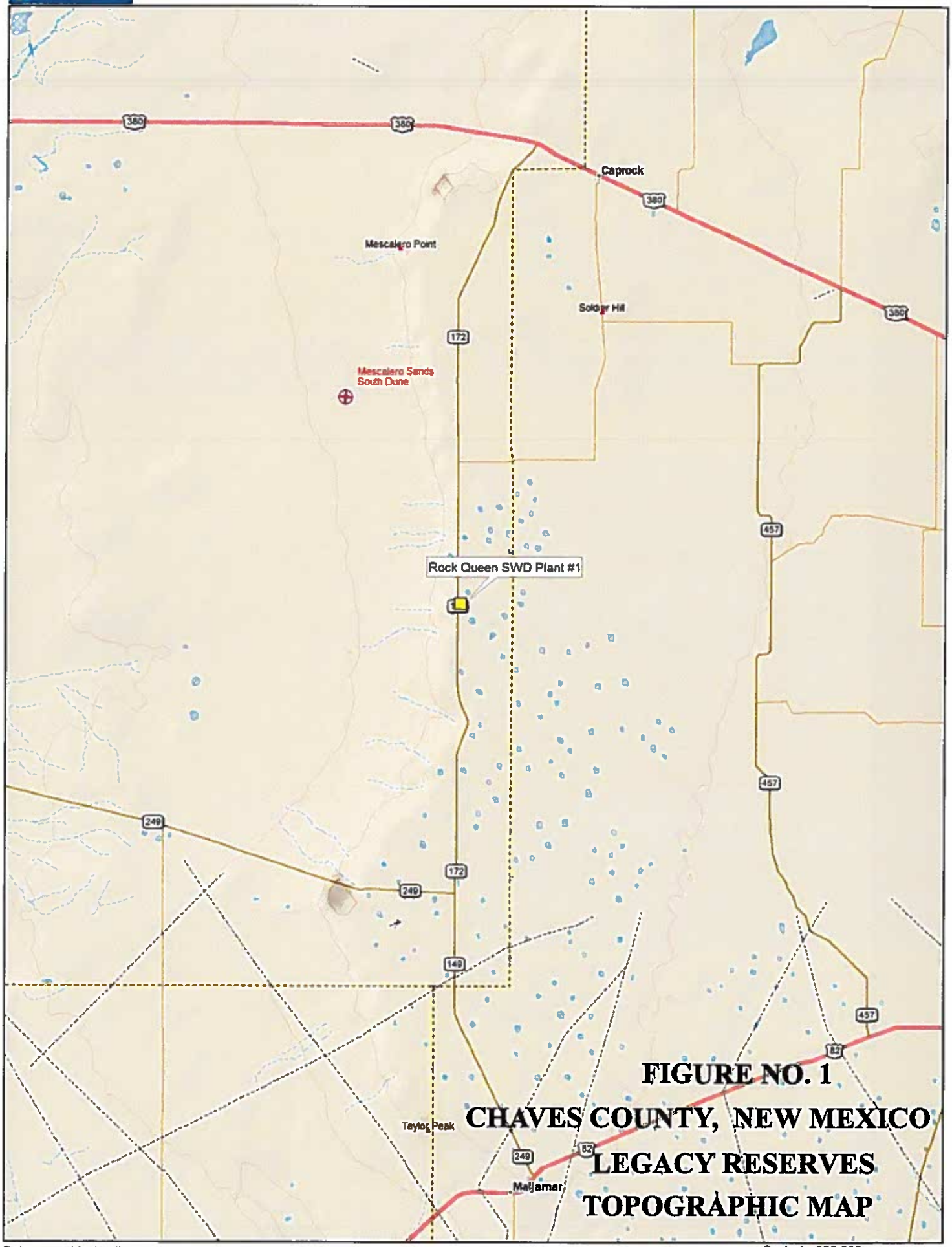

FIGURE NO. 1

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES

TOPOGRAPHIC MAP

TN
MN (7.7°E)

Scale 1 : 300,000
1" = 4.73 mi
Data Zoom 9-5

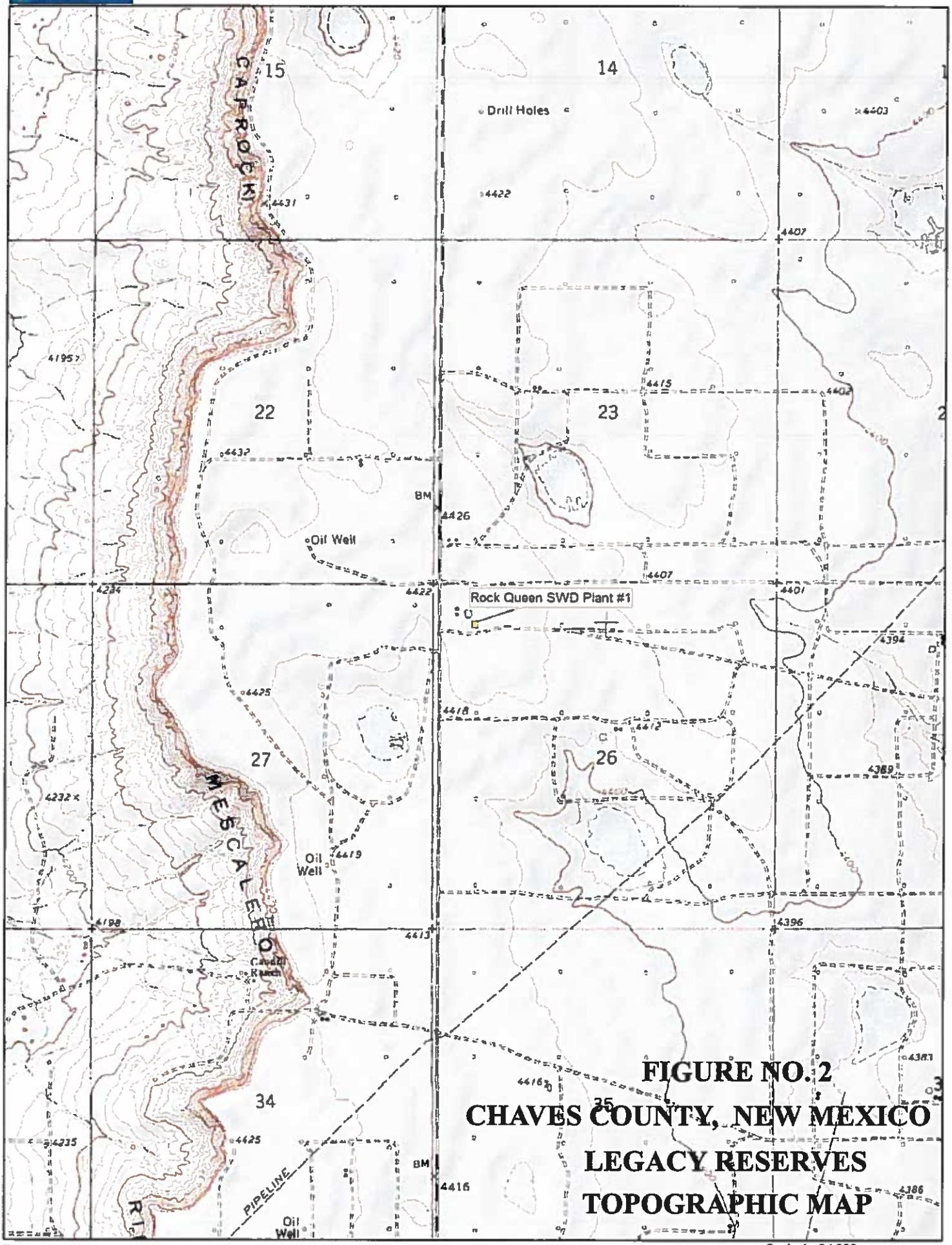

FIGURE NO.2
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

TN
MN (7.7°E)

Scale 1 : 24,000
1" = 2,000.0 ft
Data Zoom 14-0

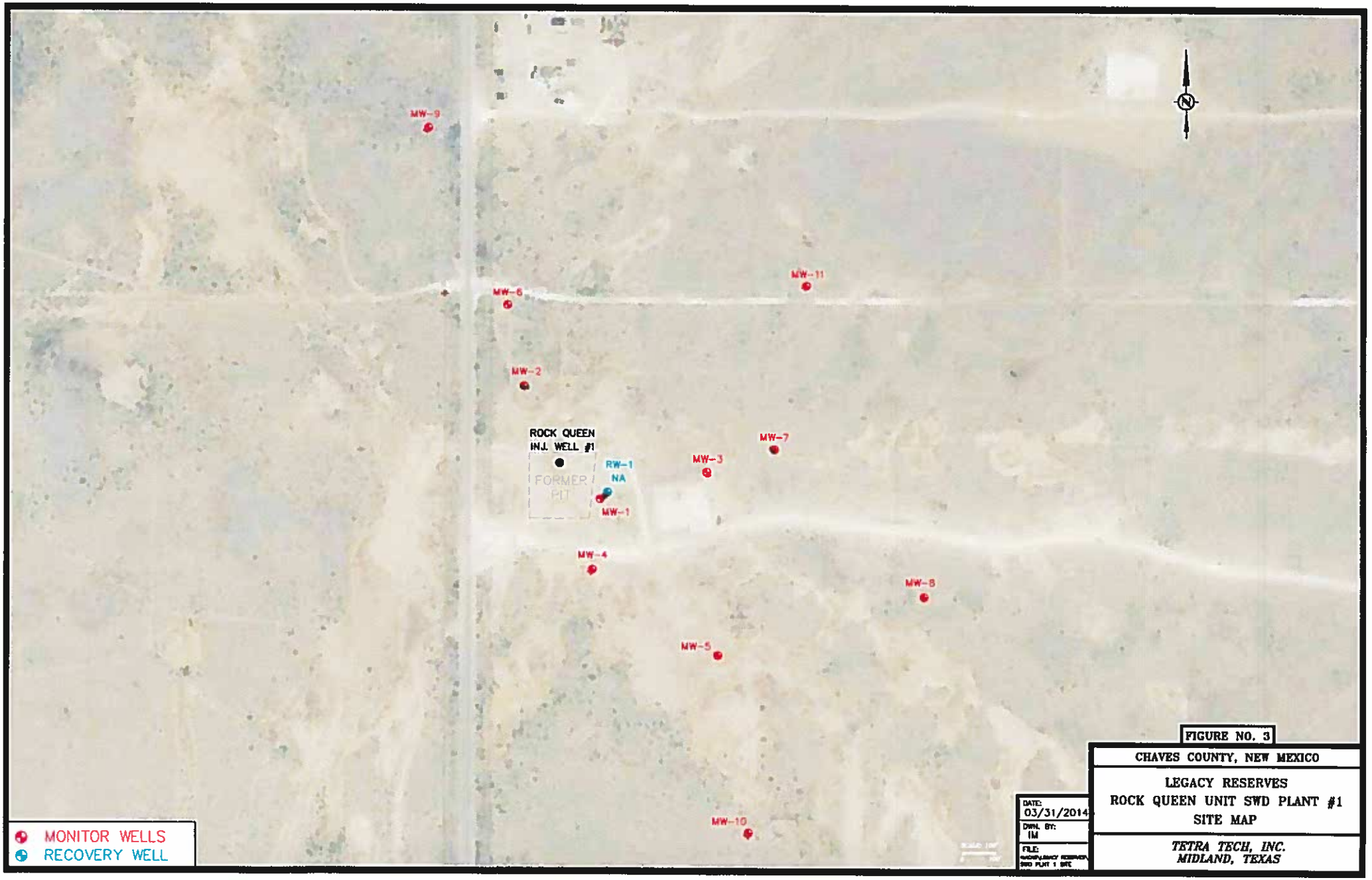

FIGURE NO. 3

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT SWD PLANT #1
SITE MAP

DATE: 03/31/2014
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FILE:

TETRA TECH, INC.
MIDLAND, TEXAS

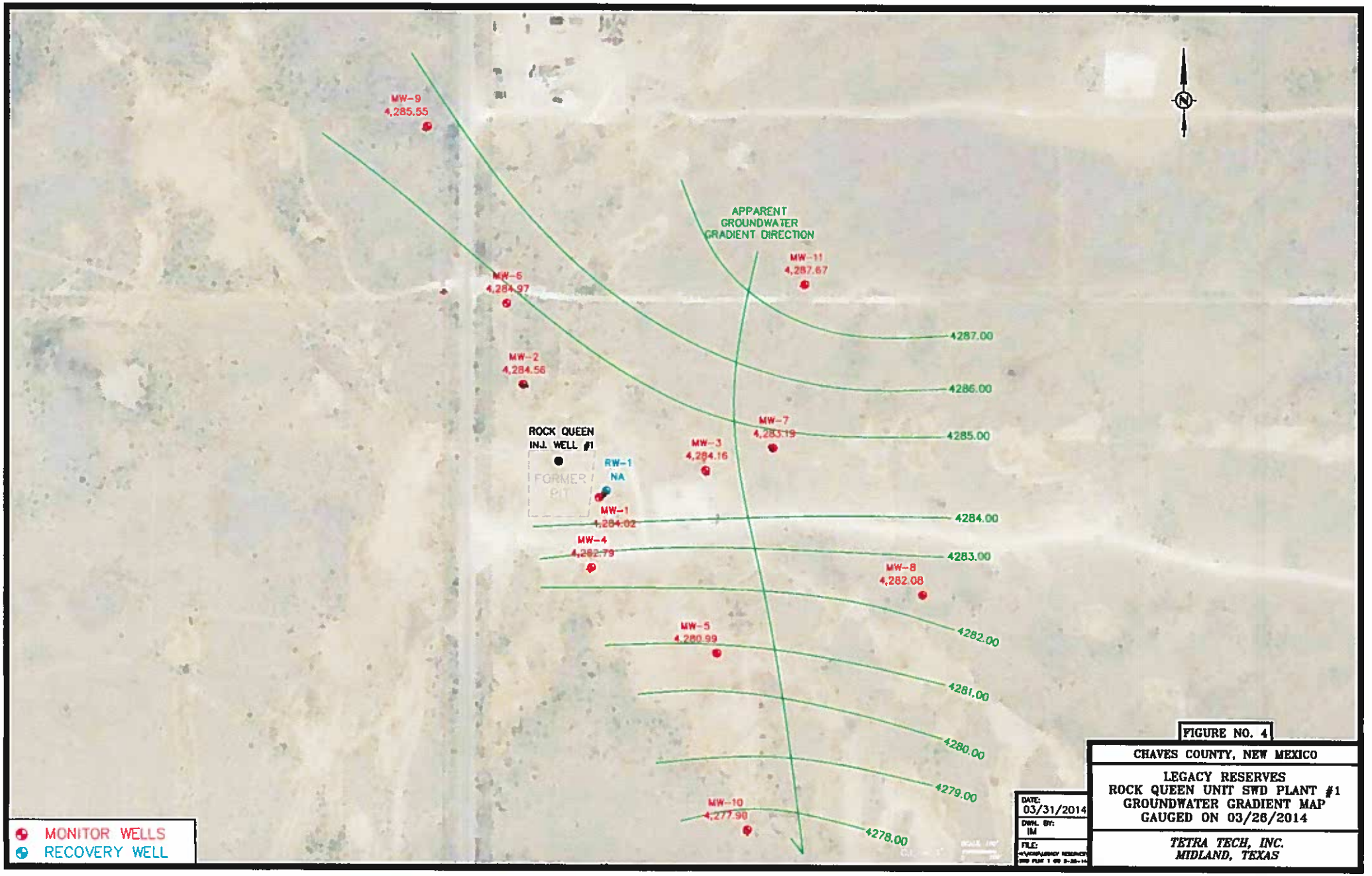


FIGURE NO. 4

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT SWD PLANT #1
GROUNDWATER GRADIENT MAP
GAUGED ON 03/26/2014

TETRA TECH, INC.
MIDLAND, TEXAS

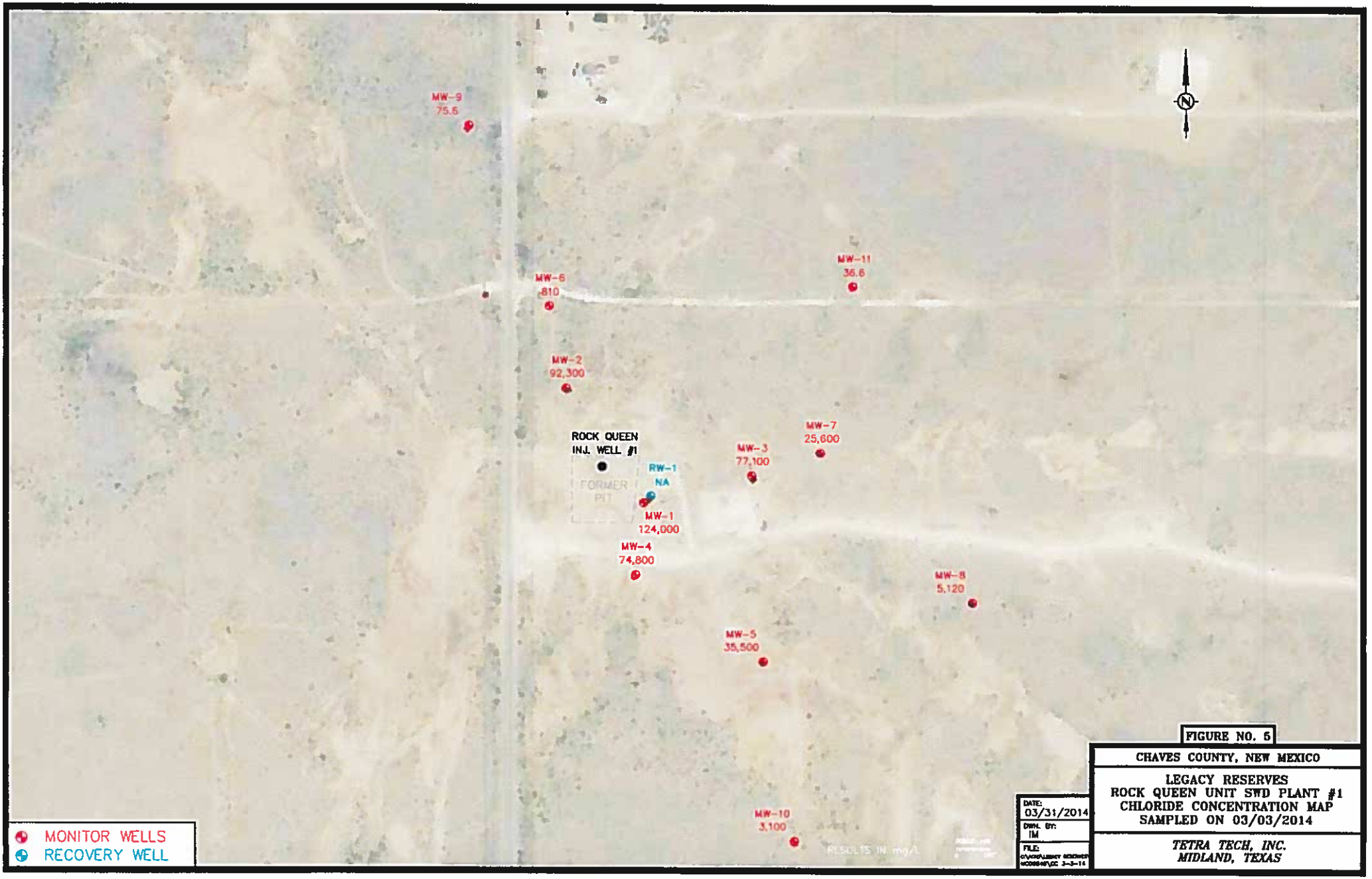


FIGURE NO. 6

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT SWD PLANT #1
CHLORIDE CONCENTRATION MAP
SAMPLED ON 03/03/2014

TETRA TECH, INC.
MIDLAND, TEXAS

TABLES

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Saltwater Injection Plant #1
Chaves County, New Mexico

Monitor Well	Date Gauged	Date Well Installation	TOC Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
MW-1	05/24/07	05/24/07	4,421.40	148.00	136.57	4,284.83
	02/05/08				136.08	4,285.32
	11/24/09				136.35	4,285.05
	07/13/10				136.49	4,284.91
	10/11/10				136.57	4,284.83
	01/17/11				136.60	4,284.80
	04/12/11				136.74	4,284.66
	07/28/11				136.82	4,284.58
	10/24/11				136.82	4,284.58
	01/03/12				136.92	4,284.48
	04/09/12				137.08	4,284.32
	07/23/12				136.99	4,284.41
	10/24/12				137.09	4,284.31
	01/28/13				136.93	4,284.47
	04/22/13				137.10	4,284.30
	07/22/13				137.21	4,284.19
	10/29/13				137.19	4,284.21
	03/26/14				137.38	4,284.02
MW-2	11/24/09	11/18/09	4,423.57	150.00	137.84	4,285.73
	07/13/10				138.05	4,285.52
	10/11/10				138.18	4,285.39
	01/17/11				138.14	4,285.43
	04/12/11				138.23	4,285.34
	07/28/11				139.22	4,284.35
	10/24/11				138.45	4,285.12
	01/03/12				138.54	4,285.03
	04/09/12				138.54	4,285.03
	07/23/12				138.57	4,285.00
	10/24/12				138.77	4,284.80
	01/28/13				138.73	4,284.84
	04/22/13				138.82	4,284.75
	07/22/13				138.74	4,284.83
	10/29/13				138.74	4,284.83
	03/26/14				139.01	4,284.56

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Saltwater Injection Plant #1
Chaves County, New Mexico

Monitor Well	Date Gauged	Date Well Installation	TOC Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
MW-3	11/24/09	11/18/09	4,421.79	150.00	137.01	4,284.78
	07/13/10				137.07	4,284.72
	10/11/10				137.19	4,284.60
	01/17/11				136.78	4,285.01
	04/12/11				136.75	4,285.04
	07/28/11				137.82	4,283.97
	10/24/11				137.08	4,284.71
	01/03/12				137.12	4,284.67
	04/09/12				137.16	4,284.63
	07/23/12				137.21	4,284.58
	10/24/12				137.44	4,284.35
	01/28/13				137.31	4,284.48
	04/22/13				137.43	4,284.36
	07/22/13				137.47	4,284.32
	10/29/13				137.46	4,284.33
	03/26/14				137.63	4,284.16
MW-4	11/24/09	11/18/09	4,421.26	150.00	137.30	4,283.96
	07/13/10				137.64	4,283.62
	10/11/10				137.72	4,283.54
	01/17/11				137.75	4,283.51
	04/12/11				137.89	4,283.37
	07/28/11				138.68	4,282.58
	10/24/11				137.99	4,283.27
	01/03/12				138.02	4,283.24
	04/09/12				138.04	4,283.22
	07/23/12				138.10	4,283.16
	10/24/12				138.23	4,283.03
	01/28/13				138.21	4,283.05
	04/22/13				138.31	4,282.95
	07/22/13				138.33	4,282.93
	10/29/13				138.30	4,282.96
	03/26/14				138.47	4,282.79

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Saltwater Injection Plant #1
Chaves County, New Mexico

Monitor Well	Date Gauged	Date Well Installation	TOC Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
MW-5	01/17/11	11/22/10	4,420.25	152.40	138.76	4,281.49
	04/12/11				138.81	4,281.44
	07/28/11				139.75	4,280.50
	10/24/11				138.97	4,281.28
	01/03/12				138.99	4,281.26
	04/09/12				139.03	4,281.22
	07/23/12				139.11	4,281.14
	10/24/12				139.09	4,281.16
	01/28/13				139.10	4,281.15
	04/22/13				139.15	4,281.10
	07/22/13				139.22	4,281.03
	10/29/13				139.17	4,281.08
	03/26/14				139.26	4,280.99
MW-6	01/17/11	11/22/10	4,423.57	149.70	137.62	4,285.95
	04/12/11				137.81	4,285.76
	07/28/11				138.71	4,284.86
	10/24/11				137.97	4,285.60
	01/03/12				138.03	4,285.54
	04/09/12				138.11	4,285.46
	07/23/12				138.07	4,285.50
	10/24/12				138.30	4,285.27
	01/28/13				138.19	4,285.38
	04/22/13				138.34	4,285.23
	07/22/13				138.20	4,285.37
	10/29/13				138.13	4,285.44
	03/26/14				138.60	4,284.97
MW-7	01/17/11	11/19/10	4,423.52	159.02	139.76	4,283.76
	04/12/11				139.79	4,283.73
	07/28/11				140.74	4,282.78
	10/24/11				139.96	4,283.56
	01/03/12				140.03	4,283.49
	04/09/12				140.05	4,283.47
	07/23/12				140.00	4,283.52
	10/24/12				140.13	4,283.39
	01/28/13				140.08	4,283.44

