1R – 1664

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
303 West Wall, Suite 1400 • Midland, Texas 79701 • P.O. Box 10848 • Midland, Texas 79702
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 Tract Battery #33, Located in Unit Letter F, Section 23, Township 13 South, Range 31 East, Chaves Country, New Mexico (NMOCD 1RP#1664)

Mr. Von Gonten:

This report details the results of the Groundwater Aquifer Slug Test Evaluation for the Rock Queen Unit Tract Battery #33, located in Chaves County, New Mexico.

Additional Monitor Well Installation

Between February 13 and February 14, 2014, Tetra Tech was onsite to oversee the installation of three additional monitor wells (MW-5, MW-6, and MW-7) for delineation purposes. Each of the three monitor wells were installed with 2-inch PVC casing. The lithology of the newly installed wells was relatively consistent with limestone and sandstone encountered to approximately 15 feet below ground surface (bgs). From approximately 15 to 100 feet bgs, the lithology is of fine grain sand. From approximately 95 to 110 feet bgs the lithology is of fine grain sand with sandstone. From 110 to 120 feet bgs the soil was brown fine sand and gray brown clay in monitor well MW-5. From 110 to 118 feet bgs in monitor well MW-6, the soil is red clay. In monitor wells MW-5 and MW-7 the soils are red clay from 120 feet bgs to terminus of the borings. See Figures 1 and 2 for site locations and Appendix A for soil boring logs.

During the investigation, groundwater was encountered at depths of approximately 111 to 116 feet bgs in MW-5 and MW-7. MW-6 was found to be dry. The monitor wells were extended to depths of 124, 115, and 126 feet bgs, respectively for MW-5, MW-6, and MW-7. All three monitor wells (MW-5 through MW-7) had 30 feet of 0.02" screen installed at the base. From the top of the screens to the surface of the boring, the wells were completed with blank schedule 40 PVC casing. A sand pack, bentonite and cement were installed in

Tetra Tech
1910 North Big Spring, Midland,TX 79705
Tel 432 682 4559 Fax 432.682.3946 www.tetratech.com

the annulus. 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 to southwest. Groundwater gradient map for the sampling event is included as Figure 4. Gauging data is summarized as Table 1.

On March 1, 2014, each of the monitor wells (except dry well MW-6) 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 73.3 mg/L in monitor well MW-5 to 50,600 mg/L in monitor well MW-1. Monitor wells MW-2, MW-5, and MW-7 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

On March 26, 2014, Tetra Tech was onsite to perform slug tests on monitor wells MW-1 and MW-4. 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. Upon collection of the data, the information was evaluated based upon the Bouwer-Rice Method.

Based on the collected data, monitor well MW-1 had a K value of 9.443E-6 m/day and a T value of 1.144E-4 m^2/day. Monitor well MW-4 had a K value of 1.008E-4 m/day and a T value of 4.432E-4 m^2/day. From *Groundwater Hydrology*, by David Keith Todd, the K values for the two 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 technologically 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