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Saltwater Injection Plant #1
Chaves County, New Mexico

Monitor Well	Date Gauged	Date Well Installation	TOC Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
MW-7	04/22/13				140.16	4,283.36
	07/22/13				140.12	4,283.40
	10/29/13				140.08	4,283.44
	03/26/14				140.33	4,283.19
MW-8	03/26/14	02/26/14	4,422.58		140.50	4,282.08
MW-9	03/26/14	02/26/14	4,425.36		139.81	4,285.55
MW-10	03/26/14	02/26/14	4,418.50		140.60	4,277.90
MW-11	03/26/14	02/26/14	4,427.09		139.42	4,287.67
RW-1	01/17/11	12/12/10	4,420.69	153.03	134.97	4,285.72
	04/12/11				135.35	4,285.34
	07/28/11				136.25	4,284.44
	10/24/11				135.72	4,284.97
	01/03/12				135.91	4,284.78
	04/09/12				135.88	4,284.81
	07/23/12				135.98	4,284.71
	10/24/12				136.05	4,284.64
	01/28/13				136.00	4,284.69
	04/22/13				136.11	4,284.58
	07/22/13				136.20	4,284.49
	10/29/13				136.19	4,284.50
	03/26/14				142.00	4,278.69

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Saltwater Injection Plant #1

Chaves County, New Mexico

Monitor Well	Date Sampled	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Potassium (mg/L)	Hydroxide Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Alkalinity (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
MW-1	05/24/07	3,040	4,620	79,100	1950	<1.00	<1.00	154	154	1,800	154,000	231,100	26,600	6.45
	11/24/09	2,060	3,630	70,000	1840	<1.00	<1.00	127	127	1,600	139,000	220,000	20,100	5.15
	07/13/10	-	-	-	-	-	-	-	-	1,530	155,000	225,000	-	-
	10/11/10	-	-	-	-	-	-	-	-	1,500	130,000	235,000	-	-
	01/18/11	-	-	-	-	-	-	-	-	1,940	132,000	234,000	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,830	174,000	237,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	1,730	137,000	223,000	-	-
	10/28/11	-	-	-	-	-	-	-	-	1,870	143,000	258,000	-	-
	01/04/12	-	-	-	-	-	-	-	-	1,760	153,000	218,000	-	-
	04/09/12	-	-	-	-	-	-	-	-	1,510	153,000	226,000	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	164,000	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	1,900	168,000	226,000	-	-
	01/30/13	-	-	-	-	-	-	-	-	1,740	153,000	247,000	-	-
	04/25/13	2,620	4,430	80,700	1,970	<1.00	<1.00	167	167	1,640	138,000	190,000	24,800	5.78
	07/24/13	2,210	4,010	82,200	2,080	<20.0	<20.0	154	154	<12500	171,000	211,000	22,000	6.22
	10/30/13	1,710	3,550	74,200	1,480	<20.0	<20.0	166	166	1,930	187,000	221,000	19,000	5.94
	03/03/14	2,160	3,930	72,600	2,160	<20.0	<20.0	203	203	1,550	124,000	195,000	21,600	6.05
MW-2	11/24/09	1,010	633	10,800	270	<1.00	<1.00	127	127	413	19,900	146,000	5,130	6.97
	07/13/10	-	-	-	-	-	-	-	-	652	43,200	72,700	-	-
	10/11/10	-	-	-	-	-	-	-	-	945	51,800	235,000	-	-
	01/18/11	-	-	-	-	-	-	-	-	1,640	66,600	133,000	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,820	99,700	159,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	1,770	90,400	155,000	-	-
	10/28/11	-	-	-	-	-	-	-	-	1,460	80,300	135,000	-	-
	01/04/12	-	-	-	-	-	-	-	-	1,820	103,000	156,000	-	-
	04/09/12	-	-	-	-	-	-	-	-	1,460	85,900	132,000	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	97,100	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	890	45,200	81,400	-	-
	01/30/13	-	-	-	-	-	-	-	-	1,160	67,700	138,000	-	-
	04/25/13	2,280	1,960	32,400	620	<1.00	<1.00	180	180	1,280	49,200	161,000	13,800	6.53
	07/24/13	3,620	2,130	41,300	1000	<20.0	<20.0	179	179	<12500	73,500	80,800	17,800	6.31
	10/30/13	1,830	1,300	24,400	614	<20.0	<20.0	187	187	746	63,400	71,000	9,920	6.67
	03/03/14	3,550	2,700	46,900	1,220	<20.0	<20.0	218	218	1,590	92,300	145,000	20,000	6.02

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Saltwater Injection Plant #1

Chaves County, New Mexico

Monitor Well	Date Sampled	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Potassium (mg/L)	Hydroxide Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Alkalinity (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
MW-3	11/24/09	6,030	2,150	29,900	323	<1.00	<1.00	92	92	908	59,500	108,000	23,900	6.02
	07/13/10	-	-	-	-	-	-	-	-	931	73,200	150,000	-	-
	10/11/10	-	-	-	-	-	-	-	-	934	85,500	167,000	-	-
	01/18/11	-	-	-	-	-	-	-	-	1,230	85,200	154,000	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,250	118,000	188,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	1,100	66,900	103,000	-	-
	10/27/11	-	-	-	-	-	-	-	-	1,160	123,000	184,000	-	-
	01/04/12	-	-	-	-	-	-	-	-	1,220	112,000	163,000	-	-
	04/09/12	-	-	-	-	-	-	-	-	1,100	69,800	104,000	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	52,000	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	1,210	84,000	123,000	-	-
	01/30/13	-	-	-	-	-	-	-	-	1,030	59,500	105,000	-	-
	04/25/13	8,950	3,440	47,600	330	<1.00	<1.00	132	132	1,190	87,700	188,000	36,500	5.95
	07/24/13	5,070	1,970	33,800	530	<20.0	<20.0	163	163	<13500	67,100	113,000	20,800	6.49
	10/30/13	2,820	1,550	28,300	550	<20.0	<20.0	150	150	940	65,200	153,000	13,400	6.24
	03/03/14	7,140	3,060	33,300	591	<20.0	<20.0	145	145	1,160	77,100	128,000	30,400	6.12
MW-4	11/24/09	791	253	4,880	76.7	<1.00	<1.00	118	118	286	9,360	22,600	3,020	7.35
	07/13/10	-	-	-	-	-	-	-	-	1,540	85,800	159,000	-	-
	10/11/10	-	-	-	-	-	-	-	-	1,640	93,200	175,000	-	-
	01/18/11	-	-	-	-	-	-	-	-	2,360	93,200	173,000	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,950	102,000	159,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	2,120	107,000	171,000	-	-
	10/28/11	-	-	-	-	-	-	-	-	2,180	124,000	171,000	-	-
	01/04/12	-	-	-	-	-	-	-	-	2,240	117,000	180,000	-	-
	04/09/12	-	-	-	-	-	-	-	-	2,020	120,000	166,000	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	119,000	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	2,230	116,000	177,000	-	-
	01/30/13	-	-	-	-	-	-	-	-	2,100	100,000	173,000	-	-
	04/25/13	3,790	3,850	65,300	1,220	<1.00	<1.00	161	161	1,940	105,000	189,000	25,300	6.15
	07/24/13	2,900	2,910	55,000	1,300	<20.0	<20.0	274	274	<12500	130,000	175,000	19,200	6.01
	10/30/13	2,370	2,970	53,700	1,150	<20.0	<20.0	191	191	2,070	132,000	144,000	18,200	6.38
	03/03/14	3,280	3,420	42,800	1,170	<20.0	<20.0	153	153	2,170	74,800	168,000	22,300	6.13

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Saltwater Injection Plant #1

Chaves County, New Mexico

Monitor Well	Date Sampled	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Potassium (mg/L)	Hydroxide Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Alkalinity (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
MW-5	01/18/11	-	-	-	-	-	-	-	-	822	32,400	69,700	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,070	20,000	39,400	-	-
	07/29/11	-	-	-	-	-	-	-	-	854	24,300	46,700	-	-
	10/27/11	-	-	-	-	-	-	-	-	701	49,700	91,900	-	-
	01/04/12	-	-	-	-	-	-	-	-	751	42,900	96,100	-	-
	04/09/12	-	-	-	-	-	-	-	-	692	44,500	79,100	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	19,900	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	1,050	23,500	45,200	-	-
	01/30/13	-	-	-	-	-	-	-	-	621	33,900	60,800	-	-
	04/25/13	18,500	2,720	7,390	63.5	<1.00	<1.00	63.0	63.0	877	53,100	90,900	57,300	6.28
	07/24/13	3,670	890	8,470	60.1	<20.0	<20.0	128.0	128.0	<2500	26,000	69,300	13,300	6.50
	10/30/13	2,600	865	7,810	57.9	<20.0	<20.0	108.0	108.0	928	20,400	39,200	10,000	6.74
	03/03/14	9,420	1,590	5,830	95.6	<20.0	<20.0	78.0	78.0	799	35,500	59,300	30,100	6.37
MW-6	01/18/11	-	-	-	-	-	-	-	-	<250	3,010	16,500	-	-
	04/14/11	-	-	-	-	-	-	-	-	188	1,320	2,100	-	-
	07/29/11	-	-	-	-	-	-	-	-	146	912	1,860	-	-
	10/27/11	-	-	-	-	-	-	-	-	191	1,110	2,240	-	-
	01/04/12	-	-	-	-	-	-	-	-	197	3,240	6,080	-	-
	04/09/12	-	-	-	-	-	-	-	-	150	2,760	4,740	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	1,470	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	142	732	1,470	-	-
	01/30/13	-	-	-	-	-	-	-	-	125	1,050	2,300	-	-
	04/25/13	840	122.0	832	12.4	<1.00	<1.00	820	820	172	3,570	5,380	2,600	7.10
	07/24/13	297	32.2	220	11.1	<20.0	<20.0	176	176	<125	595	1,400	875	7.36
	10/30/13	244	24.6	131	11.7	<20.0	<20.0	157	157	156	430	1,720	710	7.21
	03/03/14	358	45.9	316	<10.0	<20.0	<20.0	193	193	152	810	2,350	1,080	7.24

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Saltwater Injection Plant #1

Chaves County, New Mexico

Monitor Well	Date Sampled	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Potassium (mg/L)	Hydroxide Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Alkalinity (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
MW-7	01/18/11	-	-	-	-	-	-	-	-	478	35,700	75,700	-	-
	04/14/11	-	-	-	-	-	-	-	-	657	61,500	91,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	172	17,400	29,500	-	-
	10/27/11	-	-	-	-	-	-	-	-	529	49,000	75,700	-	-
	01/04/12	-	-	-	-	-	-	-	-	430	39,300	91,800	-	-
	04/09/12	-	-	-	-	-	-	-	-	151	17,000	26,000	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	37,700	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	519	40,700	54,200	-	-
	01/30/13	-	-	-	-	-	-	-	-	364	41,400	49,200	-	-
	04/25/13	18,800	2,410	7,730	49.6	<1.00	<1.00	55.0	55.0	673	46,800	117,000	56,900	6.09
	07/24/13	17,000	1,920	6,490	76.7	<20.0	<20.0	74.0	74.0	<2500	48,600	94,900	50,300	6.11
	10/30/13	3,000	417	706	31.2	<20.0	<20.0	90.0	90.0	61.2	8,050	92,300	9,210	6.33
	03/03/14	13,400	1,090	4,470	64.8	<20.0	<20.0	129	129	309	25,600	46,800	37,900	6.37
MW-8	03/03/14	2,580	362	166	27.7	<20.0	<20.0	683	683	75.6	5,120	11,100	7,930	6.88
MW-9	03/03/14	82.8	9.80	71.3	10.2	<20.0	<20.0	218	218	121	75.6	633	247	7.57
MW-10	03/03/14	1,310	204	189	16.8	<20.0	<20.0	116	116	89.4	3,100	6,520	4,110	6.71
MW-11	03/03/14	72.6	8.00	56.5	8.93	<20.0	<20.0	316	316	114	36.6	514	214	7.84
RW-1	01/18/11	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/14/11	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	07/29/11	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/27/11	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01/04/12	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/09/12	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	07/24/12	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/25/12	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01/30/13	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/25/13	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	07/24/13	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/30/13	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	03/03/14	-	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

NS - Not sampled

(-) Not analyzed

Table 3

Legacy Reserves

Groundwater Analytical Results

Rock Queen Saltwater Injection Plant #1

Chaves County, New Mexico

Monitor Well	Date Sampled	Benzene (mg/L)	Toluene (mg/L)	Ethyl-Benzene (mg/L)	Xylene (mg/L)	Total BTEX (mg/L)
MW-1	11/24/09	0.0016	<0.001	<0.001	<0.001	0.0016
	07/13/10	0.0031	<0.001	<0.001	<0.001	0.0031
	10/11/10	0.0038	<0.001	<0.001	<0.001	0.0038
	01/18/11	0.0116	0.0059	<0.001	<0.001	0.0175
	04/14/11	0.0088	0.0055	<0.001	<0.001	0.0143
	07/29/11	0.0081	<0.001	<0.001	<0.001	0.0081
	10/28/11	0.004	<0.001	<0.001	0.0063	0.0103
	01/04/12	0.0042	<0.001	<0.001	<0.001	0.0042
	04/09/12	0.005	<0.001	<0.001	<0.001	0.005
	07/24/12	0.0018	<0.0003	<0.0003	<0.0003	0.0018
	10/25/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	01/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	04/25/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	07/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	10/30/13	<0.005	<0.005	<0.005	<0.005	<0.005
	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-2	11/24/09	<0.001	<0.001	<0.001	<0.001	<0.001
	07/13/10	<0.001	<0.001	<0.001	<0.001	<0.001
	10/11/10	0.0017	<0.001	<0.001	<0.001	<0.001
	01/18/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	0.0076	<0.001	<0.001	<0.001	0.0076
	07/29/11	0.0092	<0.001	<0.001	<0.001	0.0092
	10/28/11	0.0039	<0.001	<0.001	<0.001	0.0039
	01/04/12	0.0034	<0.001	<0.001	<0.001	0.0034
	04/09/12	0.0052	<0.001	<0.001	<0.001	0.0052
	07/24/12	0.0019	<0.0003	<0.0003	<0.0003	0.0019
	10/25/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	01/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	04/25/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	07/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	10/30/13	<0.001	<0.001	<0.001	<0.001	<0.001
	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-3	11/24/09	<0.001	<0.001	<0.001	<0.001	<0.001
	07/13/10	<0.001	<0.001	<0.001	<0.001	<0.001
	10/11/10	<0.001	<0.001	<0.001	<0.001	<0.001
	01/18/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	0.0059	<0.001	<0.001	<0.001	0.0059
	07/29/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/27/11	0.00120	<0.001	<0.001	0.0044	0.0056
	01/04/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/09/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/12	<0.0003	<0.0003	<0.0003	0.0046	0.0046
	10/25/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	01/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100

Table 3

Legacy Reserves

Groundwater Analytical Results

Rock Queen Saltwater Injection Plant #1

Chaves County, New Mexico

Monitor Well	Date Sampled	Benzene (mg/L)	Toluene (mg/L)	Ethyl-Benzene (mg/L)	Xylene (mg/L)	Total BTEX (mg/L)
MW-3	04/25/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-4	11/24/09	<0.001	<0.001	<0.001	<0.001	<0.001
	07/13/10	<0.001	<0.001	<0.001	<0.001	<0.001
	10/11/10	0.0015	<0.001	<0.001	<0.001	0.0015
	01/18/11	0.0095	<0.001	<0.001	<0.001	0.0095
	04/14/11	0.0064	<0.001	<0.001	<0.001	0.0064
	07/29/11	0.0084	<0.001	<0.001	<0.001	0.0084
	10/28/11	0.0028	<0.001	<0.001	<0.001	0.0028
	01/04/12	0.0029	<0.001	<0.001	<0.001	0.0029
	04/09/12	0.0065	<0.001	<0.001	<0.001	0.0065
	07/24/12	0.0027	<0.0003	<0.0003	<0.0003	0.0027
	10/25/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	01/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	04/25/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	03/03/14	0.00110	<0.00100	<0.00100	<0.00300	0.00110
MW-5	01/18/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/29/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/27/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/04/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/09/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/12	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
	10/25/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	01/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	04/25/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-6	01/18/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/29/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/27/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/04/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/09/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/12	<0.0003	<0.0003	<0.0003	0.0007	0.0007
	10/25/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	01/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	04/25/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300

Table 3

Legacy Reserves

Groundwater Analytical Results

Rock Queen Saltwater Injection Plant #1

Chaves County, New Mexico

Monitor Well	Date Sampled	Benzene (mg/L)	Toluene (mg/L)	Ethyl-Benzene (mg/L)	Xylene (mg/L)	Total BTEX (mg/L)
MW-7	01/18/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/29/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/27/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/04/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/09/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/12	<0.0003	<0.0003	<0.0003	<0.0003	<0.0003
	101/25/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	01/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	04/25/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-8	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-9	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-10	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-11	03/03/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
RW-1	01/18/11	NS	NS	NS	NS	NS
	04/14/11	NS	NS	NS	NS	NS
	07/29/11	NS	NS	NS	NS	NS
	10/27/11	NS	NS	NS	NS	NS
	01/04/12	NS	NS	NS	NS	NS
	04/09/12	NS	NS	NS	NS	NS
	07/24/12	NS	NS	NS	NS	NS
	10/25/12	NS	NS	NS	NS	NS
	01/30/13	NS	NS	NS	NS	NS
	04/25/13	NS	NS	NS	NS	NS
	07/24/13	NS	NS	NS	NS	NS
	10/30/13	NS	NS	NS	NS	NS
	03/03/14	NS	NS	NS	NS	NS

NS - Not sampled

APPENDIX A
SOIL BORING LOGS

SAMPLE LOG

Boring/Well MW-8
GPS
Project Number 114-6401632
Client Celero Energy II, LP
Site Name Rock Queen Unit SWD Plant #1
Site Location Chaves, New Mexico
Letter D, Section 26, Township 13 South, Range 31 East
Total Depth 157'
Date Installed 02/19/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Caliche
10-11'	--	Caliche and 20% Chert
15-16'	--	Buff Sand with Caliche and 20% Chert
20-21'	--	Buff Sand with 30% Caliche
25-26'	--	Fine grain calcareous sand
30-31'	--	Tan fine grain sand
35-36'	--	Tan fine grain sand
40-41'	--	Tan fine grain sand
45-46'	--	Tan fine grain sand
50-51'	--	Tan fine grain sand
55-56'	--	Tan fine grain sand
60-61'	--	Tan fine grain sand
65-66'	--	Tan fine grain sand
70-71'	--	Tan fine grain sand
75-76'	--	Tan fine grain sand
80-81'	--	Tan fine grain sand
85-86'	--	Tan fine grain sand
90-91'	--	Tan fine grain sand
95-96'	--	Tan fine grain sand
100-101'	--	Tan fine grain sand
105-106'	--	Tan fine grain sand
110-111'	--	Tan fine grain sand
115-116'	--	Tan fine grain sand
120-121'	--	Tan fine grain sand
125-126'	--	Tan fine grain sand
130-131'	--	Tan fine grain sand
135-136'	--	Tan fine grain sand
140-141'	--	Tan fine grain sand
145-146'	--	Tan fine grain sand
150-151'	--	Tan fine grain sand
152'	--	Red Bed Clay
157'	--	Red Bed Clay

Total Depth: 157'

SAMPLE LOG

Boring/Well MW-9
GPS 33.16983, -103.80108
Project Number 114-6401632
Client Celero Energy II, LP
Site Name Rock Queen Unit SWD Plant #1
Site Location Chaves, New Mexico
Letter D, Section 26, Township 13 South, Range 31 East
Total Depth 158
Date Installed 02/18/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Sandstone and caliche (40%)
10-11'	--	Caliche, sandstone (10%) fine tan sand (60%)
15-16'	--	Caliche, sandstone (40%) fine tan sand (20%)
20-21'	--	Caliche, sandstone (40%) fine tan sand (20%)
25-26'	--	Tan fine sand
30-31'	--	Tan fine sand
35-36'	--	Tan fine sand
40-41'	--	Tan fine sand
45-46'	--	Tan fine sand
50-51'	--	Tan fine sand
55-56'	--	Tan fine sand
60-61'	--	Tan fine sand
65-66'	--	Tan fine sand
70-71'	--	Tan fine sand
75-76'	--	Tan fine sand
80-81'	--	Brown fine sand
85-86'	--	Brown fine sand
90-91'	--	Brown fine sand
95-96'	--	Brown fine sand
100-101'	--	Brown fine sand
105-106'	--	Brown fine sand and sandstone (20%)
110-111'	--	Brown fine sand and sandstone (20%)
115-116'	--	Brown fine sand and sandstone (20%)
120-121'	--	Brown fine sand and sandstone (20%)
125-126'	--	Brown fine sand and sandstone (20%)
130-131'	--	Brown fine sand and sandstone (20%)
135-136'	--	Brown fine sand and sandstone (20%)
140-141'	--	Brown fine sand and sandstone (20%)
145-146'	--	Brown fine sand and sandstone (10%)
150-151'	--	Brown fine sand with gravel (20%) and gray clay (40%)
155-156'	--	Gravel (10%) with blue clay (20%), gray clay (50%) red clay (20%)
158'	--	Blue gray and red clay (60% red)

Total Depth: 158'

SAMPLE LOG

Boring/Well MW-10
GPS
Project Number 114-6401632
Client Celero Energy II, LP
Site Name Rock Queen Unit SWD Plant #1
Site Location Chaves, New Mexico
Letter D, Section 26, Township 13 South, Range 31 East
Total Depth 148'
Date Installed 02/18/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Caliche
10-11'	--	Caliche and 20% Chert
15-16'	--	Buff Sand with Caliche and 20% Chert
20-21'	--	Buff Sand with 30% Caliche
25-26'	--	Fine grain calcareous sand
30-31'	--	Fine grain calcareous sand
35-36'	--	Tan fine grain sand
40-41'	--	Tan fine grain sand
45-46'	--	Tan fine grain sand
50-51'	--	Tan fine grain sand
55-56'	--	Tan fine grain sand
60-61'	--	Tan fine grain sand
65-66'	--	Tan fine grain sand
70-71'	--	Tan fine grain sand
75-76'	--	Tan fine grain sand
80-81'	--	Tan fine grain sand
85-86'	--	Tan fine grain sand
90-91'	--	Tan fine grain sand
95-96'	--	Tan fine grain sand
100-101'	--	Tan fine grain sand
105-106'	--	Tan fine grain sand
110-111'	--	Tan fine grain sand
115-116'	--	Tan fine grain sand
120-121'	--	Tan fine grain sand
125-126'	--	Tan fine grain sand
130-131'	--	Tan fine grain sand
135-136'	--	Tan fine grain sand
140-141'	--	Red Bed Clay
148'	--	Red Bed Clay

Total Depth: 148'

SAMPLE LOG

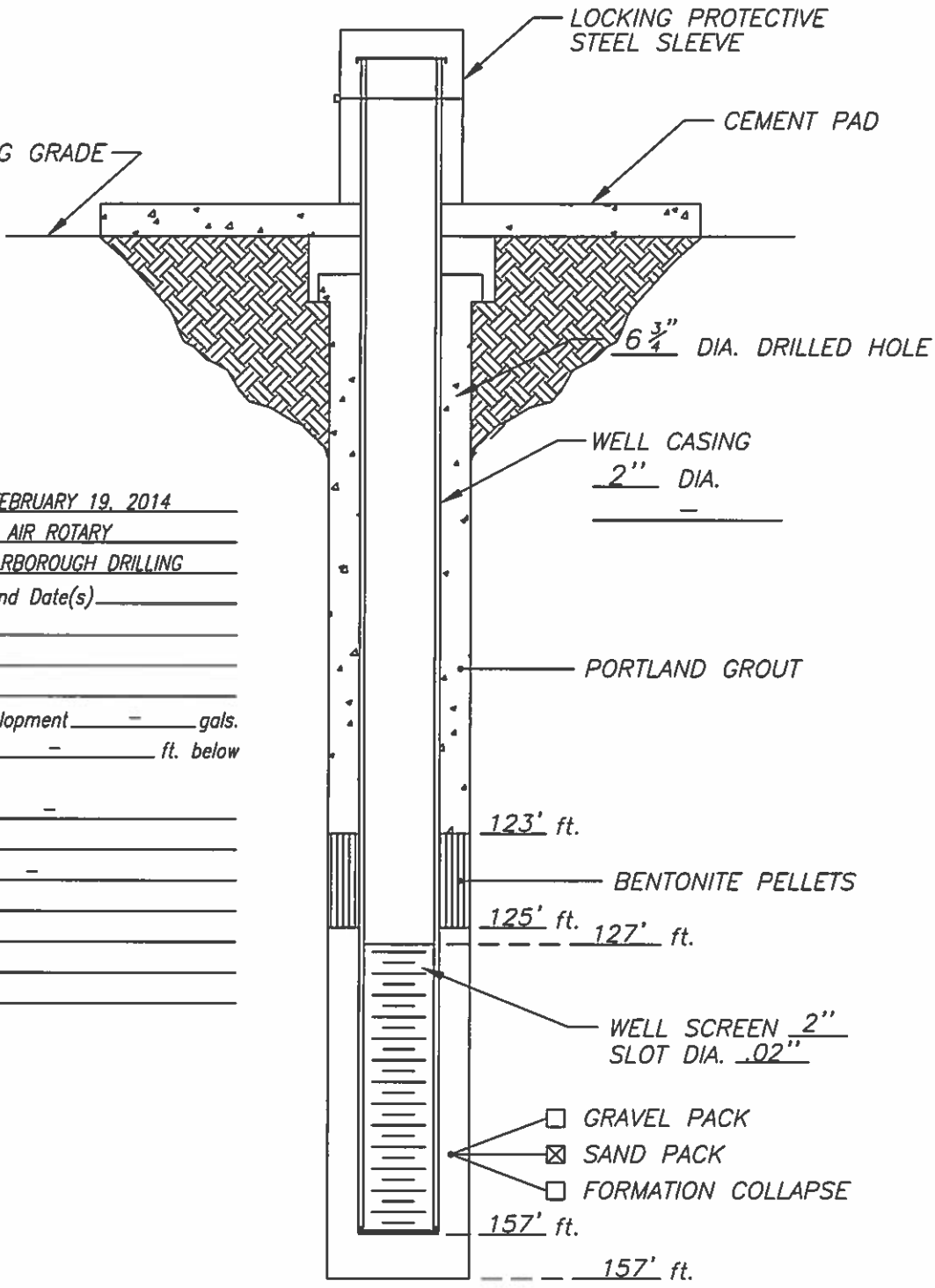
Boring/Well MW-11
GPS
Project Number 114-6401632
Client Celero Energy II, LP
Site Name Rock Queen Unit SWD Plant #1
Site Location Chaves, New Mexico
Letter D, Section 26, Township 13 South, Range 31 East
Total Depth 157'
Date Installed 02/18/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Caliche
10-11'	--	Caliche and 20% Chert
15-16'	--	Buff Sand with Caliche and 20% Chert
20-21'	--	Buff Sand with 30% Caliche
25-26'	--	Tan fine grain sand
30-31'	--	Tan fine grain sand
35-36'	--	Tan fine grain sand
40-41'	--	Tan fine grain sand
45-46'	--	Tan fine grain sand
50-51'	--	Tan fine grain sand
55-56'	--	Tan fine grain sand
60-61'	--	Tan fine grain sand
65-66'	--	Tan fine grain sand
70-71'	--	Tan fine grain sand
75-76'	--	Tan fine grain sand
80-81'	--	Tan fine grain sand
85-86'	--	Tan fine grain sand
90-91'	--	Tan fine grain sand
95-96'	--	Tan fine grain sand
100-101'	--	Tan fine grain sand
105-106'	--	Tan fine grain sand
110-111'	--	Tan fine grain sand
115-116'	--	Tan fine grain sand
120-121'	--	Tan fine grain sand
125-126'	--	Tan fine grain sand
130-131'	--	Tan fine grain sand
135-136'	--	Tan fine grain sand
140-141'	--	Tan fine grain sand
145-146'	--	Tan fine grain sand
150-151'	--	Tan fine grain sand
155'	--	Red Bed Clay
157'	--	Red Bed Clay

Total Depth: 157'

APPENDIX B
MONITOR WELL COMPLETION DIAGRAMS

WELL CONSTRUCTION LOG



Installation Date(s) FEBRUARY 19, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) –

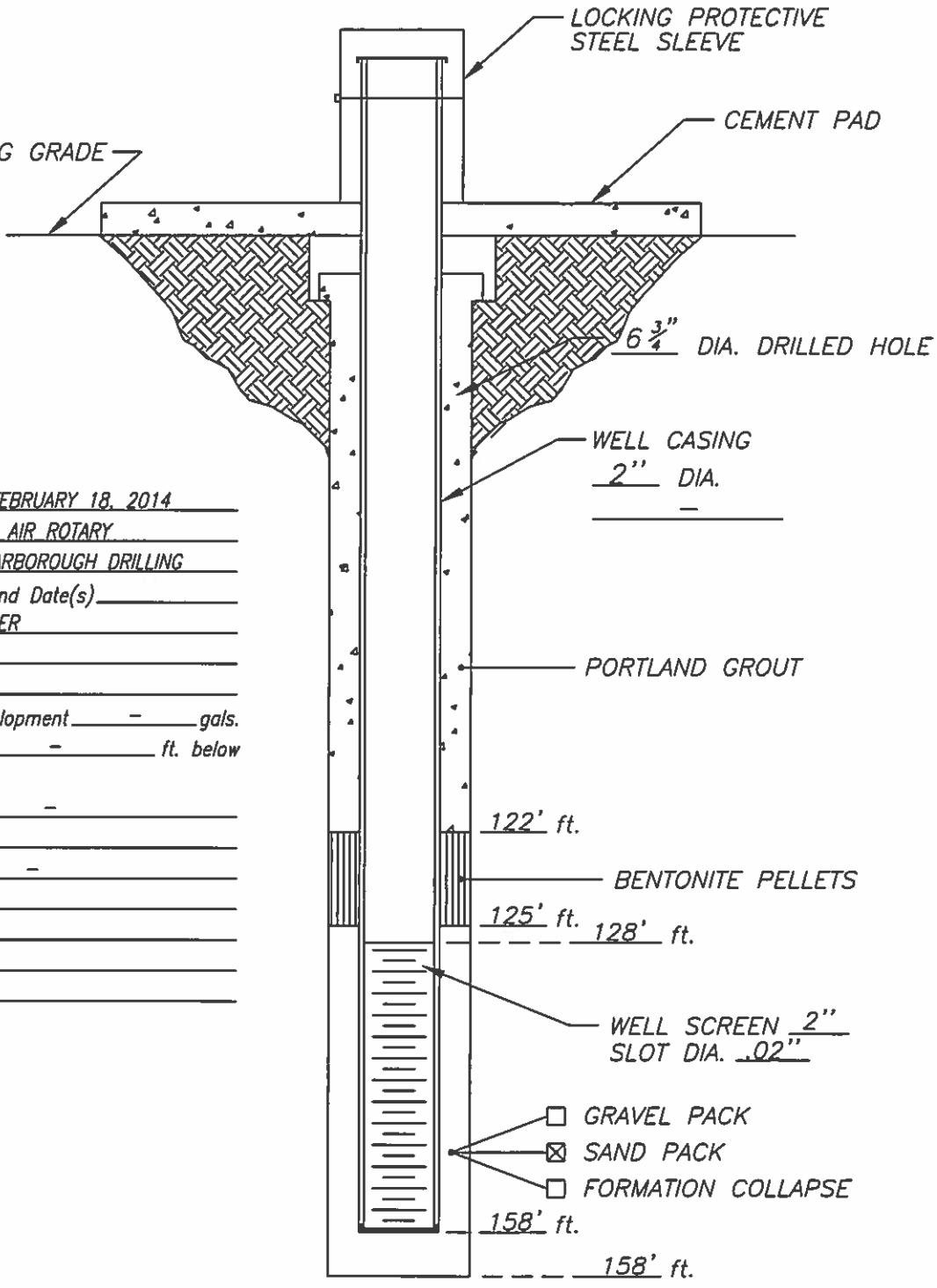
Water Removed During Development – gals.
Static Depth to Water – ft. below Ground Level
Well Purpose –

Remarks –

DATE: 03/03/2014	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: ROCK QUEEN SWD #1	MW-8
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401632

WELL CONSTRUCTION LOG



Installation Date(s) FEBRUARY 18, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) BAILER

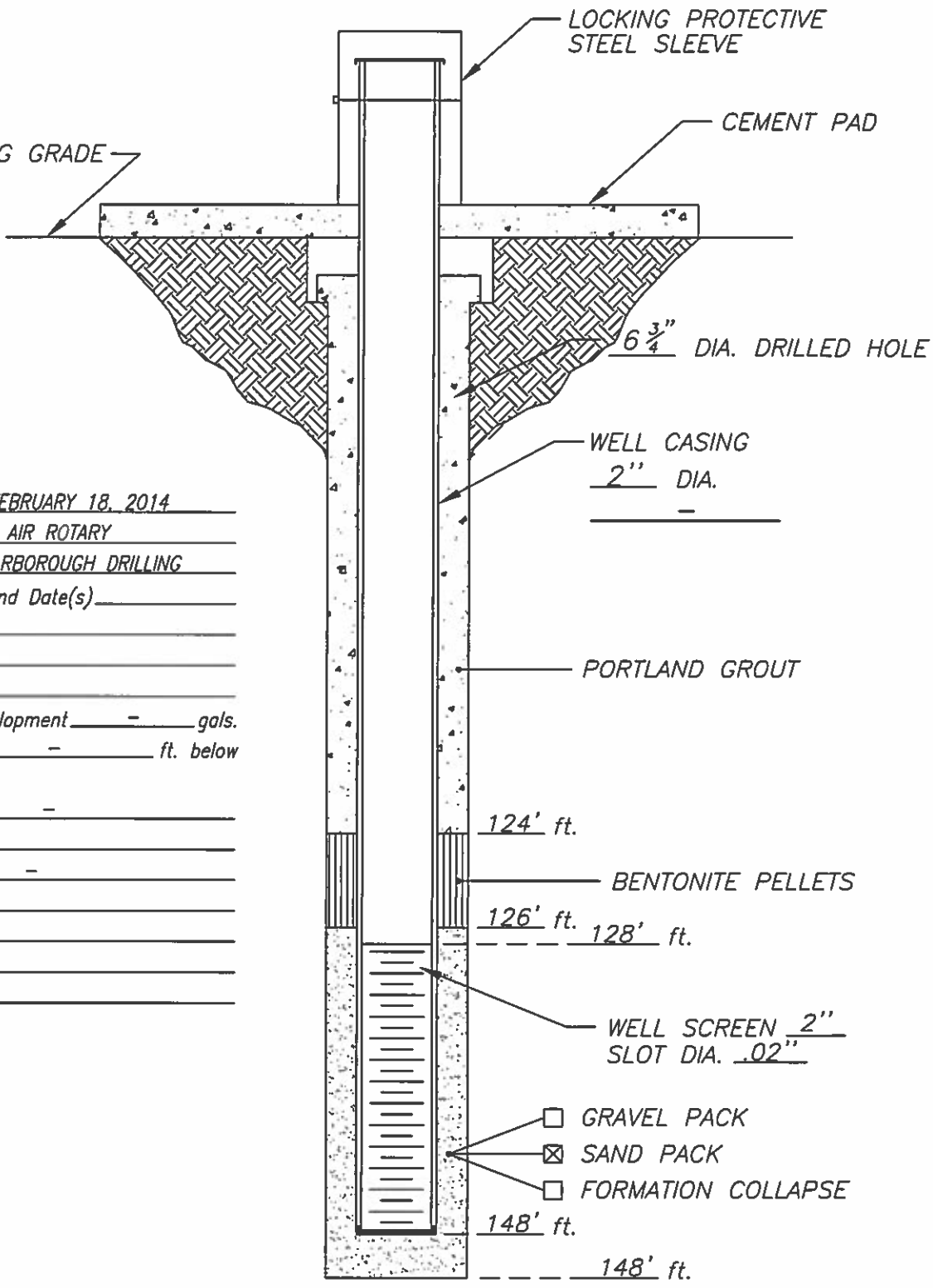
Water Removed During Development – gals.
Static Depth to Water – ft. below Ground Level
Well Purpose –

Remarks –

DATE: 03/03/2014	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: ROCK QUEEN SWD #1	MW-9
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401632

WELL CONSTRUCTION LOG



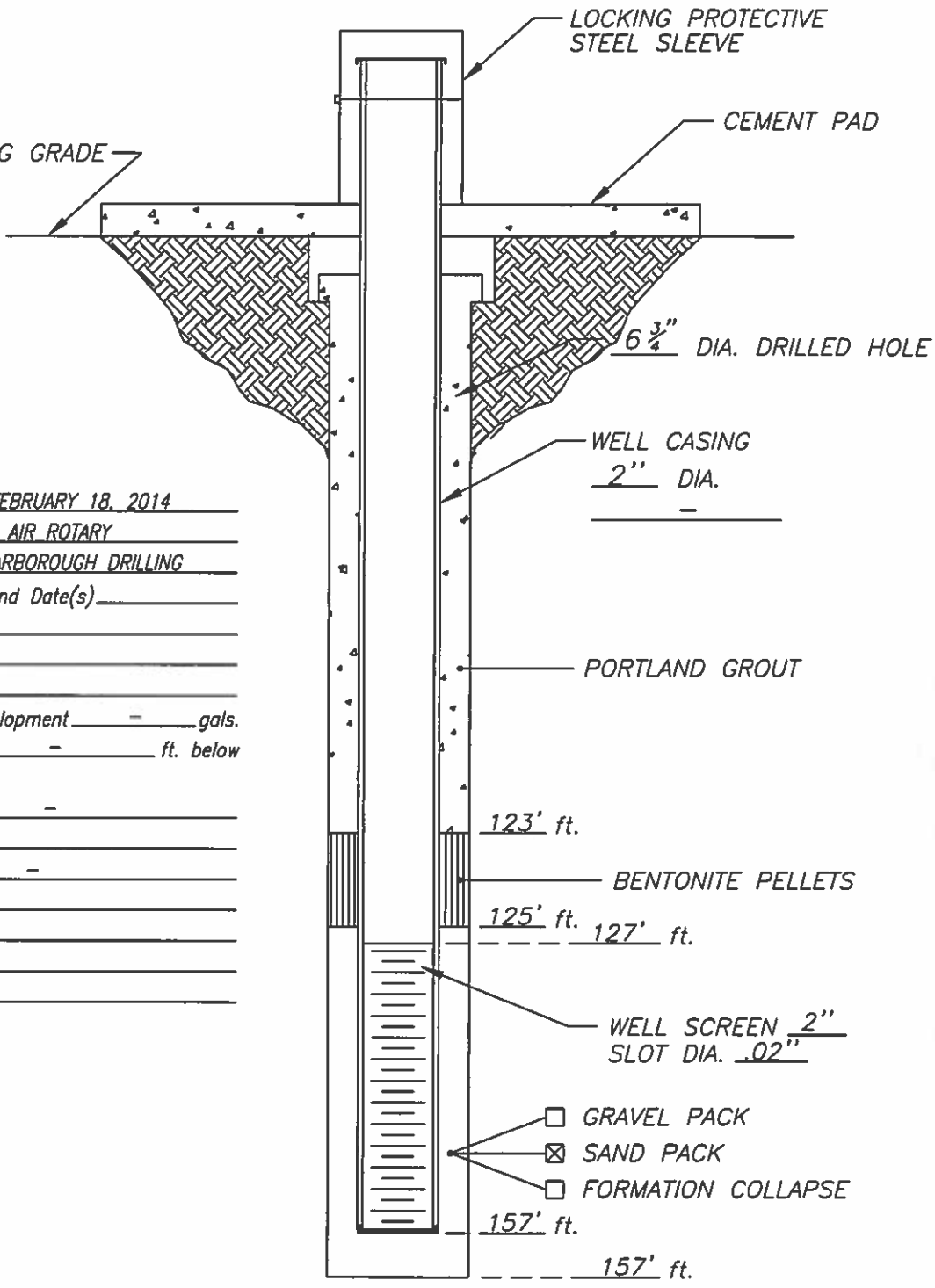
Installation Date(s) FEBRUARY 18, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) –

Water Removed During Development – gals.
Static Depth to Water – ft. below Ground Level
Well Purpose –

Remarks –

DATE: 03/03/2014	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: ROCK QUEEN SWD #1	MW-10
	LOCATION: CHAVES COUNTY, NEW MEXICO	
	114-6401632	

WELL CONSTRUCTION LOG



Installation Date(s) FEBRUARY 18, 2014

Drilling Method AIR ROTARY

Drilling Contractor SCARBOROUGH DRILLING

Development Technique(s) and Date(s) –

Water Removed During Development – gals.

Static Depth to Water – ft. below Ground Level

Well Purpose –

Remarks –

DATE: 03/03/2014 *TETRA TECH, INC.* *MIDLAND, TEXAS*	CLIENT: *CELERO ENERGY II, LLC* PROJECT: *ROCK QUEEN SWD #1* LOCATION: *CHAVES COUNTY, NEW MEXICO* 114-8401632	WELL NO. MW-11

APPENDIX C
LABORATORY ANALYTICAL RESULTS

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800-378-1296 806-794-1296 FAX 806-794-1298
200 East Sunset Road, Suite E El Paso, Texas 79922 915-585-3443 FAX 915-585-4944
5002 Basin Street, Suite A1 Midland, Texas 79703 432-689-6301 FAX 432-689-6313
(BioAquatic) 2501 Mayes Rd., Suite 100 Carrollton, Texas 75006 972-242-7750
E-Mail: lab@traceanalysis.com WEB: www.traceanalysis.com

Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

Analytical and Quality Control Report

Greg Pope
Tetra Tech
1901 N. Big Spring St.
Midland, TX, 79705

Report Date: April 2, 2014

Work Order: 14030405

Project Location: Chavez Co., NM
Project Name: Celero/Rock Queen #1 SWD
Project Number: 114-6401632

Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
356480	MW-1	water	2014-03-03	09:25	2014-03-03
356481	MW-2	water	2014-03-03	10:05	2014-03-03
356482	MW-3	water	2014-03-03	09:35	2014-03-03
356483	MW-4	water	2014-03-03	08:35	2014-03-03
356484	MW-5	water	2014-03-03	08:45	2014-03-03
356485	MW-6	water	2014-03-03	10:15	2014-03-03
356486	MW-7	water	2014-03-03	09:50	2014-03-03
356487	MW-8	water	2014-03-03	09:15	2014-03-03
356488	MW-9	water	2014-03-03	10:45	2014-03-03
356489	MW-10	water	2014-03-03	09:00	2014-03-03
356490	MW-11	water	2014-03-03	10:30	2014-03-03

These results represent only the samples received in the laboratory. The Quality Control Report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

Dr. Blair Leftwich, Director
Dr. Michael Abel, Project Manager

Report Contents

Case Narrative

Samples for project Celero/Rock Queen #1 SWD were received by TraceAnalysis, Inc. on 2014-03-03 and assigned to work order 14030405. Samples for work order 14030405 were received intact without headspace and at a temperature of -0.8 C.

Samples were analyzed for the following tests using their respective methods.

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Alkalinity	SM 2320B	92967	2014-03-07 at 07:46	109942	2014-03-07 at 11:47
Alkalinity	SM 2320B	93157	2014-03-07 at 10:43	110193	2014-03-07 at 13:27
BTEX	S 8021B	92971	2014-03-07 at 11:57	109964	2014-03-07 at 21:17
Ca, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Ca, Dissolved	S 6010C	93624	2014-04-01 at 13:55	110757	2014-04-02 at 09:38
Chloride (IC)	E 300.0	93166	2014-03-13 at 17:16	110189	2014-03-13 at 17:16
Chloride (IC)	E 300.0	93206	2014-03-14 at 18:53	110230	2014-03-14 at 18:53
Chloride (IC)	E 300.0	93238	2014-03-18 at 12:04	110268	2014-03-18 at 12:04
Chloride (IC)	E 300.0	93668	2014-04-01 at 15:05	110780	2014-04-01 at 15:05
Hardness	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Hardness	S 6010C	93624	2014-04-01 at 13:55	110757	2014-04-02 at 09:38
K, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
K, Dissolved	S 6010C	93624	2014-04-01 at 13:55	110757	2014-04-02 at 09:38
Mg, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Mg, Dissolved	S 6010C	93624	2014-04-01 at 13:55	110757	2014-04-02 at 09:38
Na, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Na, Dissolved	S 6010C	93624	2014-04-01 at 13:55	110757	2014-04-02 at 09:38
pH	SM 4500-H+	92947	2014-03-04 at 08:23	110111	2014-03-04 at 14:45
pH	SM 4500-H+	92947	2014-03-04 at 08:23	110112	2014-03-04 at 15:46
SO4 (IC)	E 300.0	93166	2014-03-13 at 17:16	110189	2014-03-13 at 17:16
SO4 (IC)	E 300.0	93206	2014-03-14 at 18:53	110230	2014-03-14 at 18:53
SO4 (IC)	E 300.0	93236	2014-03-17 at 17:12	110266	2014-03-17 at 17:12
SO4 (IC)	E 300.0	93238	2014-03-18 at 12:04	110268	2014-03-18 at 12:04
TDS	SM 2540C	92905	2014-03-05 at 07:46	109914	2014-03-06 at 13:54
TDS	SM 2540C	92935	2014-03-05 at 11:06	110082	2014-03-12 at 14:25

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 14030405 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

Analytical Report

Sample: 356480 - MW-1

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	a	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	a	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		a	**203**	mg/L as CaCo3	1	20.0
Total Alkalinity		a	**203**	mg/L as CaCo3	1	20.0

Sample: 356480 - MW-1

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	a	<0.00100	mg/L	1	0.00100
Toluene	U	a	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	a	<0.00100	mg/L	1	0.00100
Xylene	U	a	<0.00300	mg/L	1	0.00300

Surrogate		Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)	1 Qar	Qar		0.0606	mg/L	1	0.100	61	70 - 130
4-Bromofluorobenzene (4-BFB)	2 Qar	Qar		0.0444	mg/L	1	0.100	44	70 - 130

Sample: 356480 - MW-1

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Dissolved Calcium		2	**2160**		mg/L	10	1.00
Dissolved Potassium		2	**2160**		mg/L	10	1.00
Dissolved Magnesium		2	**3930**		mg/L	10	1.00
Dissolved Sodium		2	**72800**		mg/L	100	1.00

Sample: 356480 - MW-1

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Chloride		1	**124000**		mg/L	5000	2.50

Sample: 356480 - MW-1

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Hardness (by ICP)			**21600**		mg eq CaCO3/L	10	0.00

Sample: 356480 - MW-1

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110111	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
pH		3	**6.05**		s.u.	1	0.00

Sample: 356480 - MW-1

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**1550**	mg/L	50	2.50

Sample: 356480 - MW-1

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	109914	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92905	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**195000**	mg/L	100	2.50

Sample: 356481 - MW-2

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**218**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**218**	mg/L as CaCo3	1	20.0

Sample: 356481 - MW-2

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene		3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0813	mg/L	1	0.100	81	70 - 130
4-Bromofluorobenzene (4-BFB)	3 Qsr	Qsr	0.0612	mg/L	1	0.100	61	70 - 130

Sample: 356481 - MW-2

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**3550**	mg/L	10	1.00
Dissolved Potassium		2	**1220**	mg/L	100	1.00
Dissolved Magnesium		2	**2700**	mg/L	10	1.00
Dissolved Sodium		2	**46900**	mg/L	100	1.00

Sample: 356481 - MW-2

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**92300**	mg/L	5000	2.50

Sample: 356481 - MW-2

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Hardness (by ICP)			**20000**		mg eq CaCO3/L	10	0.00

Sample: 356481 - MW-2

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110111	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
pH		3	**6.02**		s.u.	1	0.00

Sample: 356481 - MW-2

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Sulfate		1	**1590**		mg/L	50	2.50

Sample: 356481 - MW-2

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	109914	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92905	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Total Dissolved Solids		3	**145000**		mg/L	100	2.50

Sample: 356482 - MW-3

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**145**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**145**	mg/L as CaCo3	1	20.0

Sample: 356482 - MW-3

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene		3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0847	mg/L	1	0.100	85	70 - 130
4-Bromofluorobenzene (4-BFB)	4 Qar	Qar	0.0585	mg/L	1	0.100	58	70 - 130

Sample: 356482 - MW-3

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		3	**7140**	mg/L	10	1.00
Dissolved Potassium		3	**591**	mg/L	1	1.00
Dissolved Magnesium		3	**3060**	mg/L	10	1.00

continued ...

sample 356482 continued ...