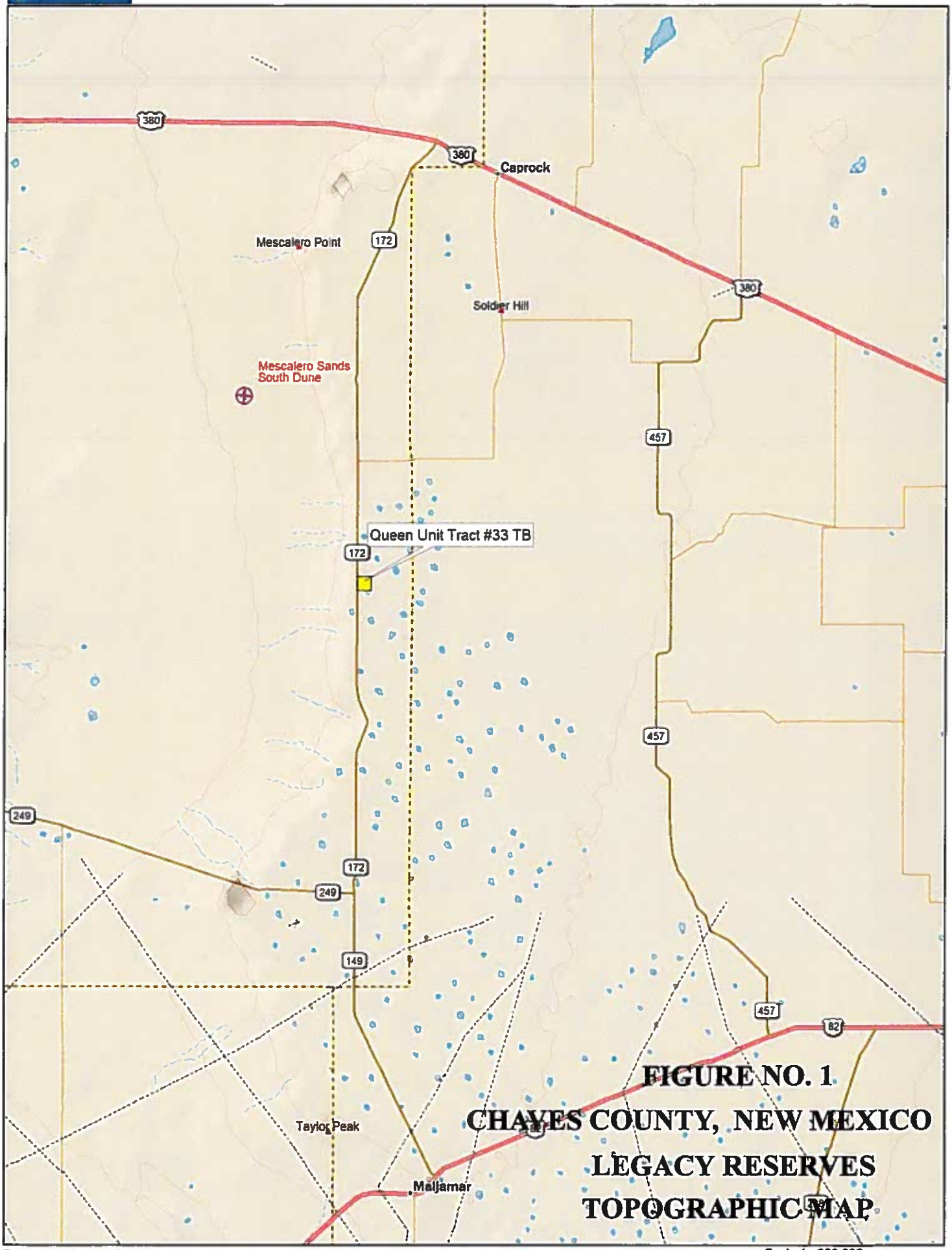


FIGURE NO. 1

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES

TOPOGRAPHIC MAP

TN
MN (7.7°E)

Scale 1 : 300,000

1" = 4.73 mi Data Zoom 9-3

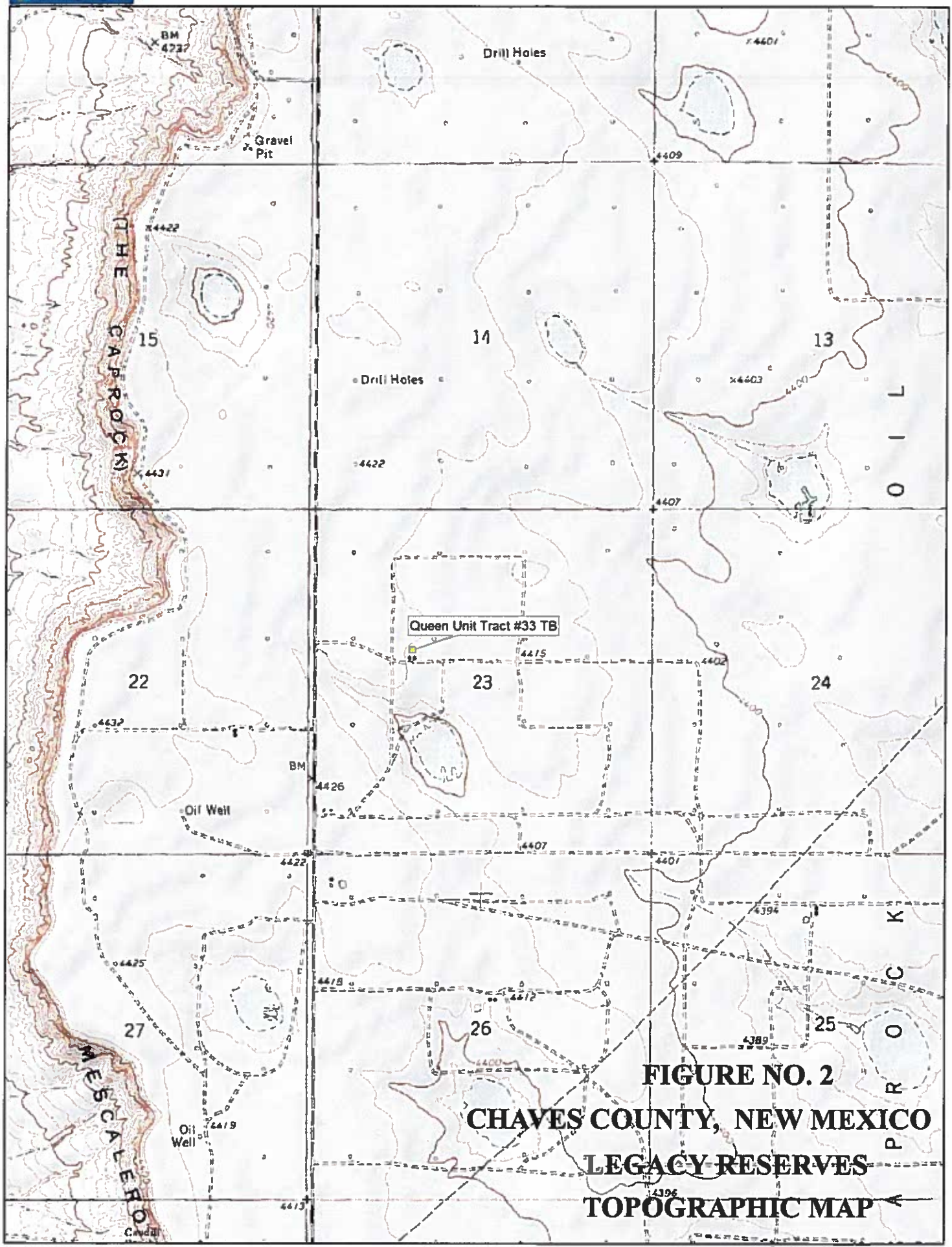


FIGURE NO. 2
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

TN

MN (7.7°E)