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Dissolved Sodium		2	**33300**		mg/L	100	1.00

Sample: 356482 - MW-3

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Chloride		1	**77100**		mg/L	5000	2.50

Sample: 356482 - MW-3

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Hardness (by ICP)			**30400**		mg eq CaCO3/L	10	0.00

Sample: 356482 - MW-3

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110111	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
pH		3	**6.12**		s.u.	1	0.00

Sample: 356482 - MW-3

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Sulfate		1	**1160**	mg/L	50	2.50

Sample: 356482 - MW-3

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	109914	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92905	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Total Dissolved Solids		3	**128000**	mg/L	100	2.50

Sample: 356483 - MW-4

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**153**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**153**	mg/L as CaCo3	1	20.0

Sample: 356483 - MW-4

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene		3	**0.00110**	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate		Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)	5	Qsr	Qsr	0.0692	mg/L	1	0.100	69	70 - 130
4-Bromofluorobenzene (4-BFB)	6	Qsr	Qsr	0.0531	mg/L	1	0.100	53	70 - 130

Sample: 356483 - MW-4

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**3280**	mg/L	10	1.00
Dissolved Potassium		2	**1170**	mg/L	10	1.00
Dissolved Magnesium		2	**3420**	mg/L	10	1.00
Dissolved Sodium		2	**42800**	mg/L	100	1.00

Sample: 356483 - MW-4

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**74800**	mg/L	5000	2.50

Sample: 356483 - MW-4

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**22300**	mg eq CaCO3/L	10	0.00

Sample: 356483 - MW-4

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110111	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**6.13**	s.u.	1	0.00

Sample: 356483 - MW-4

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110189	Date Analyzed:	2014-03-13	Analyzed By:	JR
Prep Batch:	93166	Sample Preparation:	2014-03-13	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**2170**	mg/L	50	2.50

Sample: 356483 - MW-4

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	109914	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92905	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**168000**	mg/L	100	2.50

Sample: 356484 - MW-5

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**78.0**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**78.0**	mg/L as CaCo3	1	20.0

Sample: 356484 - MW-5

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0959	mg/L	1	0.100	96	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0713	mg/L	1	0.100	71	70 - 130

Sample: 356484 - MW-5

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		3	**9420**	mg/L	10	1.00
Dissolved Potassium		3	**95.6**	mg/L	1	1.00
Dissolved Magnesium		3	**1590**	mg/L	10	1.00

continued ...

sample 356484 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2	**5830**	mg/L	10	1.00

Sample: 356484 - MW-5

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110230	Date Analyzed:	2014-03-14	Analyzed By:	JR
Prep Batch:	93206	Sample Preparation:	2014-03-14	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**35500**	mg/L	1000	2.50

Sample: 356484 - MW-5

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**30100**	mg eq CaCO3/L	10	0.00

Sample: 356484 - MW-5

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110112	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**6.37**	s.u.	1	0.00

Sample: 356484 - MW-5

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110266	Date Analyzed:	2014-03-17	Analyzed By:	JR
Prep Batch:	93236	Sample Preparation:	2014-03-17	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Sulfate		1	**799**	mg/L	50	2.50

Sample: 356484 - MW-5

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	109914	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92905	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Total Dissolved Solids		3	**59300**	mg/L	50	2.50

Sample: 356485 - MW-6

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**193**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**193**	mg/L as CaCo3	1	20.0

Sample: 356485 - MW-6

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0979	mg/L	1	0.100	98	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0736	mg/L	1	0.100	74	70 - 130

Sample: 356485 - MW-6

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110757	Date Analyzed:	2014-04-02	Analyzed By:	RR
Prep Batch:	93624	Sample Preparation:	2014-04-01	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**358**	mg/L	10	1.00
Dissolved Potassium		2	<10.0	mg/L	10	1.00
Dissolved Magnesium		2	**45.9**	mg/L	10	1.00
Dissolved Sodium		2	**316**	mg/L	10	1.00

Sample: 356485 - MW-6

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110780	Date Analyzed:	2014-04-01	Analyzed By:	JR
Prep Batch:	93668	Sample Preparation:	2014-04-01	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	H	1	**810**	mg/L	50	2.50

Sample: 356485 - MW-6

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110757	Date Analyzed:	2014-04-02	Analyzed By:	RR
Prep Batch:	93624	Sample Preparation:	2014-04-01	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**1080**	mg eq CaCO3/L	1	0.00

Sample: 356485 - MW-6

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110112	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**7.24**	s.u.	1	0.00

Sample: 356485 - MW-6

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110230	Date Analyzed:	2014-03-14	Analyzed By:	JR
Prep Batch:	93206	Sample Preparation:	2014-03-14	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**152**	mg/L	5	2.50

Sample: 356485 - MW-6

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110082	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92935	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**2350**	mg/L	2	2.50

Sample: 356486 - MW-7

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**129**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**129**	mg/L as CaCo3	1	20.0

Sample: 356486 - MW-7

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene		3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0948	mg/L	1	0.100	95	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0699	mg/L	1	0.100	70	70 - 130

Sample: 356486 - MW-7

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		3	**13400**	mg/L	100	1.00
Dissolved Potassium		3	**64.8**	mg/L	1	1.00
Dissolved Magnesium		3	**1090**	mg/L	1	1.00

continued ...

sample 356486 continued ...

Parameter	Flag	Cert	Result	Units	Dilution	RL
Dissolved Sodium		2	**4470**	mg/L	10	1.00

Sample: 356486 - MW-7

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110230	Date Analyzed:	2014-03-14	Analyzed By:	JR
Prep Batch:	93206	Sample Preparation:	2014-03-14	Prepared By:	JR

Parameter	Flag	Cert	Result	Units	Dilution	RL
Chloride		1	**25600**	mg/L	1000	2.50

Sample: 356486 - MW-7

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	Result	Units	Dilution	RL
Hardness (by ICP)			**37900**	mg eq CaCO3/L	1	0.00

Sample: 356486 - MW-7

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110112	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	Result	Units	Dilution	RL
pH		3	**6.37**	s.u.	1	0.00

Sample: 356486 - MW-7

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110230	Date Analyzed:	2014-03-14	Analyzed By:	JR
Prep Batch:	93206	Sample Preparation:	2014-03-14	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Sulfate		1	**309**	mg/L	10	2.50

Sample: 356486 - MW-7

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110082	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92935	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Total Dissolved Solids		3	**46800**	mg/L	50	2.50

Sample: 356487 - MW-8

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109942	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92967	Sample Preparation:	2014-03-07	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**683**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**683**	mg/L as CaCo3	1	20.0

Sample: 356487 - MW-8

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.100	mg/L	1	0.100	100	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0724	mg/L	1	0.100	72	70 - 130

Sample: 356487 - MW-8

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**2580**	mg/L	10	1.00
Dissolved Potassium		2	**27.7**	mg/L	1	1.00
Dissolved Magnesium		2	**362**	mg/L	1	1.00
Dissolved Sodium		2	**166**	mg/L	1	1.00

Sample: 356487 - MW-8

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**5120**	mg/L	500	2.50

Sample: 356487 - MW-8

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**7930**	mg eq CaCO3/L	1	0.00

Sample: 356487 - MW-8

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110112	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**6.88**	s.u.	1	0.00

Sample: 356487 - MW-8

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**75.6**	mg/L	10	2.50

Sample: 356487 - MW-8

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110082	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92935	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**11100**	mg/L	10	2.50

Sample: 356488 - MW-9

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	110193	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	93157	Sample Preparation:	2014-03-11	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**218**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**218**	mg/L as CaCo3	1	20.0

Sample: 356488 - MW-9

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0992	mg/L	1	0.100	99	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0697	mg/L	1	0.100	70	70 - 130

Sample: 356488 - MW-9

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**82.8**	mg/L	1	1.00
Dissolved Potassium		2	**10.2**	mg/L	1	1.00
Dissolved Magnesium		2	**9.80**	mg/L	1	1.00

continued ...

sample 356488 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2	**71.3**	mg/L	1	1.00

Sample: 356488 - MW-9

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**75.6**	mg/L	5	2.50

Sample: 356488 - MW-9

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**247**	mg eq CaCO3/L	1	0.00

Sample: 356488 - MW-9

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110112	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**7.57**	s.u.	1	0.00

Sample: 356488 - MW-9

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**121**	mg/L	5	2.50

Sample: 356488 - MW-9

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110082	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92935	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**633**	mg/L	1	2.50

Sample: 356489 - MW-10

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	110193	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	93157	Sample Preparation:	2014-03-11	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**116**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**116**	mg/L as CaCo3	1	20.0

Sample: 356489 - MW-10

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	3	<0.00100	mg/L	1	0.00100
Toluene	U	3	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	3	<0.00100	mg/L	1	0.00100
Xylene	U	3	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0974	mg/L	1	0.100	97	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0705	mg/L	1	0.100	70	70 - 130

Sample: 356489 - MW-10

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**1310**	mg/L	10	1.00
Dissolved Potassium		2	**16.8**	mg/L	1	1.00
Dissolved Magnesium		2	**204**	mg/L	1	1.00
Dissolved Sodium		2	**189**	mg/L	1	1.00

Sample: 356489 - MW-10

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**3100**	mg/L	100	2.50

Sample: 356489 - MW-10

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**4110**	mg eq CaCO3/L	1	0.00

Sample: 356489 - MW-10

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110112	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**6.71**	s.u.	1	0.00

Sample: 356489 - MW-10

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**89.4**	mg/L	5	2.50

Sample: 356489 - MW-10

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110082	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92935	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**6520**	mg/L	5	2.50

Sample: 356490 - MW-11

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	110193	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	93157	Sample Preparation:	2014-03-11	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Hydroxide Alkalinity	U	a	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	a	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		a	**316**	mg/L as CaCo3	1	20.0
Total Alkalinity		a	**316**	mg/L as CaCo3	1	20.0

Sample: 356490 - MW-11

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109964	Date Analyzed:	2014-03-07	Analyzed By:	AK
Prep Batch:	92971	Sample Preparation:	2014-03-07	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene	U	a	<0.00100	mg/L	1	0.00100
Toluene	U	a	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	a	<0.00100	mg/L	1	0.00100
Xylene	U	a	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0981	mg/L	1	0.100	98	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0699	mg/L	1	0.100	70	70 - 130

Sample: 356490 - MW-11

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Dissolved Calcium		a	**72.6**	mg/L	1	1.00
Dissolved Potassium		a	**8.93**	mg/L	1	1.00
Dissolved Magnesium		a	**8.00**	mg/L	1	1.00

continued ...

sample 356490 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2	**56.5**	mg/L	1	1.00

Sample: 356490 - MW-11

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**36.6**	mg/L	1	2.50

Sample: 356490 - MW-11

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110044	Date Analyzed:	2014-03-11	Analyzed By:	LM
Prep Batch:	93041	Sample Preparation:	2014-03-11	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**214**	mg eq CaCO3/L	1	0.00

Sample: 356490 - MW-11

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110112	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**7.84**	s.u.	1	0.00

Sample: 356490 - MW-11

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	Sample Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**114**	mg/L	10	2.50

Sample: 356490 - MW-11

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110082	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92935	Sample Preparation:	2014-03-05	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**514**	mg/L	1	2.50

Method Blanks

Method Blank (1) QC Batch: 109914

QC Batch: 109914 | Date Analyzed: 2014-03-06 | Analyzed By: AR
Prep Batch: 92905 | QC Preparation: 2014-03-05 | Prepared By: AR

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		3	3.00	mg/L	2.5

Method Blank (1) QC Batch: 109942

QC Batch: 109942 | Date Analyzed: 2014-03-07 | Analyzed By: AR
Prep Batch: 92967 | QC Preparation: 2014-03-07 | Prepared By: AR

Parameter	Flag	Cert	MDL Result	Units	RL
Hydroxide Alkalinity		3	<20.0	mg/L as CaCo3	20
Carbonate Alkalinity		3	<20.0	mg/L as CaCo3	20
Bicarbonate Alkalinity		3	<20.0	mg/L as CaCo3	20
Total Alkalinity		3	<20.0	mg/L as CaCo3	20

Method Blank (1) QC Batch: 109964

QC Batch: 109964 | Date Analyzed: 2014-03-07 | Analyzed By: AK
Prep Batch: 92971 | QC Preparation: 2014-03-07 | Prepared By: AK

Parameter	Flag	Cert	MDL Result	Units	RL
Benzene		3	<0.000238	mg/L	0.001
Toluene		3	<0.000181	mg/L	0.001
Ethylbenzene		3	<0.000247	mg/L	0.001
Xylene		3	<0.000189	mg/L	0.003

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.102	mg/L	1	0.100	102	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0758	mg/L	1	0.100	76	70 - 130

Method Blank (1) QC Batch: 110044

QC Batch: 110044 Date Analyzed: 2014-03-11 Analyzed By: LM
Prep Batch: 93041 QC Preparation: 2014-03-11 Prepared By: PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Calcium		2	<0.0441	mg/L	1
Dissolved Potassium		2	<0.0443	mg/L	1
Dissolved Magnesium		2	<0.0296	mg/L	1
Dissolved Sodium		2	<0.172	mg/L	1

Method Blank (1) QC Batch: 110082

QC Batch: 110082 Date Analyzed: 2014-03-12 Analyzed By: AR
Prep Batch: 92935 QC Preparation: 2014-03-05 Prepared By: AR

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		3	3.00	mg/L	2.5

Method Blank (1) QC Batch: 110189

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR
Prep Batch: 93166 QC Preparation: 2014-03-13 Prepared By: JR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	<0.678	mg/L	2.5

Method Blank (1) QC Batch: 110189

QC Batch: 110189 | Date Analyzed: 2014-03-13 | Analyzed By: JR
Prep Batch: 93166 | QC Preparation: 2014-03-13 | Prepared By: JR

Parameter	Flag	Cert	MDL Result	Units	RL
Sulfate		1	<0.0260	mg/L	2.5

Method Blank (1) QC Batch: 110193

QC Batch: 110193 | Date Analyzed: 2014-03-07 | Analyzed By: AR
Prep Batch: 93157 | QC Preparation: 2014-03-07 | Prepared By: AR

Parameter	Flag	Cert	MDL Result	Units	RL
Hydroxide Alkalinity		3	<20.0	mg/L as CaCo3	20
Carbonate Alkalinity		3	<20.0	mg/L as CaCo3	20
Bicarbonate Alkalinity		3	<20.0	mg/L as CaCo3	20
Total Alkalinity		3	<20.0	mg/L as CaCo3	20

Method Blank (1) QC Batch: 110230

QC Batch: 110230 | Date Analyzed: 2014-03-14 | Analyzed By: JR
Prep Batch: 93206 | QC Preparation: 2014-03-14 | Prepared By: JR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.28	mg/L	2.5

Method Blank (1) QC Batch: 110230

QC Batch: 110230 | Date Analyzed: 2014-03-14 | Analyzed By: JR
Prep Batch: 93206 | QC Preparation: 2014-03-14 | Prepared By: JR

Parameter	Flag	Cert	MDL Result	Units	RL
Sulfate		1	0.839	mg/L	2.5

Method Blank (1) QC Batch: 110266

QC Batch:	110266	Date Analyzed:	2014-03-17	Analyzed By:	JR
Prep Batch:	93236	QC Preparation:	2014-03-17	Prepared By:	JR

Parameter	Flag	Cert	MDL Result	Units	RL
Sulfate		1	<0.0260	mg/L	2.5

Method Blank (1) QC Batch: 110268

QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	QC Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.27	mg/L	2.5

Method Blank (1) QC Batch: 110268

QC Batch:	110268	Date Analyzed:	2014-03-18	Analyzed By:	JR
Prep Batch:	93238	QC Preparation:	2014-03-18	Prepared By:	JR

Parameter	Flag	Cert	MDL Result	Units	RL
Sulfate		1	<0.0260	mg/L	2.5

Method Blank (1) QC Batch: 110757

QC Batch:	110757	Date Analyzed:	2014-04-02	Analyzed By:	RR
Prep Batch:	93624	QC Preparation:	2014-04-01	Prepared By:	PM

Parameter	Flag	Cert	MDL Result	Units	RL
Dissolved Calcium		2	<0.0441	mg/L	1
Dissolved Potassium		2	<0.0443	mg/L	1
Dissolved Magnesium		2	<0.0296	mg/L	1
Dissolved Sodium		2	<0.172	mg/L	1

Method Blank (1) QC Batch: 110780

QC Batch: 110780 | Date Analyzed: 2014-04-01 | Analyzed By: JR
Prep Batch: 93668 | QC Preparation: 2014-04-01 | Prepared By: JR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	<0.678	mg/L	2.5

Duplicates (1) Duplicated Sample: 356484

QC Batch: 109914 | Date Analyzed: 2014-03-06 | Analyzed By: AR
Prep Batch: 92905 | QC Preparation: 2014-03-05 | Prepared By: AR

Param	Flag	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	3	63300	59300	mg/L	50	6	10

Duplicates (1) Duplicated Sample: 356484

QC Batch: 109942 | Date Analyzed: 2014-03-07 | Analyzed By: AR
Prep Batch: 92967 | QC Preparation: 2014-03-07 | Prepared By: AR

Param	Flag	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity	3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Carbonate Alkalinity	3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Bicarbonate Alkalinity	3	77.0	78.0	mg/L as CaCo3	1	1	20
Total Alkalinity	3	77.0	78.0	mg/L as CaCo3	1	1	20

Duplicates (1) Duplicated Sample: 356493

QC Batch: 110082 | Date Analyzed: 2014-03-12 | Analyzed By: AR
Prep Batch: 92935 | QC Preparation: 2014-03-05 | Prepared By: AR

continued ...

duplicate continued . . .

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	3	82300	79600	mg/L	50	3	10

Duplicates (1) Duplicated Sample: 356470

QC Batch: 110111 | Date Analyzed: 2014-03-04 | Analyzed By: AR
Prep Batch: 92947 | QC Preparation: 2014-03-04 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	3	7.06	7.08	s.u.	1	0	10

Duplicates (1) Duplicated Sample: 356484

QC Batch: 110112 | Date Analyzed: 2014-03-04 | Analyzed By: AR
Prep Batch: 92947 | QC Preparation: 2014-03-04 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	3	6.37	6.37	s.u.	1	0	10

Duplicates (1) Duplicated Sample: 356523

QC Batch: 110193 | Date Analyzed: 2014-03-07 | Analyzed By: AR
Prep Batch: 93157 | QC Preparation: 2014-03-07 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity	3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Carbonate Alkalinity	3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Bicarbonate Alkalinity	3	203	200	mg/L as CaCo3	1	2	20
Total Alkalinity	3	203	200	mg/L as CaCo3	1	2	20

Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

QC Batch: 109914 | Date Analyzed: 2014-03-06 | Analyzed By: AR
Prep Batch: 92905 | QC Preparation: 2014-03-05 | Prepared By: AR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		a	994	mg/L	1	1000	<2.50	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		a	933	mg/L	1	1000	<2.50	93	90 - 110	6	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 109964 | Date Analyzed: 2014-03-07 | Analyzed By: AK
Prep Batch: 92971 | QC Preparation: 2014-03-07 | Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		a	0.104	mg/L	1	0.100	<0.000238	104	70 - 130
Toluene		a	0.107	mg/L	1	0.100	<0.000181	107	70 - 130
Ethylbenzene		a	0.104	mg/L	1	0.100	<0.000247	104	70 - 130
Xylene		a	0.315	mg/L	1	0.300	<0.000189	105	70 - 130

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Benzene		a	0.104	mg/L	1	0.100	<0.000238	104	70 - 130	0	20
Toluene		a	0.106	mg/L	1	0.100	<0.000181	106	70 - 130	1	20
Ethylbenzene		a	0.102	mg/L	1	0.100	<0.000247	102	70 - 130	2	20
Xylene		a	0.311	mg/L	1	0.300	<0.000189	104	70 - 130	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

continued ...

control spikes continued ...

Surrogate	LCS Result	LCSD Result	Units	Dil.	Spike Amount	LCS Rec.	LCSD Rec.	Rec. Limit
Surrogate	LCS Result	LCSD Result	Units	Dil.	Spike Amount	LCS Rec.	LCSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	0.100	0.100	mg/L	1	0.100	100	100	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0898	0.0886	mg/L	1	0.100	90	89	70 - 130

Laboratory Control Spike (LCS-1)

QC Batch: 110044 | Date Analyzed: 2014-03-11 | Analyzed By: LM
Prep Batch: 93041 | QC Preparation: 2014-03-11 | Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	53.6	mg/L	1	50.0	<0.0441	107	85 - 115
Dissolved Potassium		2	52.5	mg/L	1	50.0	<0.0443	105	85 - 115
Dissolved Magnesium		2	53.2	mg/L	1	50.0	<0.0296	106	85 - 115
Dissolved Sodium		2	52.3	mg/L	1	50.0	<0.172	105	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		2	53.7	mg/L	1	50.0	<0.0441	107	85 - 115	0	20
Dissolved Potassium		2	52.4	mg/L	1	50.0	<0.0443	105	85 - 115	0	20
Dissolved Magnesium		2	51.8	mg/L	1	50.0	<0.0296	104	85 - 115	3	20
Dissolved Sodium		2	52.7	mg/L	1	50.0	<0.172	105	85 - 115	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110082 | Date Analyzed: 2014-03-12 | Analyzed By: AR
Prep Batch: 92935 | QC Preparation: 2014-03-05 | Prepared By: AR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		3	996	mg/L	1	1000	<2.50	100	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		3	1050	mg/L	1	1000	<2.50	105	90 - 110	5	10

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110189 | Date Analyzed: 2014-03-13 | Analyzed By: JR
Prep Batch: 93166 | QC Preparation: 2014-03-13 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	24.5	mg/L	1	25.0	<0.678	98	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	24.5	mg/L	1	25.0	<0.678	98	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110189 | Date Analyzed: 2014-03-13 | Analyzed By: JR
Prep Batch: 93166 | QC Preparation: 2014-03-13 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	24.6	mg/L	1	25.0	<0.0260	98	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	24.6	mg/L	1	25.0	<0.0260	98	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110230 | Date Analyzed: 2014-03-14 | Analyzed By: JR
Prep Batch: 93206 | QC Preparation: 2014-03-14 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	24.3	mg/L	1	25.0	<0.678	97	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	24.2	mg/L	1	25.0	<0.678	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110230 | Date Analyzed: 2014-03-14 | Analyzed By: JR
Prep Batch: 93206 | QC Preparation: 2014-03-14 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	24.4	mg/L	1	25.0	<0.0260	98	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	24.3	mg/L	1	25.0	<0.0260	97	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110266 | Date Analyzed: 2014-03-17 | Analyzed By: JR
Prep Batch: 93236 | QC Preparation: 2014-03-17 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	25.4	mg/L	1	25.0	<0.0260	102	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	25.4	mg/L	1	25.0	<0.0260	102	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110268 | Date Analyzed: 2014-03-18 | Analyzed By: JR
Prep Batch: 93238 | QC Preparation: 2014-03-18 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	25.5	mg/L	1	25.0	<0.678	102	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	25.5	mg/L	1	25.0	<0.678	102	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110268 | Date Analyzed: 2014-03-18 | Analyzed By: JR
Prep Batch: 93238 | QC Preparation: 2014-03-18 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	25.7	mg/L	1	25.0	<0.0260	103	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	25.6	mg/L	1	25.0	<0.0260	102	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110757 | Date Analyzed: 2014-04-02 | Analyzed By: RR
Prep Batch: 93624 | QC Preparation: 2014-04-01 | Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	51.6	mg/L	1	52.5	<0.0441	98	85 - 115
Dissolved Potassium		2	50.9	mg/L	1	52.5	<0.0443	97	85 - 115
Dissolved Magnesium		2	52.6	mg/L	1	52.5	<0.0296	100	85 - 115

continued ...

control spikes continued ...

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Sodium		2	51.3	mg/L	1	52.5	<0.172	98	85 - 115

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		2	53.1	mg/L	1	52.5	<0.0441	101	85 - 115	3	20
Dissolved Potassium		2	52.2	mg/L	1	52.5	<0.0443	99	85 - 115	2	20
Dissolved Magnesium		2	54.1	mg/L	1	52.5	<0.0296	103	85 - 115	3	20
Dissolved Sodium		2	52.4	mg/L	1	52.5	<0.172	100	85 - 115	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Laboratory Control Spike (LCS-1)

QC Batch: 110780 | Date Analyzed: 2014-04-01 | Analyzed By: JR
Prep Batch: 93668 | QC Preparation: 2014-04-01 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	24.7	mg/L	1	25.0	<0.678	99	90 - 110

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	24.6	mg/L	1	25.0	<0.678	98	90 - 110	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 356485

QC Batch: 109964 | Date Analyzed: 2014-03-07 | Analyzed By: AK
Prep Batch: 92971 | QC Preparation: 2014-03-07 | Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		3	0.110	mg/L	1	0.100	<0.000238	110	70 - 130
Toluene		3	0.111	mg/L	1	0.100	<0.000181	111	70 - 130
Ethylbenzene		3	0.106	mg/L	1	0.100	<0.000247	106	70 - 130
Xylene		3	0.321	mg/L	1	0.300	<0.000189	107	70 - 130

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Benzene		3	0.108	mg/L	1	0.100	<0.000238	108	70 - 130	2	20
Toluene		3	0.108	mg/L	1	0.100	<0.000181	108	70 - 130	3	20
Ethylbenzene		3	0.101	mg/L	1	0.100	<0.000247	101	70 - 130	5	20
Xylene		3	0.307	mg/L	1	0.300	<0.000189	102	70 - 130	4	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Surrogate	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	0.100	0.0990	mg/L	1	0.1	100	99	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0885	0.0849	mg/L	1	0.1	88	85	70 - 130

Matrix Spike (xMS-1) Spiked Sample: 357343

QC Batch: 110044 | Date Analyzed: 2014-03-11 | Analyzed By: LM
Prep Batch: 93041 | QC Preparation: 2014-03-11 | Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	578	mg/L	1	500	36.98	108	75 - 125
Dissolved Potassium		2	528	mg/L	1	500	3.408	105	75 - 125
Dissolved Magnesium		2	553	mg/L	1	500	27.81	105	75 - 125
Dissolved Sodium		2	547	mg/L	1	500	22.1	105	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		2	569	mg/L	1	500	36.98	106	75 - 125	2	20
Dissolved Potassium		2	526	mg/L	1	500	3.408	104	75 - 125	0	20
Dissolved Magnesium		2	557	mg/L	1	500	27.81	106	75 - 125	1	20
Dissolved Sodium		2	556	mg/L	1	500	22.1	107	75 - 125	2	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 356468

QC Batch: 110189 | Date Analyzed: 2014-03-13 | Analyzed By: JR
Prep Batch: 93166 | QC Preparation: 2014-03-13 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	1450	mg/L	55.6	1390	86.1	98	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	1440	mg/L	55.6	1390	86.1	97	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 356468

QC Batch: 110189 | Date Analyzed: 2014-03-13 | Analyzed By: JR
Prep Batch: 93166 | QC Preparation: 2014-03-13 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1530	mg/L	55.6	1390	185	97	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	1530	mg/L	55.6	1390	185	97	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 358042

QC Batch: 110230 | Date Analyzed: 2014-03-14 | Analyzed By: JR
Prep Batch: 93206 | QC Preparation: 2014-03-14 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	2020	mg/L	55.6	1390	544	106	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	2000	mg/L	55.6	1390	544	105	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 358042

QC Batch: 110230 | Date Analyzed: 2014-03-14 | Analyzed By: JR
Prep Batch: 93206 | QC Preparation: 2014-03-14 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1620	mg/L	55.6	1390	220	101	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	1610	mg/L	55.6	1390	220	100	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 358119

QC Batch: 110266 | Date Analyzed: 2014-03-17 | Analyzed By: JR
Prep Batch: 93236 | QC Preparation: 2014-03-17 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1790	mg/L	55.6	1390	345	104	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	1790	mg/L	55.6	1390	345	104	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 356489

QC Batch: 110268 | Date Analyzed: 2014-03-18 | Analyzed By: JR
Prep Batch: 93238 | QC Preparation: 2014-03-18 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	6370	mg/L	111	2780	3100	118	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	6370	mg/L	111	2780	3100	118	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 356489

QC Batch: 110268 | Date Analyzed: 2014-03-18 | Analyzed By: JR
Prep Batch: 93238 | QC Preparation: 2014-03-18 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	2950	mg/L	111	2780	89.4	103	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	2940	mg/L	111	2780	89.4	102	80 - 120	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (xMS-1) Spiked Sample: 359247

QC Batch: 110757 | Date Analyzed: 2014-04-02 | Analyzed By: RR
Prep Batch: 93624 | QC Preparation: 2014-04-01 | Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	131	mg/L	1	52.5	77	103	75 - 125
Dissolved Potassium		2	56.4	mg/L	1	52.5	5.85	96	75 - 125
Dissolved Magnesium		2	66.7	mg/L	1	52.5	14	100	75 - 125
Dissolved Sodium		2	220	mg/L	1	52.5	161	112	75 - 125

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Calcium		2	130	mg/L	1	52.5	77	101	75 - 125	1	20
Dissolved Potassium		2	56.9	mg/L	1	52.5	5.85	97	75 - 125	1	20
Dissolved Magnesium		2	65.6	mg/L	1	52.5	14	98	75 - 125	2	20
Dissolved Sodium		2	220	mg/L	1	52.5	161	112	75 - 125	0	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Matrix Spike (MS-1) Spiked Sample: 357547

QC Batch: 110780 | Date Analyzed: 2014-04-01 | Analyzed By: JR
Prep Batch: 93668 | QC Preparation: 2014-04-01 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	2260	mg/L	55.6	1390	739	109	80 - 120

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	2230	mg/L	55.6	1390	739	107	80 - 120	1	20

Percent recovery is based on the spike result. RPD is based on the spike and spike duplicate result.

Calibration Standards

Standard (ICV-1)

QC Batch: 109942 | Date Analyzed: 2014-03-07 | Analyzed By: AR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	246		-	2014-03-07
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Total Alkalinity		3	mg/L as CaCo3	250	257	103	90 - 110	2014-03-07

Standard (CCV-1)

QC Batch: 109942 | Date Analyzed: 2014-03-07 | Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	250		-	2014-03-07
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Total Alkalinity		3	mg/L as CaCo3	250	254	102	90 - 110	2014-03-07

Standard (CCV-1)

QC Batch: 109964 | Date Analyzed: 2014-03-07 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		3	mg/L	0.100	0.110	110	80 - 120	2014-03-07
Toluene		3	mg/L	0.100	0.110	110	80 - 120	2014-03-07
Ethylbenzene		3	mg/L	0.100	0.102	102	80 - 120	2014-03-07
Xylene		3	mg/L	0.300	0.312	104	80 - 120	2014-03-07

Standard (CCV-2)

QC Batch: 109964 | Date Analyzed: 2014-03-07 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		3	mg/L	0.100	0.103	103	80 - 120	2014-03-07
Toluene		3	mg/L	0.100	0.105	105	80 - 120	2014-03-07
Ethylbenzene		3	mg/L	0.100	0.100	100	80 - 120	2014-03-07
Xylene		3	mg/L	0.300	0.305	102	80 - 120	2014-03-07

Standard (CCV-3)

QC Batch: 109964 | Date Analyzed: 2014-03-07 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		3	mg/L	0.100	0.104	104	80 - 120	2014-03-07
Toluene		3	mg/L	0.100	0.109	109	80 - 120	2014-03-07
Ethylbenzene		3	mg/L	0.100	0.105	105	80 - 120	2014-03-07
Xylene		3	mg/L	0.300	0.320	107	80 - 120	2014-03-07

Standard (ICV-1)

QC Batch: 110044 | Date Analyzed: 2014-03-11 | Analyzed By: LM

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		2	mg/L	51.0	52.4	103	90 - 110	2014-03-11
Dissolved Potassium		2	mg/L	55.0	56.4	102	90 - 110	2014-03-11
Dissolved Magnesium		2	mg/L	51.0	52.2	102	90 - 110	2014-03-11
Dissolved Sodium		2	mg/L	51.0	52.7	103	90 - 110	2014-03-11

Standard (CCV-1)

QC Batch: 110044 | Date Analyzed: 2014-03-11 | Analyzed By: LM

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		2	mg/L	51.0	52.7	103	90 - 110	2014-03-11
Dissolved Potassium		2	mg/L	55.0	52.7	96	90 - 110	2014-03-11
Dissolved Magnesium		2	mg/L	51.0	54.2	106	90 - 110	2014-03-11
Dissolved Sodium		2	mg/L	51.0	49.4	97	90 - 110	2014-03-11

Standard (ICV-1)

QC Batch: 110111 Date Analyzed: 2014-03-04 Analyzed By: AR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		3	s.u.	7.00	7.08	101	98 - 102	2014-03-04

Standard (CCV-1)

QC Batch: 110111 Date Analyzed: 2014-03-04 Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		3	s.u.	7.00	7.07	101	98 - 102	2014-03-04

Standard (ICV-1)

QC Batch: 110112 Date Analyzed: 2014-03-04 Analyzed By: AR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		3	s.u.	7.00	7.07	101	98 - 102	2014-03-04

Standard (CCV-1)

QC Batch: 110112 Date Analyzed: 2014-03-04 Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		3	s.u.	7.00	6.94	99	98 - 102	2014-03-04

Standard (CCV-1)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.7	99	90 - 110	2014-03-13

Standard (CCV-1)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-13

Standard (CCV-2)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.7	99	90 - 110	2014-03-13

Standard (CCV-2)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-13

Standard (CCV-3)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.8	99	90 - 110	2014-03-13

Standard (CCV-3)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.9	100	90 - 110	2014-03-13

Standard (CCV-4)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.7	99	90 - 110	2014-03-13

Standard (CCV-4)

QC Batch: 110189 Date Analyzed: 2014-03-13 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-13

Standard (ICV-1)

QC Batch: 110193 Date Analyzed: 2014-03-07 Analyzed By: AR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	252		-	2014-03-07
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Total Alkalinity		3	mg/L as CaCo3	250	253	101	90 - 110	2014-03-07

Standard (CCV-1)

QC Batch: 110193 Date Analyzed: 2014-03-07 Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	250		-	2014-03-07
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-07
Total Alkalinity		3	mg/L as CaCo3	250	257	103	90 - 110	2014-03-07

Standard (CCV-1)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.7	99	90 - 110	2014-03-14

Standard (CCV-1)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-14

Standard (CCV-2)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.8	99	90 - 110	2014-03-14

Standard (CCV-2)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-14

Standard (CCV-3)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.8	99	90 - 110	2014-03-14

Standard (CCV-3)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-14

Standard (CCV-4)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.8	99	90 - 110	2014-03-14

Standard (CCV-4)

QC Batch: 110230 Date Analyzed: 2014-03-14 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.9	100	90 - 110	2014-03-14

Standard (CCV-1)

QC Batch: 110266 Date Analyzed: 2014-03-17 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-17

Standard (CCV-2)

QC Batch: 110266 Date Analyzed: 2014-03-17 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.7	99	90 - 110	2014-03-17

Standard (CCV-3)

QC Batch: 110266 Date Analyzed: 2014-03-17 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.7	99	90 - 110	2014-03-17

Standard (CCV-1)

QC Batch: 110268 Date Analyzed: 2014-03-18 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.7	99	90 - 110	2014-03-18

Standard (CCV-1)

QC Batch: 110268 Date Analyzed: 2014-03-18 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.7	99	90 - 110	2014-03-18

Standard (CCV-2)

QC Batch: 110268 Date Analyzed: 2014-03-18 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.7	99	90 - 110	2014-03-18

Standard (CCV-2)

QC Batch: 110268 Date Analyzed: 2014-03-18 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.7	99	90 - 110	2014-03-18

Standard (CCV-3)

QC Batch: 110268 Date Analyzed: 2014-03-18 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.9	100	90 - 110	2014-03-18

Standard (CCV-3)

QC Batch: 110268 Date Analyzed: 2014-03-18 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.9	100	90 - 110	2014-03-18

Standard (ICV-1)

QC Batch: 110757 Date Analyzed: 2014-04-02 Analyzed By: RR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		2	mg/L	51.0	51.1	100	90 - 110	2014-04-02
Dissolved Potassium		2	mg/L	55.0	54.8	100	90 - 110	2014-04-02
Dissolved Magnesium		2	mg/L	51.0	51.1	100	90 - 110	2014-04-02
Dissolved Sodium		2	mg/L	51.0	51.1	100	90 - 110	2014-04-02

Standard (CCV-1)

QC Batch: 110757 Date Analyzed: 2014-04-02 Analyzed By: RR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Dissolved Calcium		2	mg/L	51.0	47.7	94	90 - 110	2014-04-02
Dissolved Potassium		2	mg/L	55.0	50.1	91	90 - 110	2014-04-02
Dissolved Magnesium		2	mg/L	51.0	46.4	91	90 - 110	2014-04-02
Dissolved Sodium		2	mg/L	51.0	47.1	92	90 - 110	2014-04-02

Standard (CCV-1)

QC Batch: 110780 Date Analyzed: 2014-04-01 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	23.7	95	90 - 110	2014-04-01

Standard (CCV-2)

QC Batch: 110780 Date Analyzed: 2014-04-01 Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	23.7	95	90 - 110	2014-04-01

Appendix

Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704221-12-3	El Paso
2	NELAP	T104704219-14-10	Lubbock
3	NELAP	T104704392-13-7	Midland

Standard Flags

F	Description
B	Analyte detected in the corresponding method blank above the method detection limit
H	Analyzed out of hold time
J	Estimated concentration
Jb	The analyte is positively identified and the value is approximated between the SDL and MQL. Sample contains less then ten times the concentration found in the method blank. The result should be considered non-detect to the SDL.
Je	Estimated concentration exceeding calibration range.
MI1	Split peak or shoulder peak
MI2	Instrument software did not integrate
MI3	Instrument software misidentified the peak
MI4	Instrument software integrated improperly
MI5	Baseline correction
Qc	Calibration check outside of laboratory limits.
Qr	RPD outside of laboratory limits
Qs	Spike recovery outside of laboratory limits.
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

Result Comments

1 Surrogate failed due to matrix effect - confirmed by reanalysis.
2 Surrogate failed due to matrix effect - confirmed by reanalysis.
3 Surrogate failed due to matrix effect - confirmed by reanalysis.
4 Surrogate failed due to matrix effect - confirmed by reanalysis.
5 Surrogate failed due to matrix effect - confirmed by reanalysis.
6 Surrogate failed due to matrix effect - confirmed by reanalysis.

Attachments

The scanned attachments will follow this page.
Please note, each attachment may consist of more than one page.

14030405

Analysis Request of Chain of Custody Record

TETRA TECH
1910 N. Big Spring St.
Midland, Texas 79705
(432) 682-4559 • Fax (432) 682-3946

PAGE: 1 OF: 2

CLIENT NAME: Celero Energy

SITE MANAGER: Greg Pope

PROJECT NO.: 114-6401632

PROJECT NAME: Rock Queen SWD #1

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 8081/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, SO4, ALK, HARDNESS					
356480	3/3/14	0925	W		X	MW-1	6		X		X		X											X				X					6
481		1005			X	MW-2																											6
482		0935			X	MW-3																											6
483		0835			X	MW-4																											4
484		0815			X	MW-5																											6
485		1015			X	MW-6																											7
486		0950			X	MW-7																											6
487		0915			X	MW-8																											7
488		1045			X	MW-9																											7
489	↓	0900	↓		X	MW-10	↓		↓		↓		↓											↓				↓					6

ANALYSIS REQUEST (Circle or Specify Method No.)

RELINQUISHED BY: (Signature)	Date: 3/3/14 Time: 1500	RECEIVED BY: (Signature)	Date: 03/03/14 Time: 1500
RELINQUISHED BY: (Signature)	Date: 03/03/14 Time: 1620	RECEIVED BY: (Signature)	Date: 3/3/14 Time: 1620
RELINQUISHED BY: (Signature)	Date: Time:	RECEIVED BY: (Signature)	Date: Time:

SAMPLED BY: (Print & Initial) CF/TH Date: Time:

SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS AIRBILL #: OTHER:

RECEIVING LABORATORY: RECEIVED BY: (Signature)
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE: DATE: TIME:

TETRA TECH CONTACT PERSON: GREG POPE

Results by: STP

RUSH Charges Authorized: Yes No

SAMPLE CONDITION WHEN RECEIVED: -0.8

REMARKS: Midland - BTEX/TPH/Chloride/TDS Lubbock - Cations/Anions/Hardness EP - Cl/SO4

Please fill out all copies - Laboratory retains Yellow copy - Return Original copy to Tetra Tech - Project Manager retains Pink copy - Accounting receives Gold copy.

14030405

Analysis Request of Chain of Custody Record

TETRA TECH
1910 N. Big Spring St.
Midland, Texas 79705
(432) 682-4559 • Fax (432) 682-3946

PAGE: 2 OF: 2

CLIENT NAME: Celero Energy

SITE MANAGER: Greg Pope

PROJECT NO.: 114-6401632

PROJECT NAME: Rock Queen SWD #1

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	ANALYSIS REQUEST (Circle or Specify Method No.): BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, 504, ALK, HARDNESS
490	3/3/14	1030	W		X	MW-11	6		X		X		X											X				X

RELINQUISHED BY: (Signature) Date: 3/3/14 Time: 1500
RECEIVED BY: (Signature) Date: 03/03/14 Time: 1500

RELINQUISHED BY: (Signature) Date: 03/03/14 Time: 1620
RECEIVED BY: (Signature) Date: 3/3/14 Time: 1620

RELINQUISHED BY: (Signature) Date: Time:
RECEIVED BY: (Signature) Date: Time:

SAMPLED BY: (Print & Initial) CF/KH Date: Time:

SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS AIRBILL #: OTHER:

RECEIVING LABORATORY:
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE:
RECEIVED BY: (Signature)
DATE: TIME:

TETRA TECH CONTACT PERSON: GREG POPE

Results by: STD

RUSH Charges Authorized: Yes No

SAMPLE CONDITION WHEN RECEIVED: -0.8

REMARKS: ALK, HARDNESS

Please fill out all copies - Laboratory retains Yellow copy - Return Orginal copy to Tetra Tech - Project Manager retains Pink copy - Accounting receives Gold copy.

14030405

Analysis Request of Chain of Custody Record

PAGE: 1 OF: 2

TETRA TECH
1910 N. Big Spring St.
Midland, Texas 79705
(432) 682-4559 • Fax (432) 682-3946

ANALYSIS REQUEST
(*Circle or Specify Method No.*)

CLIENT NAME: Celero Energy
SITE MANAGER: Greg Pope
PROJECT NO.: 114-6401632
PROJECT NAME: Rock Queen SWD #1

PRESERVATIVE METHOD

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, SO4, ALK, HARDNESS	
356480	3/3/14	0925	w		X	MW-1	6		X		X		X												X				X	6
481		1005			X	MW-2																								6
482		0935			X	MW-3																								6
483		0835			X	MW-4																								6
484		0845			X	MW-5																								6
485		1015			X	MW-6																								7
486		0950			X	MW-7																								6
487		0915			X	MW-8																								7
488		1045			X	MW-9																								7
489		0900			X	MW-10																								6

RELINQUISHED BY: (Signature) [signature] Date: 3/3/14 Time: 1520
RECEIVED BY: (Signature) [signature] Date: 03/03/14 Time: 1520

RELINQUISHED BY: (Signature) [signature] Date: 03/03/14 Time: 1620
RECEIVED BY: (Signature) [signature] Date: 3/3/14 Time: 16:20

RELINQUISHED BY: (Signature) [signature] Date: 3/4/14 Time: 15:30
RECEIVED BY: (Signature) Date: Time:

SAMPLED BY: (Print & Initial) CF/TH Date: Time:
SAMPLE SHIPPED BY: (Circle) FEDEX BUS (HAND DELIVERED) UPS AIRBILL #: 2Q957248 OTHER:
TETRA TECH CONTACT PERSON: GREG POPE
Results by: STP
RUSH Charges Authorized: Yes No

RECEIVING LABORATORY:
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE:
RECEIVED BY: (Signature) [signature] TA Lubbock
DATE: 3/5/14 TIME: 9:00

SAMPLE CONDITION WHEN RECEIVED: -0.8 IR3 - 2.9/2.7
REMARKS: Midland - BTEX/pH/alk/TDS Lubbock - Cations/Hardness EP - Cl/SO4

Please fill out all copies - Laboratory retains Yellow copy - Return Original copy to Tetra Tech - Project Manager retains Pink copy - Accounting receives Gold copy.

14030405

Analysis Request of Chain of Custody Record

TETRA TECH
1910 N. Big Spring St.
Midland, Texas 79705
(432) 682-4559 • Fax (432) 682-3946

CLIENT NAME: Celero Energy
SITE MANAGER: Greg Pope
PROJECT NO.: 114-6401632
PROJECT NAME: Rock Queen SUD #1

ANALYSIS REQUEST (Circle or Specify Method No.)

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, SO4, ALK, HARDNESS			
490	3/3/14	1030	W		X	MW-11	6		X		X		X												X				X			

RELINQUISHED BY: (Signature) [signature] Date: 3/3/14 Time: 1500
RECEIVED BY: (Signature) [signature] Date: 03/03/14 Time: 1500

RELINQUISHED BY: (Signature) [signature] Date: 03/03/14 Time: 1620
RECEIVED BY: (Signature) [signature] Date: 3/3/14 Time: 16:20

RELINQUISHED BY: (Signature) Date: Time:
RECEIVED BY: (Signature) Date: Time:

RECEIVING LABORATORY:
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE:

RECEIVED BY: (Signature) [signature] TA Lubbock
DATE: 3/6/14 TIME: 9:00

SAMPLED BY: (Print & Initial) CF/TH Date: Time:
SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED (circled) UPS
AIRBILL #: EQ95124S
OTHER:
TETRA TECH CONTACT PERSON: GREG POPE
Results by: STD
RUSH Charges Authorized: Yes No

SAMPLE CONDITION WHEN RECEIVED: -0.8 2.9/2.7
REMARKS:

AR

Please fill out all copies - Laboratory retains Yellow copy - Return Orginal copy to Tetra Tech - Project Manager retains Pink copy - Accounting receives Gold copy.

Cation-Anion Balance Sheet

DATE: 4/2/2014

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate-N ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
356480	2160	3930	72800	2160	203.00	1550	124000				195000	
356481	3550	2700	46900	1220	218.00	1590	92300				145000	
356482	7140	3060	33300	591	145.00	1160	77100				128000	
356483	3280	3420	42800	1170	153.00	2170	74800				168000	
356484	9420	1590	5830	95.6	78.00	799	35500				59300	
356485	358	45.9	316	8.42	193.00	152	810				2350	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate-N in meq/L	Fluoride in meq/L	Bromide in meq/L	Total Cations in meq/L	Total Anions in meq/L	% Difference*
356480	107.78	323.40	3166.80	55.25	4.06	32.27	3498.04	0.00	0.00	0.00	3653.24	3534.37	1.653756135
356481	177.15	222.18	2040.15	31.21	4.36	33.10	2603.78	0.00	0.00	0.00	2470.69	2641.25	3.33653082
356482	356.29	251.81	1448.55	15.12	2.90	24.15	2174.99	0.00	0.00	0.00	2071.76	2202.04	3.04836251
356483	163.67	281.43	1861.80	29.93	3.06	45.18	2110.11	0.00	0.00	0.00	2336.83	2158.35	3.970586449
356484	470.06	130.84	253.61	2.45	1.56	16.64	1001.46	0.00	0.00	0.00	856.95	1019.65	8.669969923
356485	17.86	3.78	13.75	0.22	3.86	3.16	22.85	0.00	0.00	0.00	35.60	29.87	8.747982622

	EC/Cation	EC/Anion				
356480	365323.65	353437.1	range	0	to	0
356481	247068.56	264124.68	range	0	to	0
356482	207176.118	220204.22	range	0	to	0
356483	233683.24	215834.74	range	0	to	0
356484	85694.9548	101965.018	range	0	to	0
356485	3560.26946	2987.474	range	0	to	0

TDS/EC	TDS/Cat		TDS/Anion	
#DIV/0!	0.53		0.55	needs to be 0.55-0.77
#DIV/0!	0.59		0.55	needs to be 0.55-0.77
#DIV/0!	0.62		0.58	needs to be 0.55-0.77
#DIV/0!	0.72		0.78	needs to be 0.55-0.77
#DIV/0!	0.69		0.58	needs to be 0.55-0.77
#DIV/0!	0.66		0.79	needs to be 0.55-0.77

Cation-Anion Balance Sheet

DATE: 4/2/2014

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate-N ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
356486	13400	1090	4470	64.8	129.00	309	25600				46800	
356487	2580	361.8	165.7	27.71	683.00	75.6	5120				11100	
356488	82.8	9.8	71.3	10.2	218.00	121	75.6				633	
356489	1310	204	189	16.8	116.00	89.4	3100				6520	
356490	72.6	8	56.5	8.93	316.00	114	36.6				514	

Sample #	Calcium in meq/L	Magnesium in meq/L	Sodium in meq/L	Potassium in meq/L	Alkalinity in meq/L	Sulfate in meq/L	Chloride in meq/L	Nitrate-N in meq/L	Fluoride in meq/L	Bromide in meq/L	Total Cations in meq/L	Total Anions in meq/L	% Difference*
356486	668.66	89.70	194.45	1.66	2.58	6.43	722.18	0.00	0.00	0.00	954.46	731.19	13.24530955
356487	128.74	29.77	7.21	0.71	13.66	1.57	144.44	0.00	0.00	0.00	166.43	159.67	2.073625184
356488	4.13	0.81	3.10	0.26	4.36	2.52	2.13	0.00	0.00	0.00	8.30	9.01	4.108401525
356489	65.37	16.79	8.22	0.43	2.32	1.86	87.45	0.00	0.00	0.00	90.81	91.63	0.452151558
356490	3.62	0.66	2.46	0.23	6.32	2.37	1.03	0.00	0.00	0.00	6.97	9.73	16.52604478

	EC/Cation	EC/Anion				
356486	95445.8684	73118.938	range	0	to	0
356487	16643.12938	15966.9192	range	0	to	0
356488	830.0628	901.1896	range	0	to	0
356489	9080.7404	9163.2308	range	0	to	0
356490	696.72394	972.5966	range	0	to	0

TDS/EC	TDS/Cat		TDS/Anion	
#DIV/0!	0.49		0.64	needs to be 0.55-0.77
#DIV/0!	0.67		0.70	needs to be 0.55-0.77
#DIV/0!	0.76		0.70	needs to be 0.55-0.77
#DIV/0!	0.72		0.71	needs to be 0.55-0.77
#DIV/0!	0.74		0.53	needs to be 0.55-0.77

APPENDIX D
SLUG TEST DATA

Data Set: H:\WinSitu Data\Celero Caprock Slug Test Data\Exported Data\RQ Tract SWD #1 MW-5\RQTractSWD
Title: Falling-Head Slug Test
Date: 04/28/14
Time: 15:46:41

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Date: 03/26/14
Test Well: MW-5slugin

AQUIFER DATA

Saturated Thickness: 13.64 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.637 ft
Static Water Column Height: 8.696 ft
Casing Radius: 0.083 ft
Well Radius: 0.281 ft
Well Skin Radius: 1. ft
Screen Length: 13.64 ft
Total Well Penetration Depth: 13.64 ft

No. of Observations: 60

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	8.696	1860.	8.79
120.	9.333	1920.	8.801
180.	9.159	1980.	8.791
240.	9.067	2040.	8.788
300.	9.01	2100.	8.789
360.	8.956	2160.	8.789
420.	8.915	2220.	8.802
480.	8.891	2280.	8.797
540.	8.867	2340.	8.794
600.	8.854	2400.	8.799
660.	8.85	2460.	8.788
720.	8.818	2520.	8.798
780.	8.821	2580.	8.792
840.	8.805	2640.	8.798
900.	8.806	2700.	8.788
960.	8.8	2760.	8.792
1020.	8.796	2820.	8.793
1080.	8.779	2880.	8.802
1140.	8.793	2940.	8.796
1200.	8.801	3000.	8.8
1260.	8.783	3060.	8.787
1320.	8.788	3120.	8.795
1380.	8.79	3180.	8.794
1440.	8.801	3240.	8.802
1500.	8.797	3300.	8.809
1560.	8.78	3360.	8.801
1620.	8.801	3420.	8.775
1680.	8.794	3480.	8.802
1740.	8.786	3540.	8.792
1800.	8.793	3600.	8.809

SOLUTION

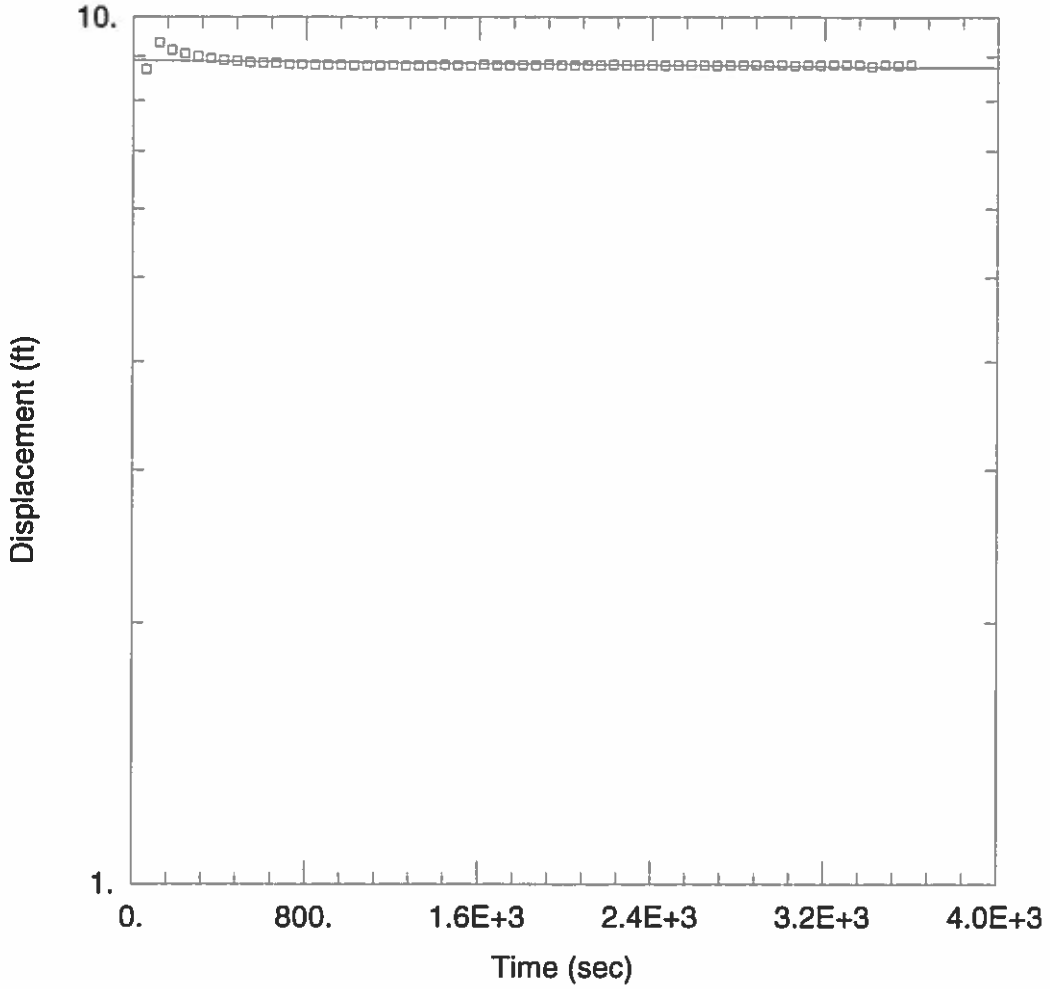
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	4.267E-5	m/day
y0	8.907	ft

K = 4.938E-8 cm/sec
T = K*b = 0.0001774 m²/day (2.053E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-5slugin.aqt
Date: 04/28/14 Time: 15:46:50

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-5slugin
Test Date: 03/26/14

AQUIFER DATA

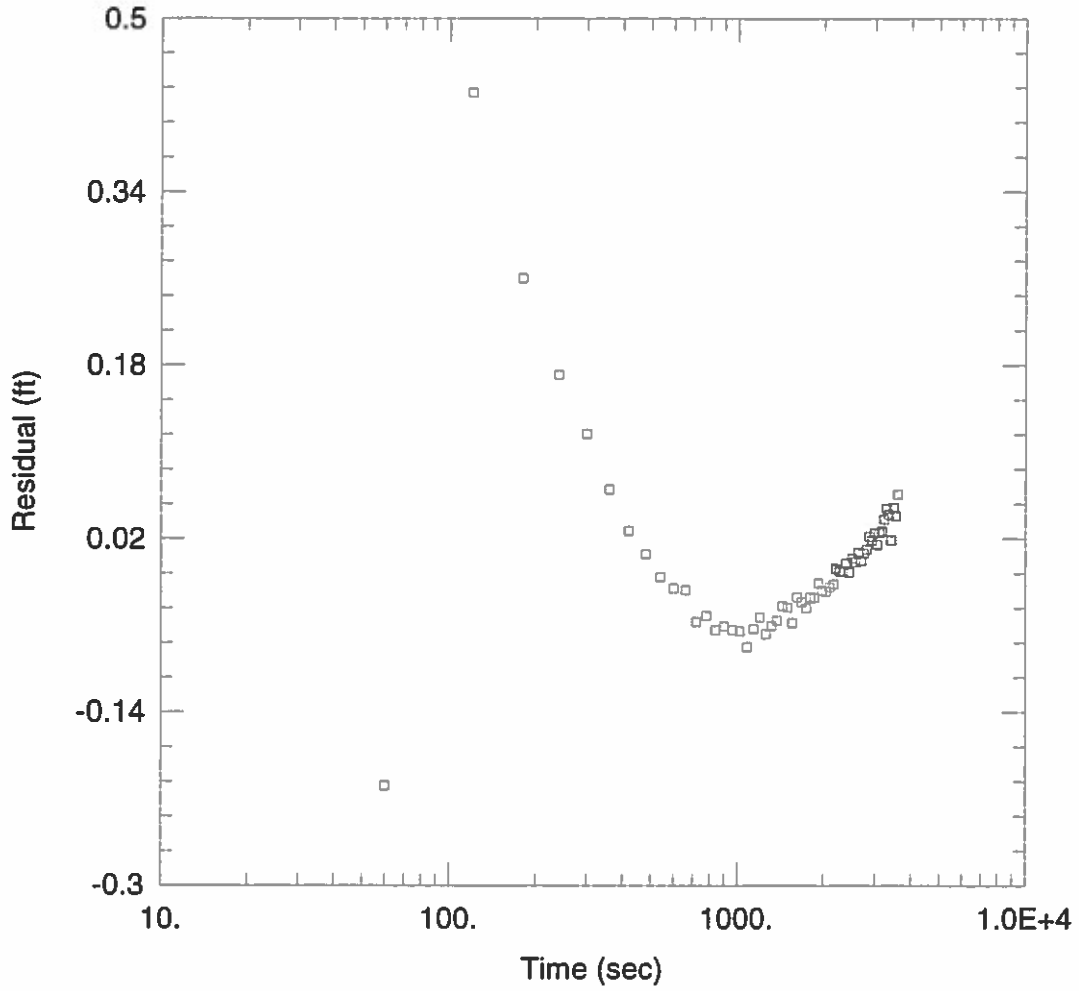
Saturated Thickness: 13.64 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.637 ft
Total Well Penetration Depth: 13.64 ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.696 ft
Screen Length: 13.64 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.267E-5 m/day
y0 = 8.907 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-5slugin.aqt
Date: 04/28/14 Time: 15:46:56

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-5slugin
Test Date: 03/26/14

AQUIFER DATA

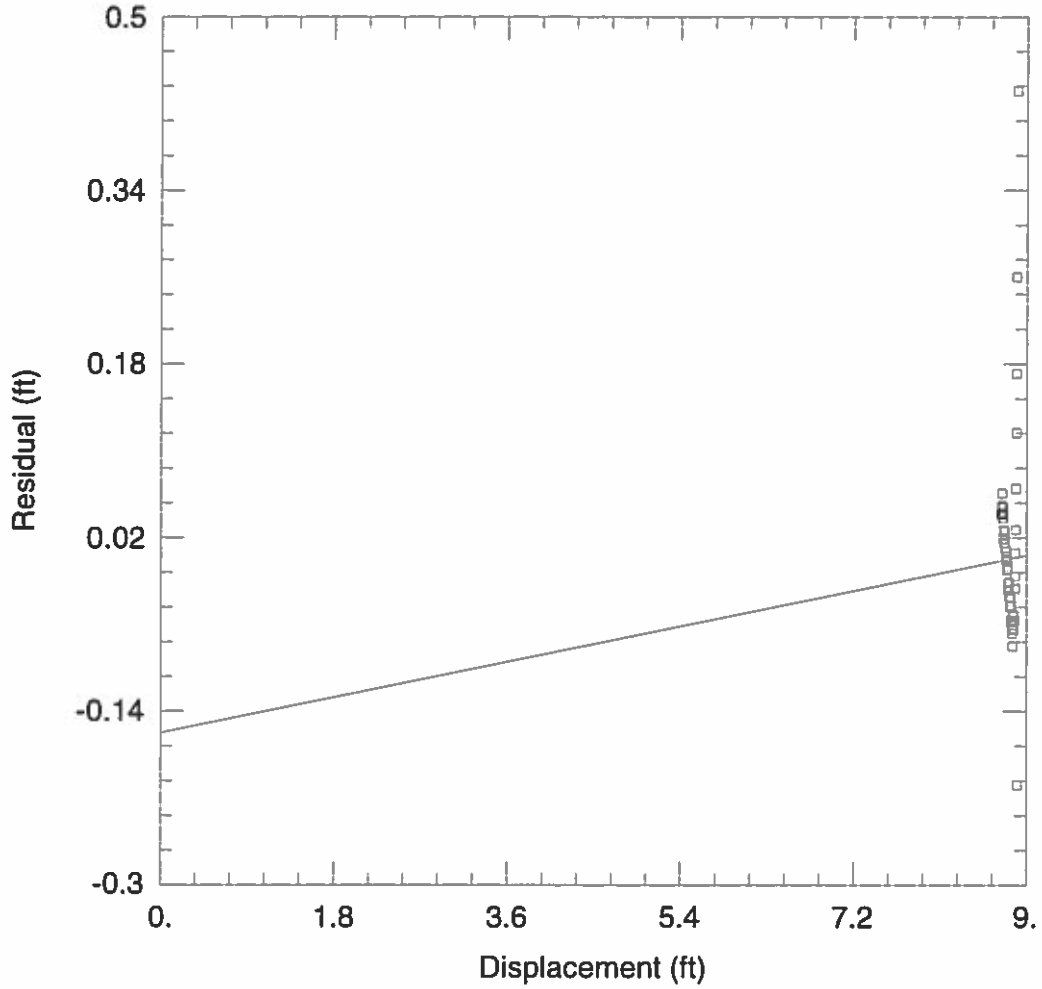
Saturated Thickness: 13.64 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.637 ft
Total Well Penetration Depth: 13.64 ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.696 ft
Screen Length: 13.64 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-5slugin.aqt
Date: 04/28/14 Time: 15:47:03

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-5slugin
Test Date: 03/26/14

AQUIFER DATA

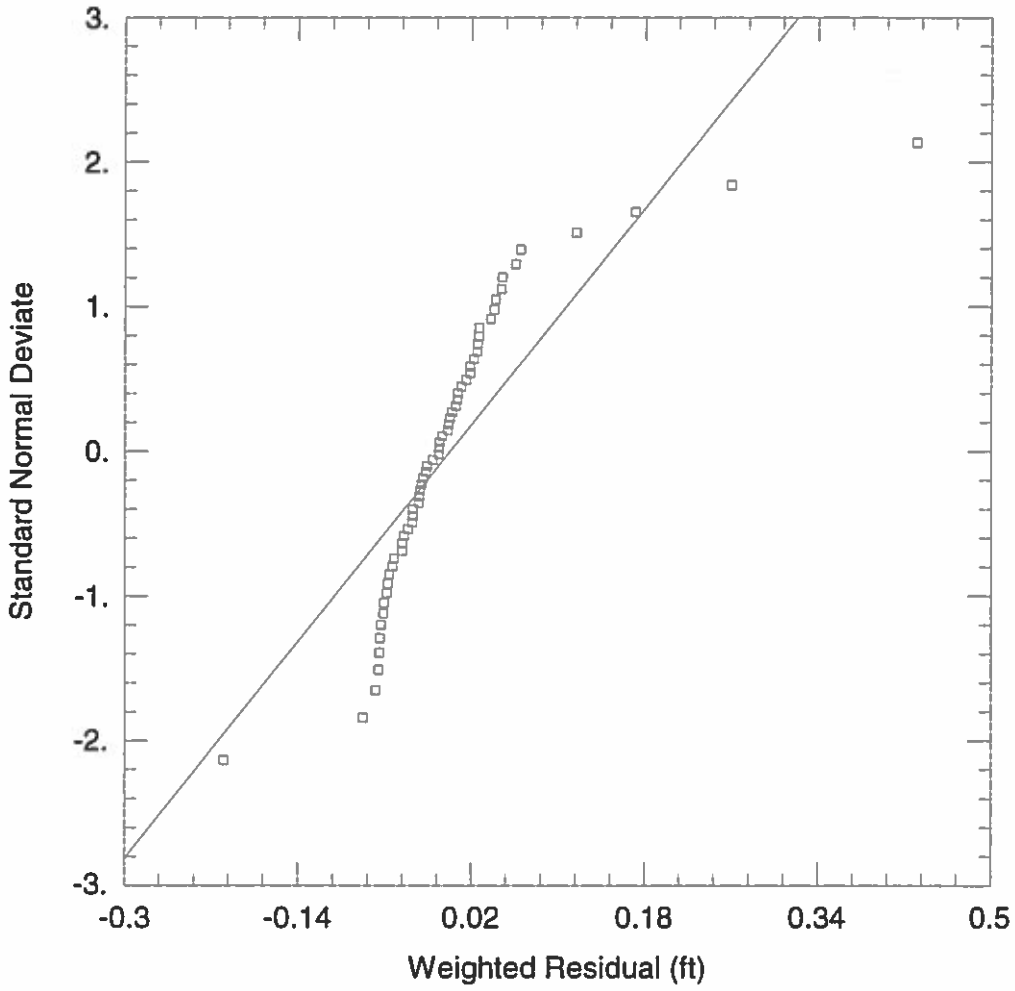
Saturated Thickness: 13.64 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.637 ft
Total Well Penetration Depth: 13.64 ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.696 ft
Screen Length: 13.64 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-5slugin.aqt
Date: 04/28/14 Time: 15:47:09

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-5slugin
Test Date: 03/26/14

AQUIFER DATA

Saturated Thickness: 13.64 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.637 ft
Total Well Penetration Depth: 13.64 ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.696 ft
Screen Length: 13.64 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft

Data Set: H:\WinSitu Data\Celero Caprock Slug Test Data\Exported Data\RQ SWD #1 MW-6\RQSWD#1MW-6sl
Title: Falling-Head Slug Test
Date: 05/13/14
Time: 14:49:48

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQSWD#1
Test Date: 03/26/14
Test Well: MW-6Slugin

AQUIFER DATA

Saturated Thickness: 9.9 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.219 ft
Static Water Column Height: 7.113 ft
Casing Radius: 0.083 ft
Well Radius: 0.2813 ft
Well Skin Radius: 1. ft
Screen Length: 9.9 ft
Total Well Penetration Depth: 9.9 ft

No. of Observations: 56

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	7.332	1740.	7.109
120.	7.16	1800.	7.108
180.	7.134	1860.	7.1
240.	7.123	1920.	7.098
300.	7.102	1980.	7.108
360.	7.105	2040.	7.088
420.	7.084	2100.	7.098
480.	7.096	2160.	7.097
540.	7.103	2220.	7.097
600.	7.087	2280.	7.099
660.	7.103	2340.	7.095
720.	7.099	2400.	7.082
780.	7.091	2460.	7.1
840.	7.092	2520.	7.101
900.	7.095	2580.	7.088
960.	7.089	2640.	7.106
1020.	7.09	2700.	7.085
1080.	7.097	2760.	7.096
1140.	7.096	2820.	7.099
1200.	7.091	2880.	7.098
1260.	7.1	2940.	7.099
1320.	7.095	3000.	7.093
1380.	7.099	3060.	7.099
1440.	7.095	3120.	7.096
1500.	7.094	3180.	7.106
1560.	7.092	3240.	7.105
1620.	7.095	3300.	7.088
1680.	7.09	3360.	7.102

SOLUTION

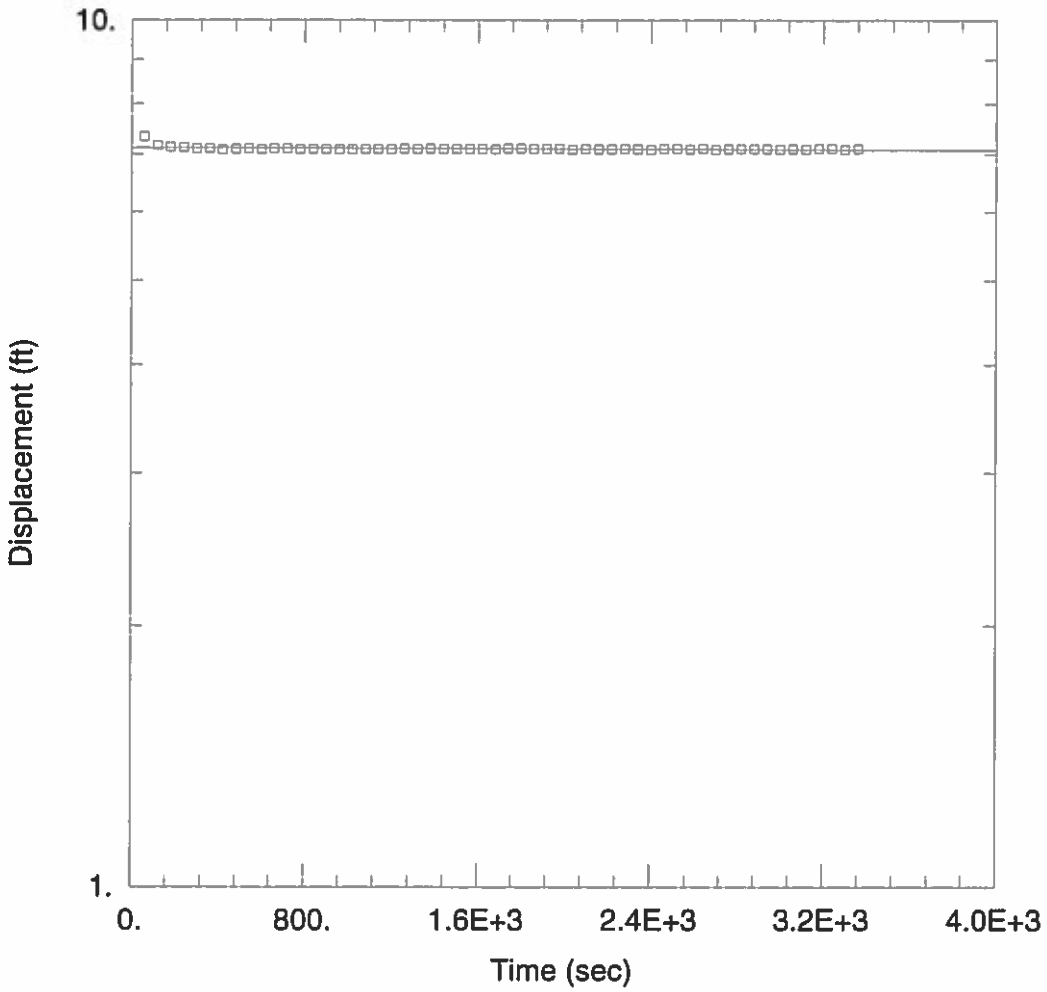
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 2.706

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.629E-5	m/day
y0	7.121	ft

K = 1.886E-8 cm/sec
T = K*b = 4.917E-5 m²/day (5.691E-6 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQSWD#1MW-6slugin.aqt
Date: 04/28/14 Time: 11:23:10

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQSWD#1
Test Well: MW-6Slugin
Test Date: 03/26/14

AQUIFER DATA

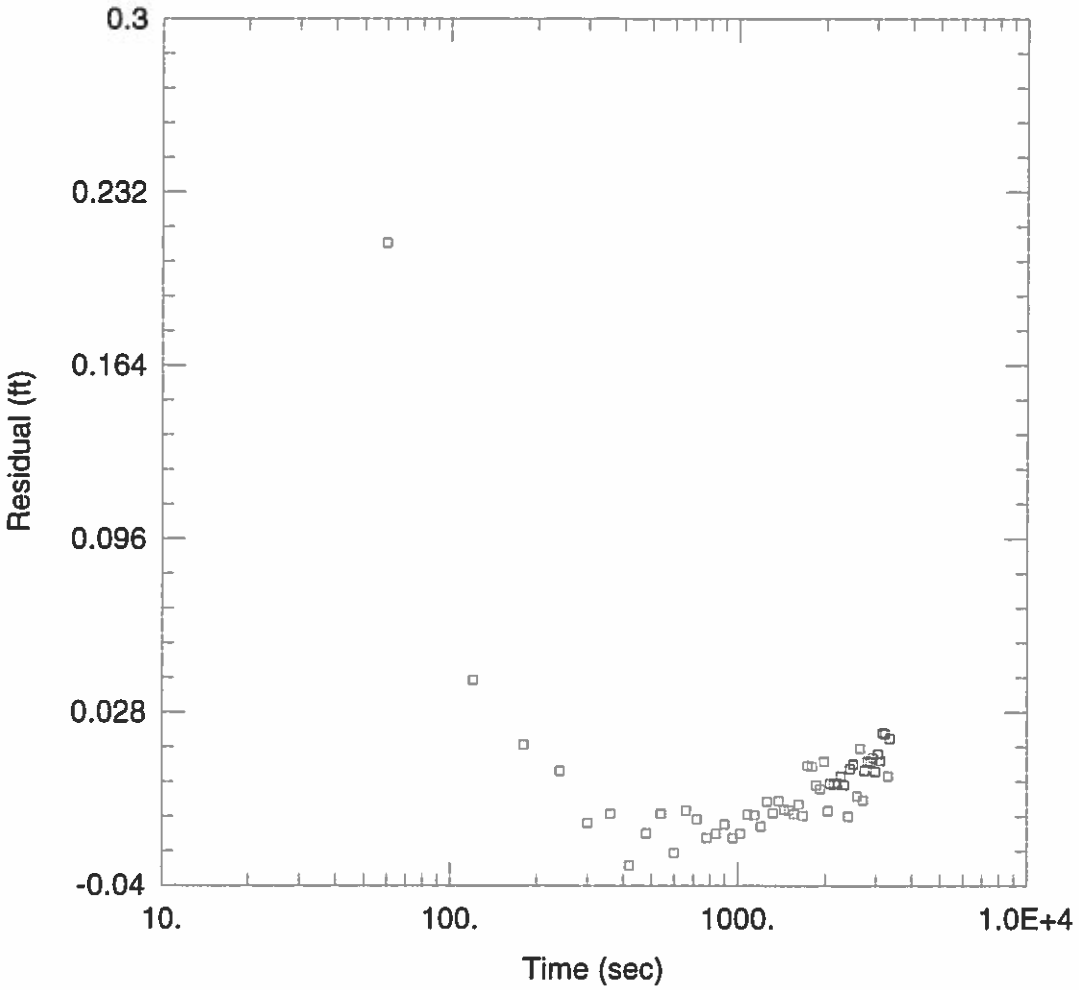
Saturated Thickness: 9.9 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.219 ft Static Water Column Height: 7.113 ft
Total Well Penetration Depth: 9.9 ft Screen Length: 9.9 ft
Casing Radius: 0.083 ft Well Radius: 0.2813 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 1.629E-5 m/day y0 = 7.121 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQSWD#1MW-6slugin.aqt
Date: 04/28/14 Time: 11:23:31

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQSWD#1
Test Well: MW-6Slugin
Test Date: 03/26/14

AQUIFER DATA

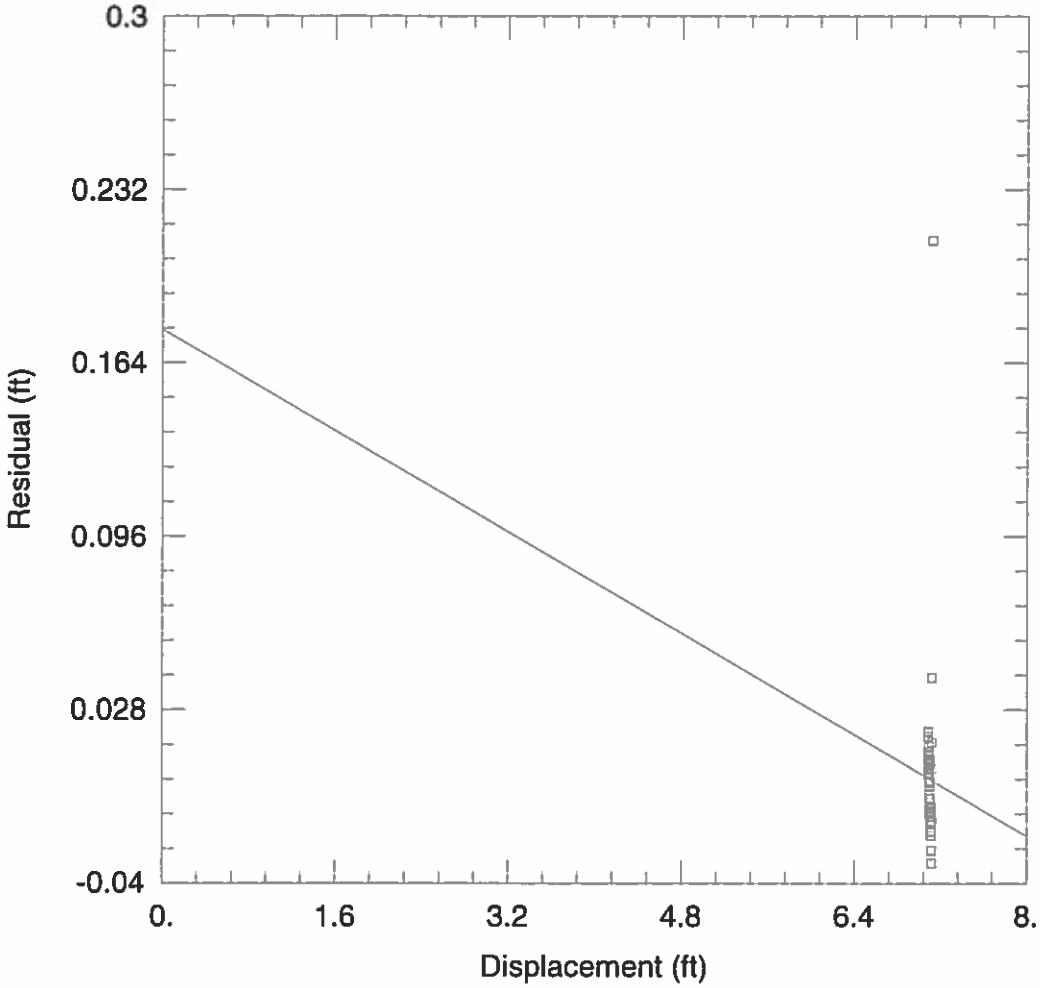
Saturated Thickness: 9.9 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.219 ft
Total Well Penetration Depth: 9.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 7.113 ft
Screen Length: 9.9 ft
Well Radius: 0.2813 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQSWD#1MW-6slugin.aqt
Date: 04/28/14 Time: 11:23:43

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQSWD#1
Test Well: MW-6Slugin
Test Date: 03/26/14

AQUIFER DATA

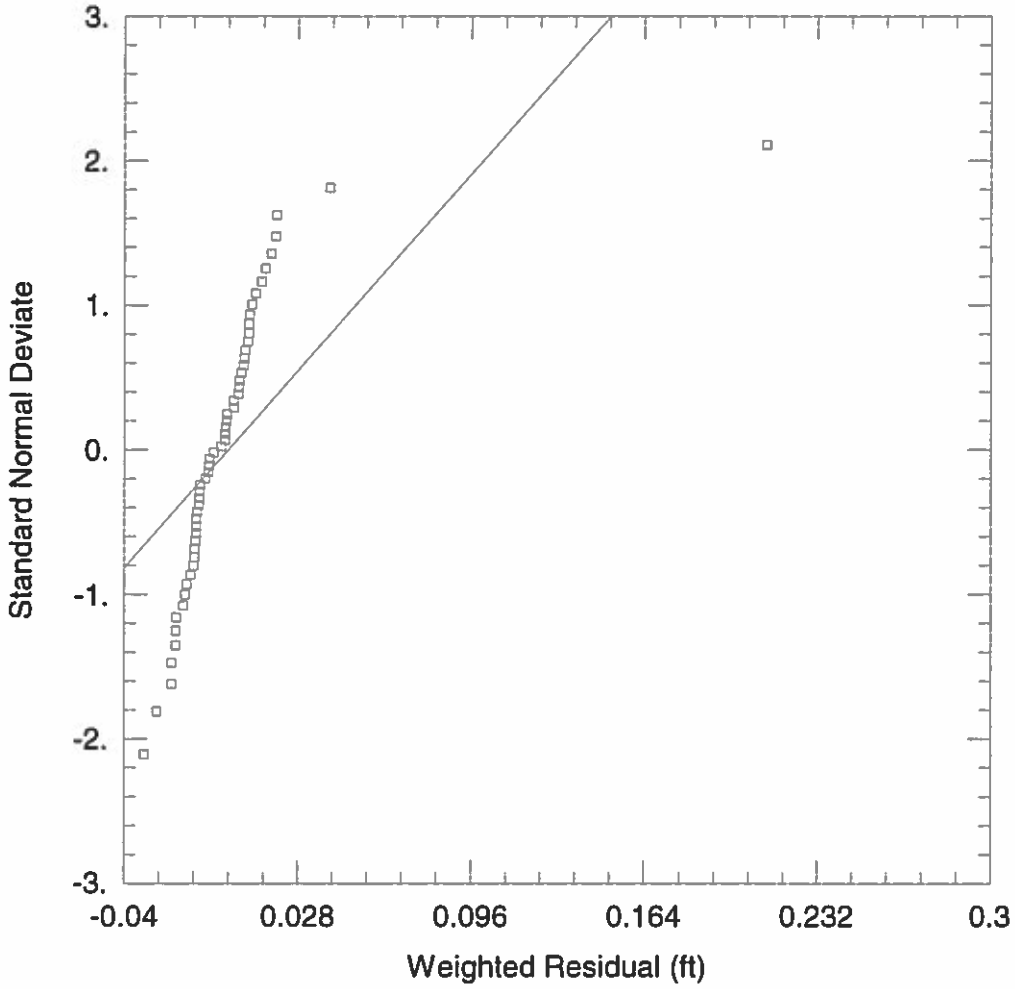
Saturated Thickness: 9.9 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.219 ft
Total Well Penetration Depth: 9.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 7.113 ft
Screen Length: 9.9 ft
Well Radius: 0.2813 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQSWD#1MW-6slugin.aqt
Date: 04/28/14 Time: 11:23:51

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQSWD#1
Test Well: MW-6Slugin
Test Date: 03/26/14

AQUIFER DATA

Saturated Thickness: 9.9 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.219 ft
Total Well Penetration Depth: 9.9 ft
Casing Radius: 0.083 ft
Static Water Column Height: 7.113 ft
Screen Length: 9.9 ft
Well Radius: 0.2813 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft

Data Set: H:\WinSitu Data\Celero Caprock Slug Test Data\Exported Data\RQ Tract SWD #1 MW 11\RQTractSW
Title: Falling-Head Slug Test
Date: 04/28/14
Time: 15:43:35

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Date: 03/27/14
Test Well: MW-11slugin

AQUIFER DATA

Saturated Thickness: 11.58 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.487 ft
Static Water Column Height: 8.702 ft
Casing Radius: 0.083 ft
Well Radius: 0.281 ft
Well Skin Radius: 1. ft
Screen Length: 11.58 ft
Total Well Penetration Depth: 11.58 ft

No. of Observations: 38

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	8.665	1200.	8.671
120.	8.982	1260.	8.668
180.	8.802	1320.	8.676
240.	8.736	1380.	8.67
300.	8.699	1440.	8.679
360.	8.678	1500.	8.668
420.	8.675	1560.	8.67
480.	8.671	1620.	8.679
540.	8.666	1680.	8.667
600.	8.67	1740.	8.683
660.	8.673	1800.	8.664
720.	8.672	1860.	8.681
780.	8.664	1920.	8.673
840.	8.669	1980.	8.673
900.	8.67	2040.	8.679
960.	8.675	2100.	8.67
1020.	8.662	2160.	8.665
1080.	8.671	2220.	8.676
1140.	8.668	2280.	8.688

SOLUTION

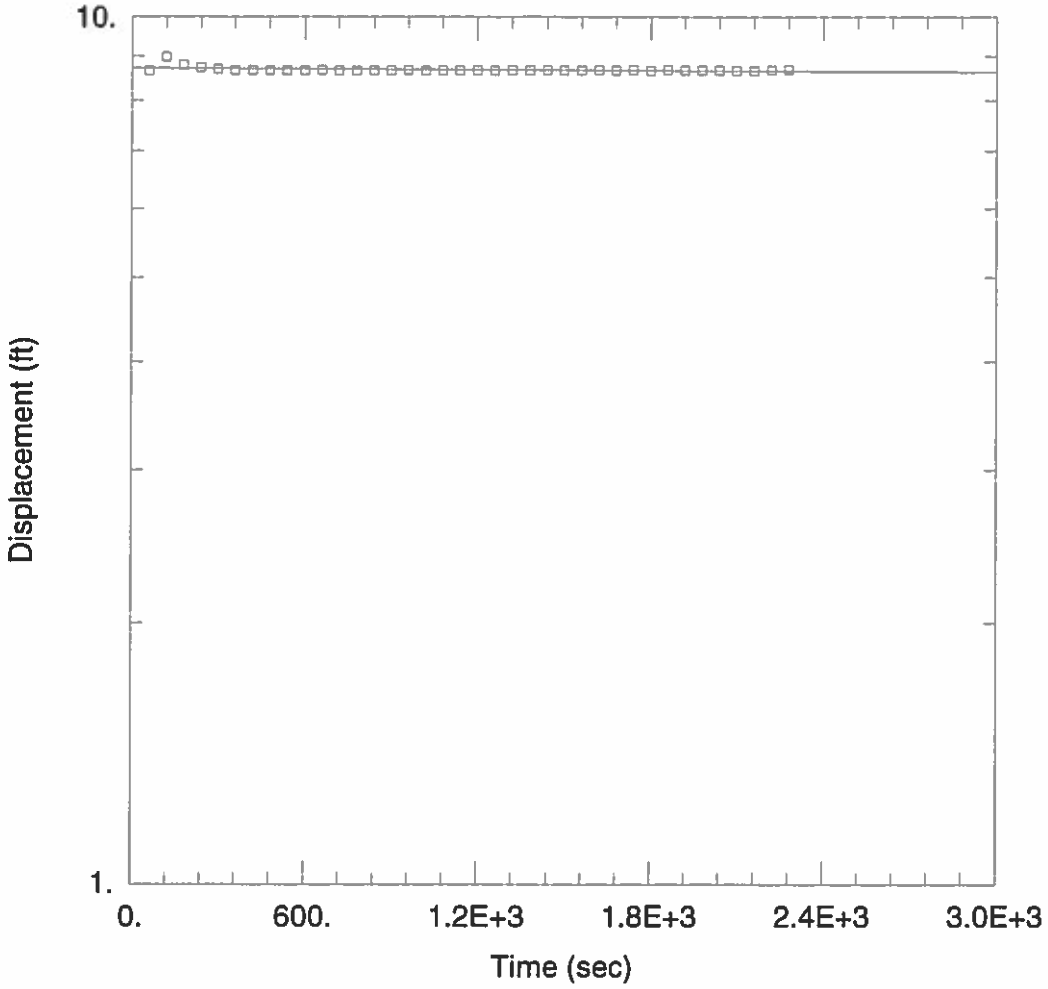
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	7.639E-5	m/day
y0	8.721	ft

K = 8.841E-8 cm/sec
T = K*b = 0.0002696 m²/day (3.121E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-11slugin.aqt
Date: 04/28/14 Time: 15:43:42

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-11slugin
Test Date: 03/27/14

AQUIFER DATA

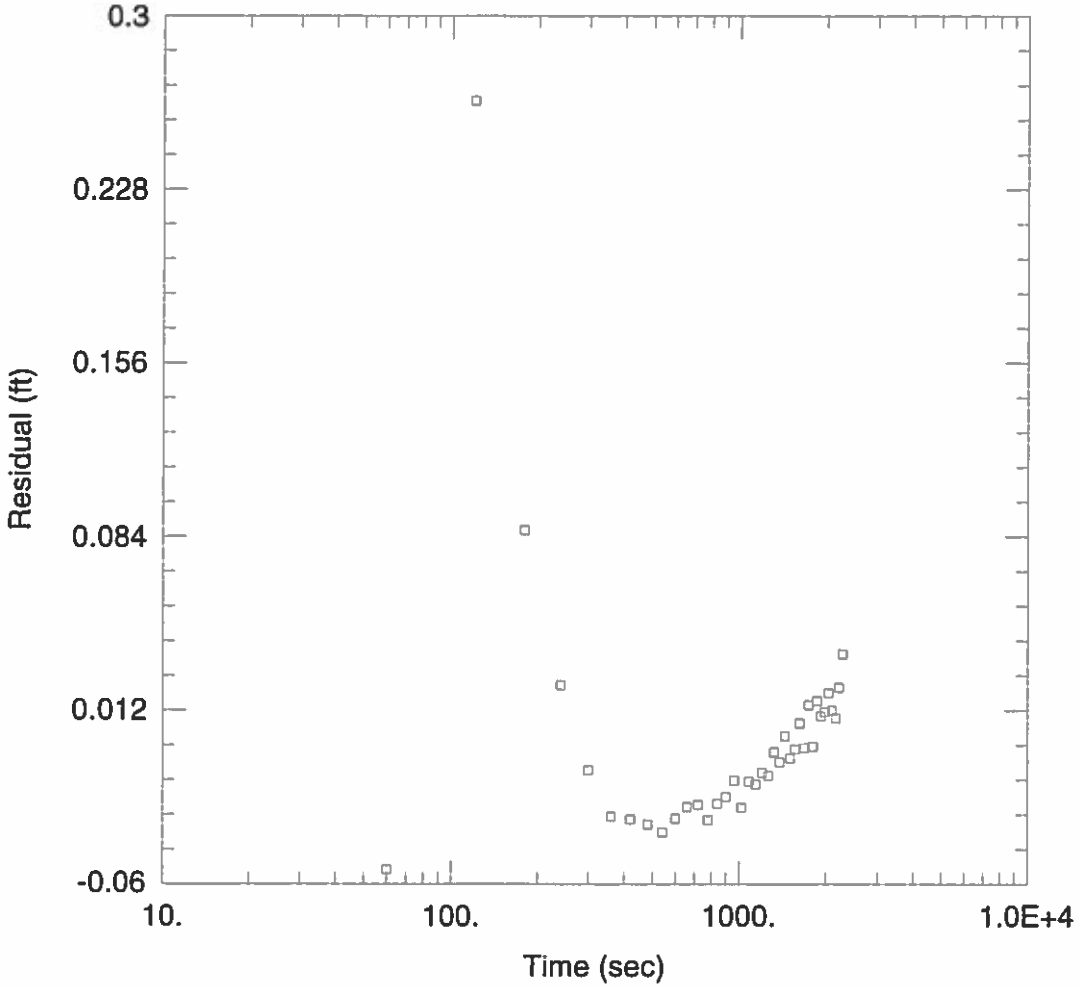
Saturated Thickness: 11.58 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.487 ft
Total Well Penetration Depth: 11.58 ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.702 ft
Screen Length: 11.58 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 7.639E-5 m/day
y0 = 8.721 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-11slugin.aqt
Date: 04/28/14 Time: 15:43:49

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-11slugin
Test Date: 03/27/14

AQUIFER DATA

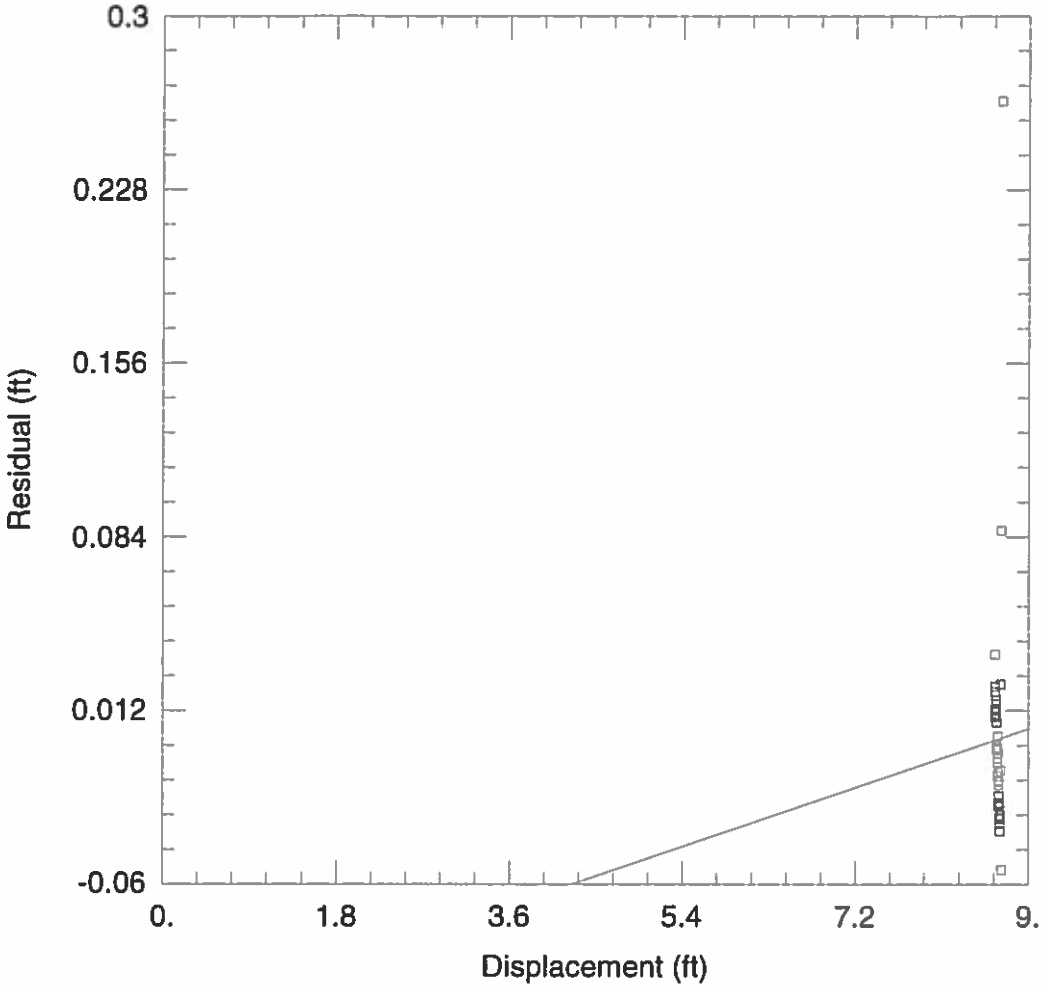
Saturated Thickness: 11.58 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.487 ft
Total Well Penetration Depth: 11.58 ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.702 ft
Screen Length: 11.58 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-11slugin.aqt
Date: 04/28/14 Time: 15:43:56

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-11slugin
Test Date: 03/27/14

AQUIFER DATA

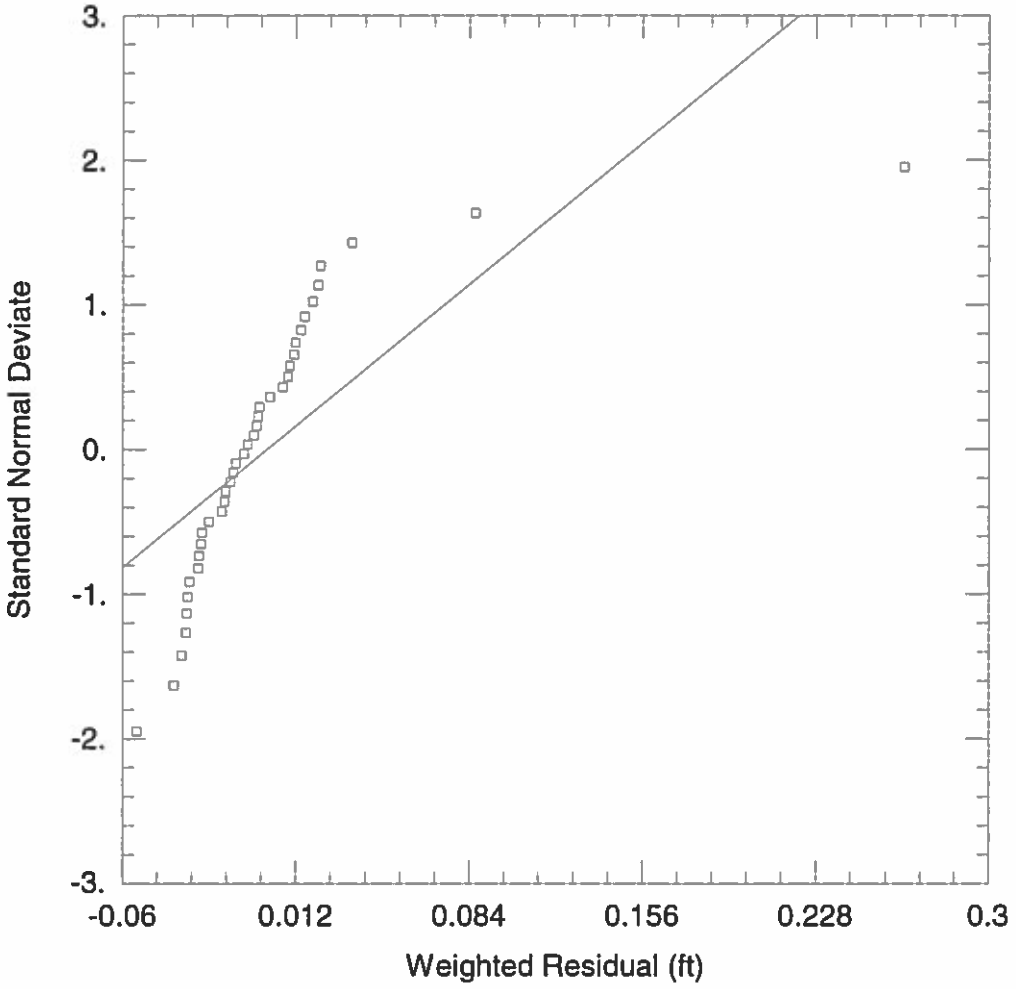
Saturated Thickness: 11.58 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.487 ft
Total Well Penetration Depth: 11.58 ft
Casing Radius: 0.083 ft
Static Water Column Height: 8.702 ft
Screen Length: 11.58 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTractSWD#1MW-11slugin.aqt
Date: 04/28/14 Time: 15:44:03

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: MW-11slugin
Test Date: 03/27/14

AQUIFER DATA

Saturated Thickness: 11.58 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.487 ft Static Water Column Height: 8.702 ft
Total Well Penetration Depth: 11.58 ft Screen Length: 11.58 ft
Casing Radius: 0.083 ft Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0. m/day y0 = 0. ft

Data Set: H:\WinSitu Data\Celero Caprock Slug Test Data\Exported Data\RQSWD#1 RW-1\RQSWD#1RW-1slu
Date: 04/28/14
Time: 15:53:22

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Date: 03/25/14
Test Well: RW-1slugin

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

X Location: 0. ft
Y Location: 0. ft

Initial Displacement: 0.523 ft
Static Water Column Height: 16.1 ft
Casing Radius: 0.2083 ft
Well Radius: 0.364 ft
Well Skin Radius: 1. ft
Screen Length: 8. ft
Total Well Penetration Depth: 8. ft

No. of Observations: 117

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	16.07	3600.	16.34
120.	16.64	3660.	16.36
180.	16.62	3720.	16.34
240.	16.63	3780.	16.34
300.	16.6	3840.	16.34
360.	16.61	3900.	16.33
420.	16.59	3960.	16.34
480.	16.56	4020.	16.33
540.	16.57	4080.	16.34
600.	16.58	4140.	16.33
660.	16.57	4200.	16.34
720.	16.56	4260.	16.32
780.	16.56	4320.	16.33
840.	16.55	4380.	16.32
900.	16.54	4440.	16.32
960.	16.52	4500.	16.31
1020.	16.53	4560.	16.31
1080.	16.51	4620.	16.35
1140.	16.49	4680.	16.32
1200.	16.5	4740.	16.31
1260.	16.5	4800.	16.32
1320.	16.49	4860.	16.31
1380.	16.49	4920.	16.3
1440.	16.48	4980.	16.29
1500.	16.47	5040.	16.3
1560.	16.48	5100.	16.3
1620.	16.46	5160.	16.3
1680.	16.47	5220.	16.28
1740.	16.45	5280.	16.3
1800.	16.44	5340.	16.29
1860.	16.44	5400.	16.3
1920.	16.43	5460.	16.29

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1980.	16.43	5520.	16.29
2040.	16.43	5580.	16.3
2100.	16.42	5640.	16.3
2160.	16.41	5700.	16.28
2220.	16.42	5760.	16.28
2280.	16.42	5820.	16.29
2340.	16.41	5880.	16.27
2400.	16.41	5940.	16.28
2460.	16.4	6000.	16.27
2520.	16.39	6060.	16.27
2580.	16.4	6120.	16.27
2640.	16.4	6180.	16.29
2700.	16.41	6240.	16.27
2760.	16.38	6300.	16.28
2820.	16.39	6360.	16.27
2880.	16.39	6420.	16.28
2940.	16.39	6480.	16.29
3000.	16.38	6540.	16.26
3060.	16.37	6600.	16.27
3120.	16.37	6660.	16.27
3180.	16.37	6720.	16.27
3240.	16.37	6780.	16.26
3300.	16.37	6840.	16.25
3360.	16.36	6900.	16.26
3420.	16.35	6960.	16.26
3480.	16.36	7020.	16.26
3540.	16.36		

SOLUTION

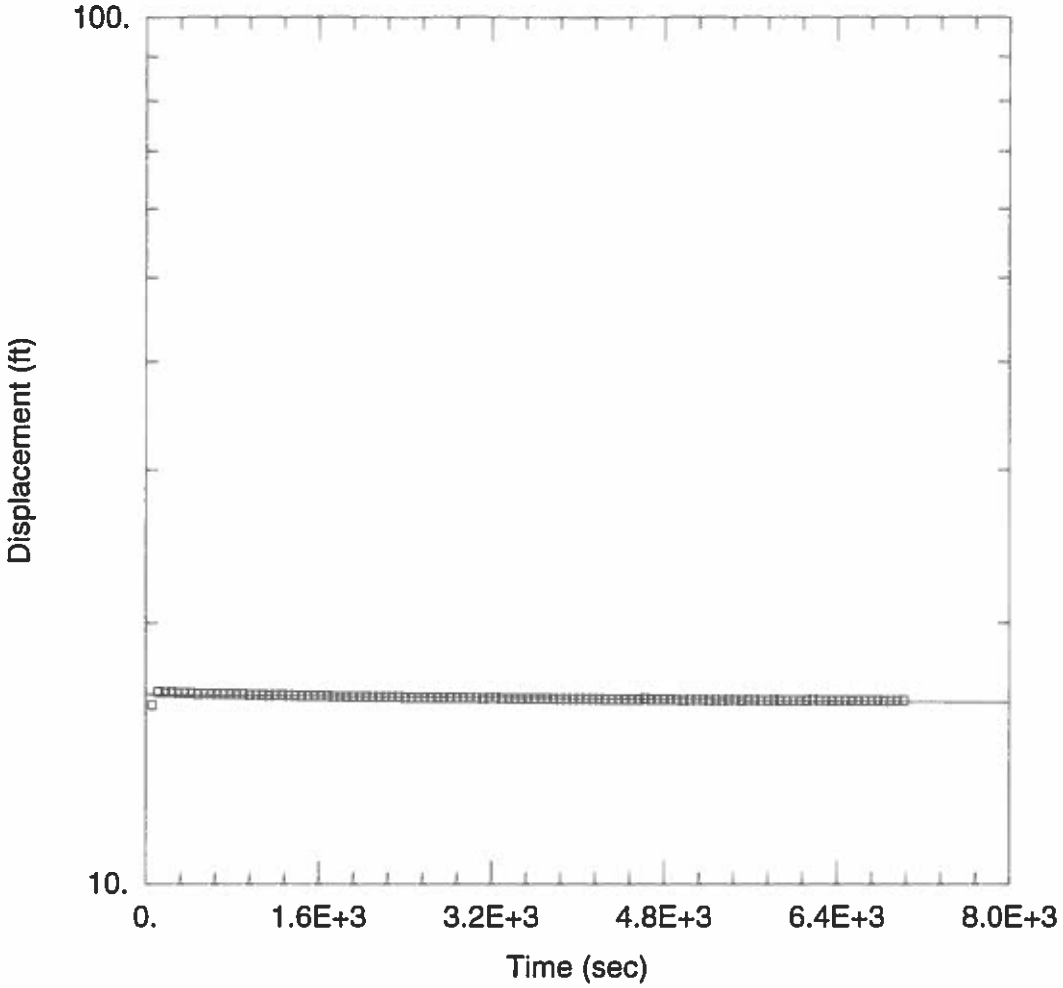
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0003996	m/day
y0	16.54	ft

K = 4.625E-7 cm/sec
T = K*b = 0.0009744 m²/day (0.0001128 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: H:\...\RQSWD#1RW-1slugin.aqt
Date: 04/28/14 Time: 15:53:29

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: RW-1slugin
Test Date: 03/25/14

AQUIFER DATA

Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

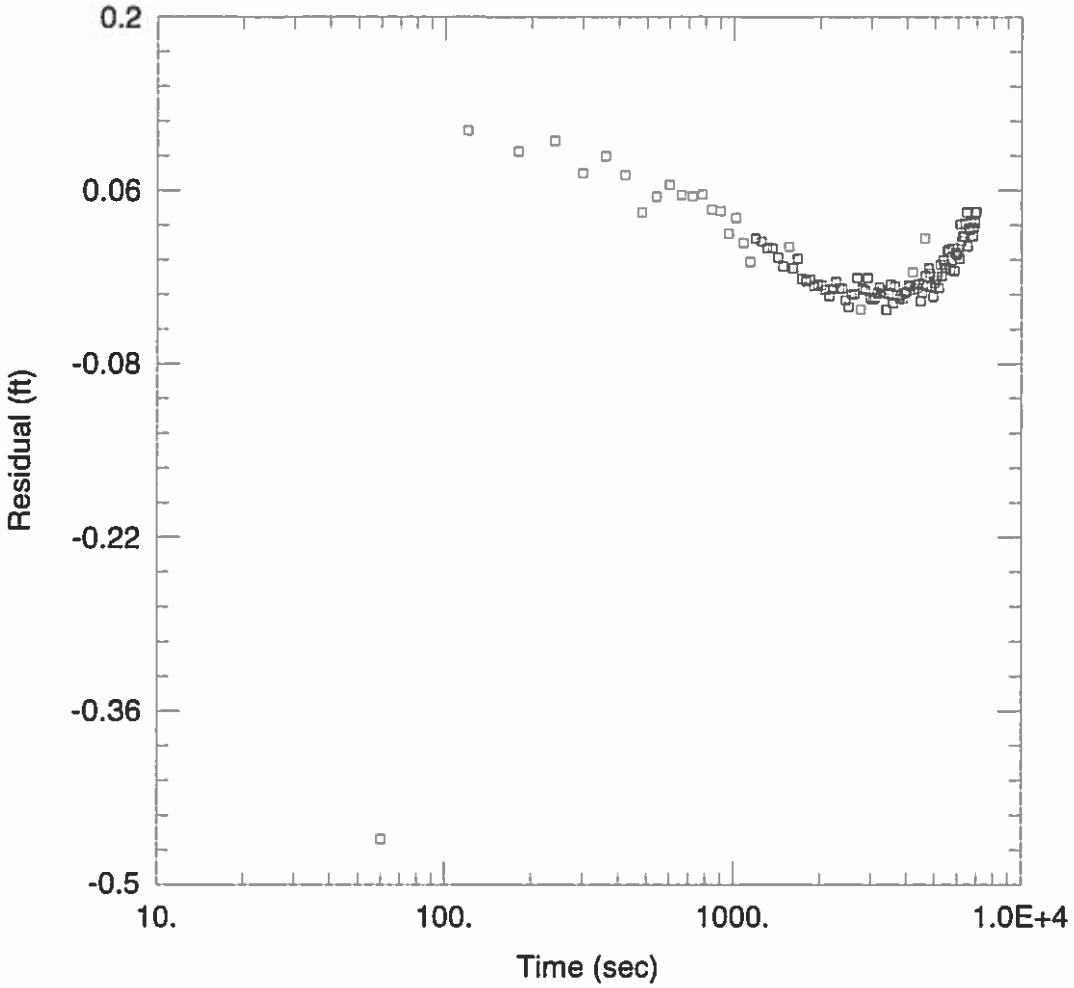
WELL DATA (New Well)

Initial Displacement: 0.523 ft
Total Well Penetration Depth: 8. ft
Casing Radius: 0.2083 ft
Static Water Column Height: 16.1 ft
Screen Length: 8. ft
Well Radius: 0.364 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.0003996 m/day y0 = 16.54 ft



WELL TEST ANALYSIS

Data Set: H:\...\RQSWD#1RW-1slugin.aqt
Date: 04/28/14 Time: 15:53:36

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: RW-1slugin
Test Date: 03/25/14

AQUIFER DATA

Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

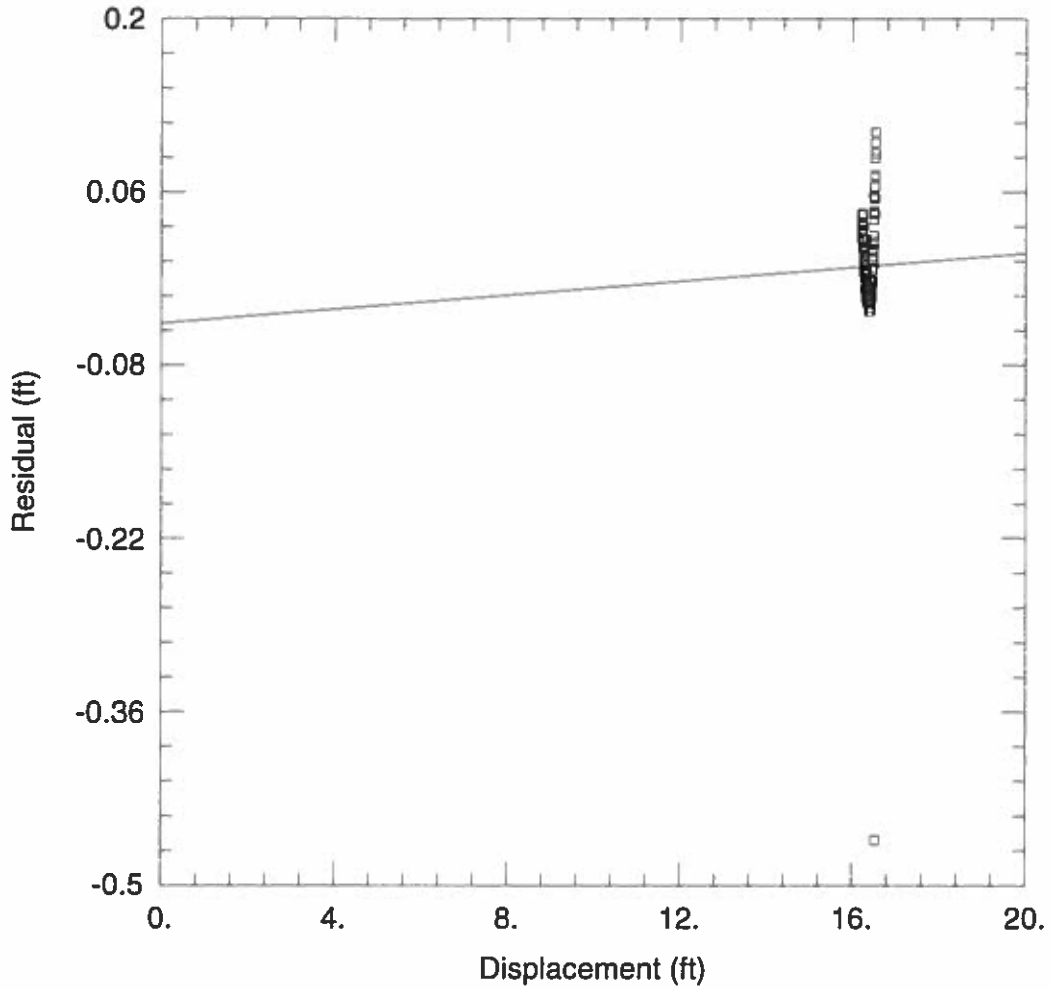
WELL DATA (New Well)

Initial Displacement: 0.523 ft
Total Well Penetration Depth: 8. ft
Casing Radius: 0.2083 ft
Static Water Column Height: 16.1 ft
Screen Length: 8. ft
Well Radius: 0.364 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0. m/day y0 = 0. ft



WELL TEST ANALYSIS

Data Set: H:\...\RQSWD#1RW-1slugin.aqt
Date: 04/28/14 Time: 15:53:42

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: RW-1slugin
Test Date: 03/25/14

AQUIFER DATA

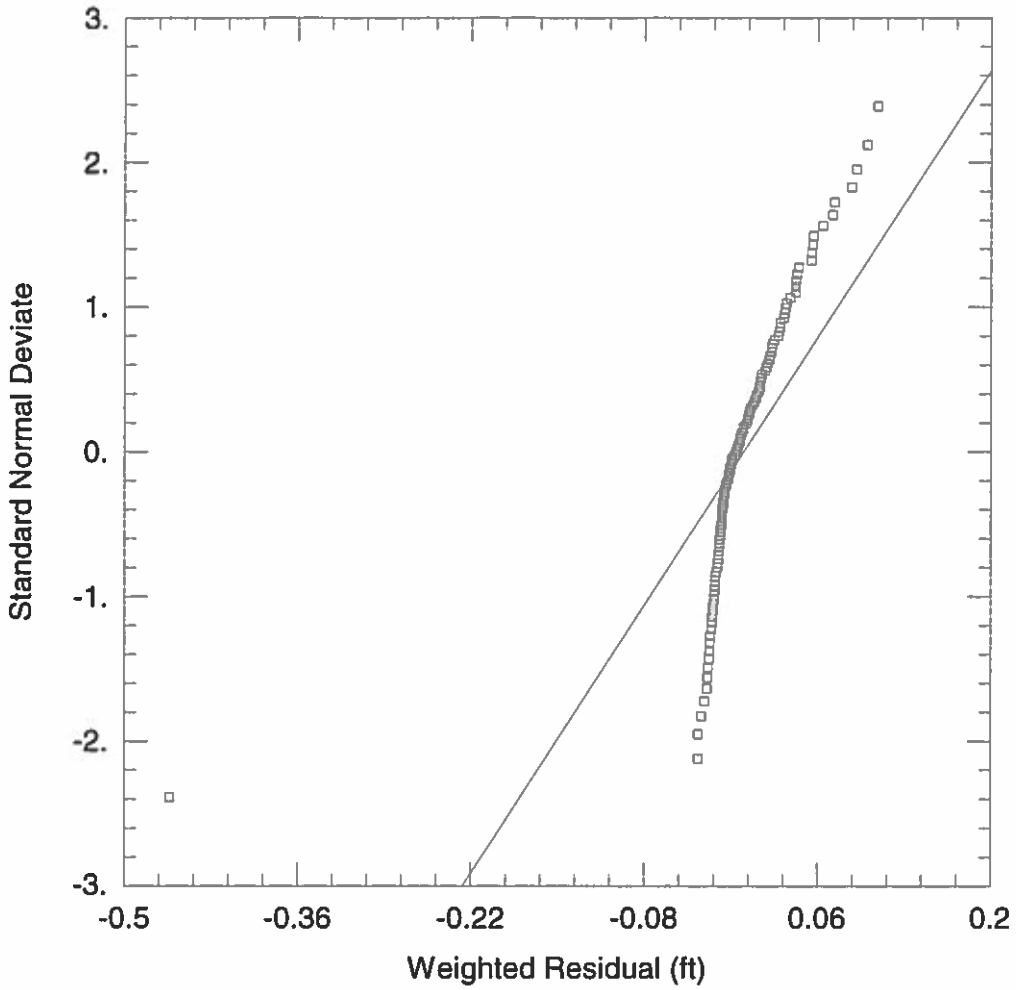
Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.523 ft
Total Well Penetration Depth: 8. ft
Casing Radius: 0.2083 ft
Static Water Column Height: 16.1 ft
Screen Length: 8. ft
Well Radius: 0.364 ft

SOLUTION

Aquifer Model: Unconfined
K = 0. m/day
Solution Method: Bouwer-Rice
y0 = 0. ft



WELL TEST ANALYSIS

Data Set: H:\...\RQSWD#1RW-1slugin.aqt
Date: 04/28/14 Time: 15:53:49

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQSWD#1
Test Well: RW-1slugin
Test Date: 03/25/14

AQUIFER DATA

Saturated Thickness: 8. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.523 ft
Total Well Penetration Depth: 8. ft
Casing Radius: 0.2083 ft
Static Water Column Height: 16.1 ft
Screen Length: 8. ft
Well Radius: 0.364 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0. m/day
y0 = 0. ft