Scale 1 : 24,000

1" = 2,000.0 ft

Data Zoom 14-0

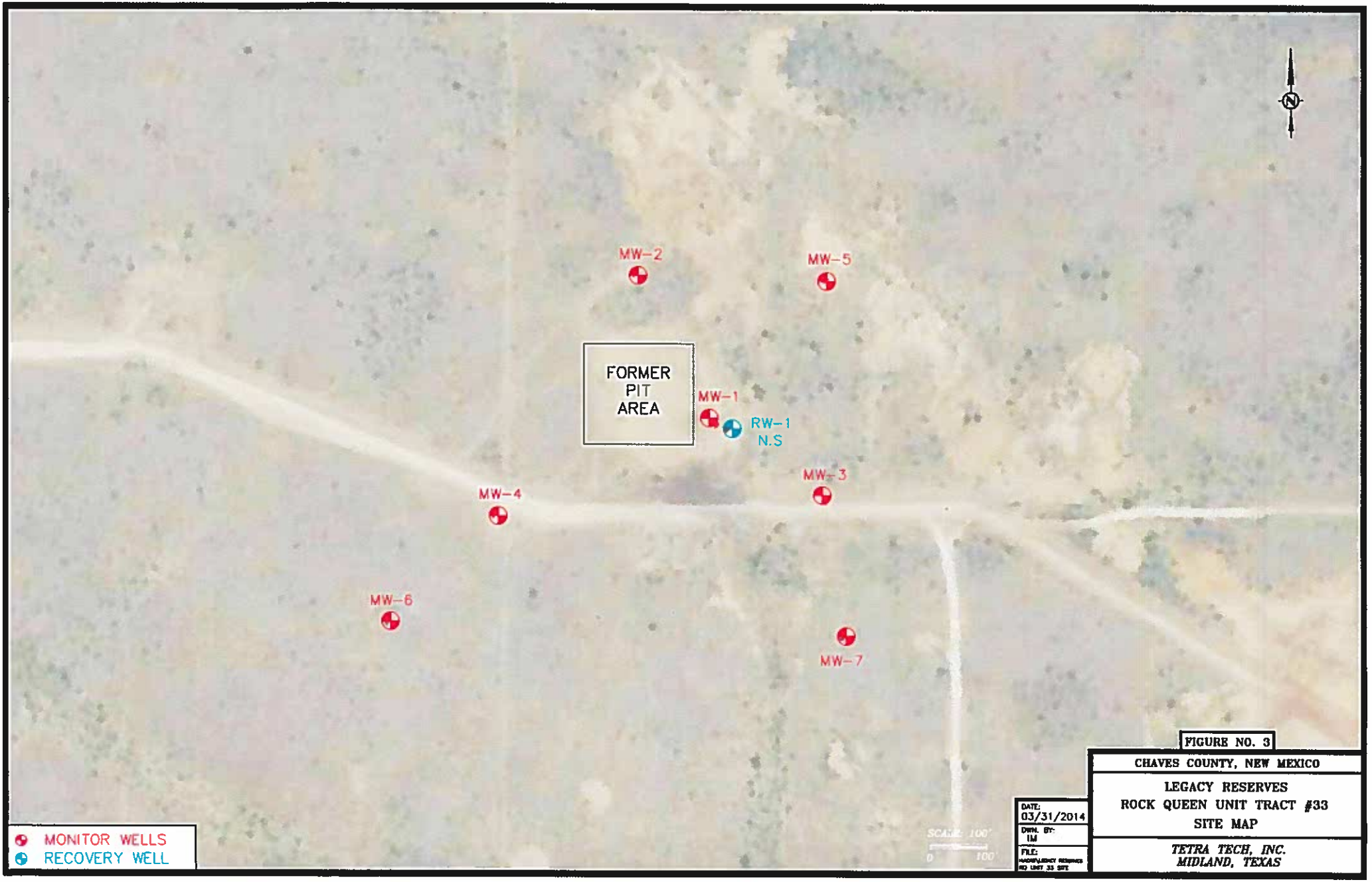


FIGURE NO. 3

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT TRACT #33
SITE MAP

TETRA TECH, INC.
MIDLAND, TEXAS

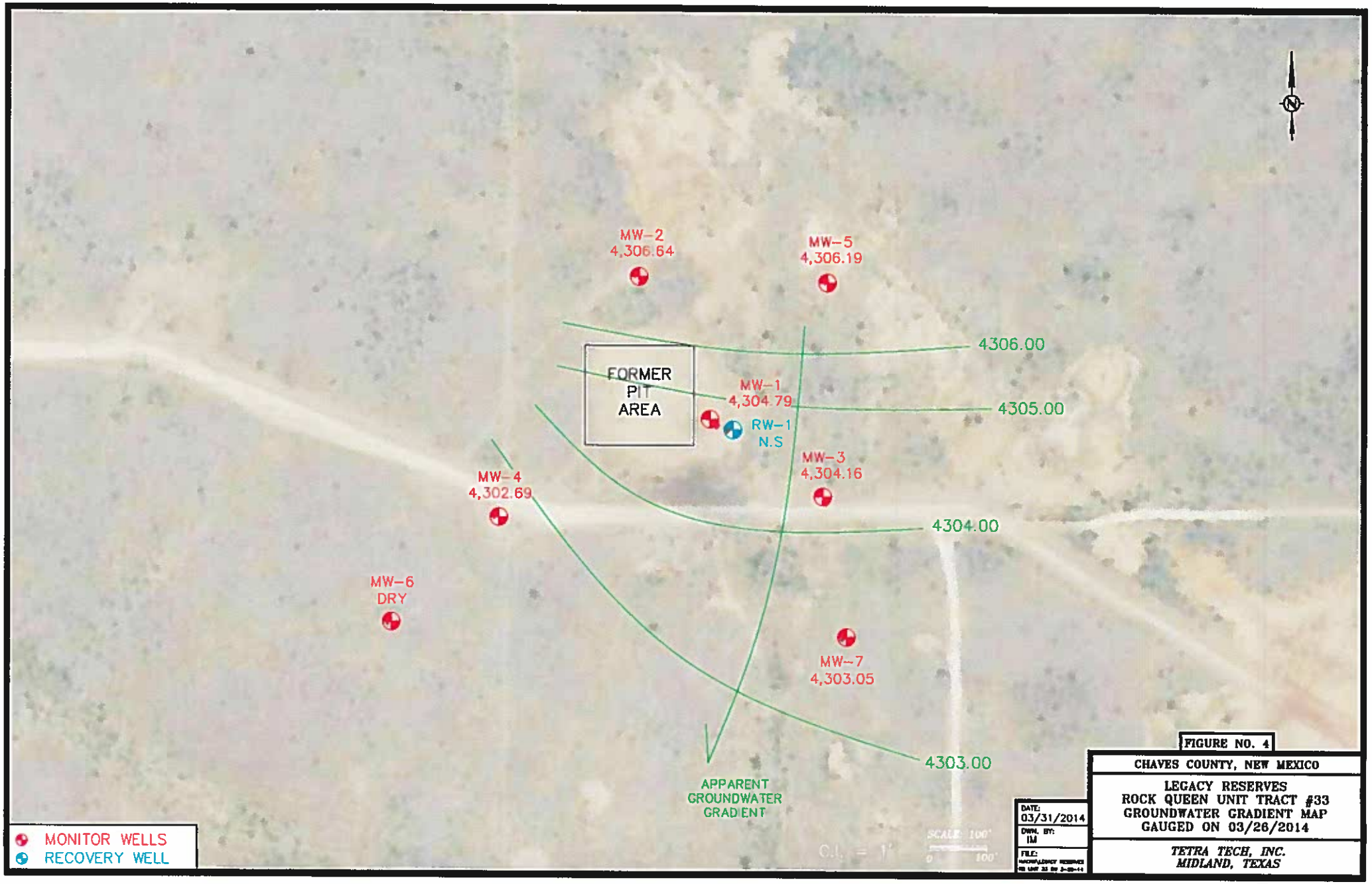


FIGURE NO. 4

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT TRACT #33
GROUNDWATER GRADIENT MAP
GAUGED ON 03/26/2014

TETRA TECH, INC.
MIDLAND, TEXAS

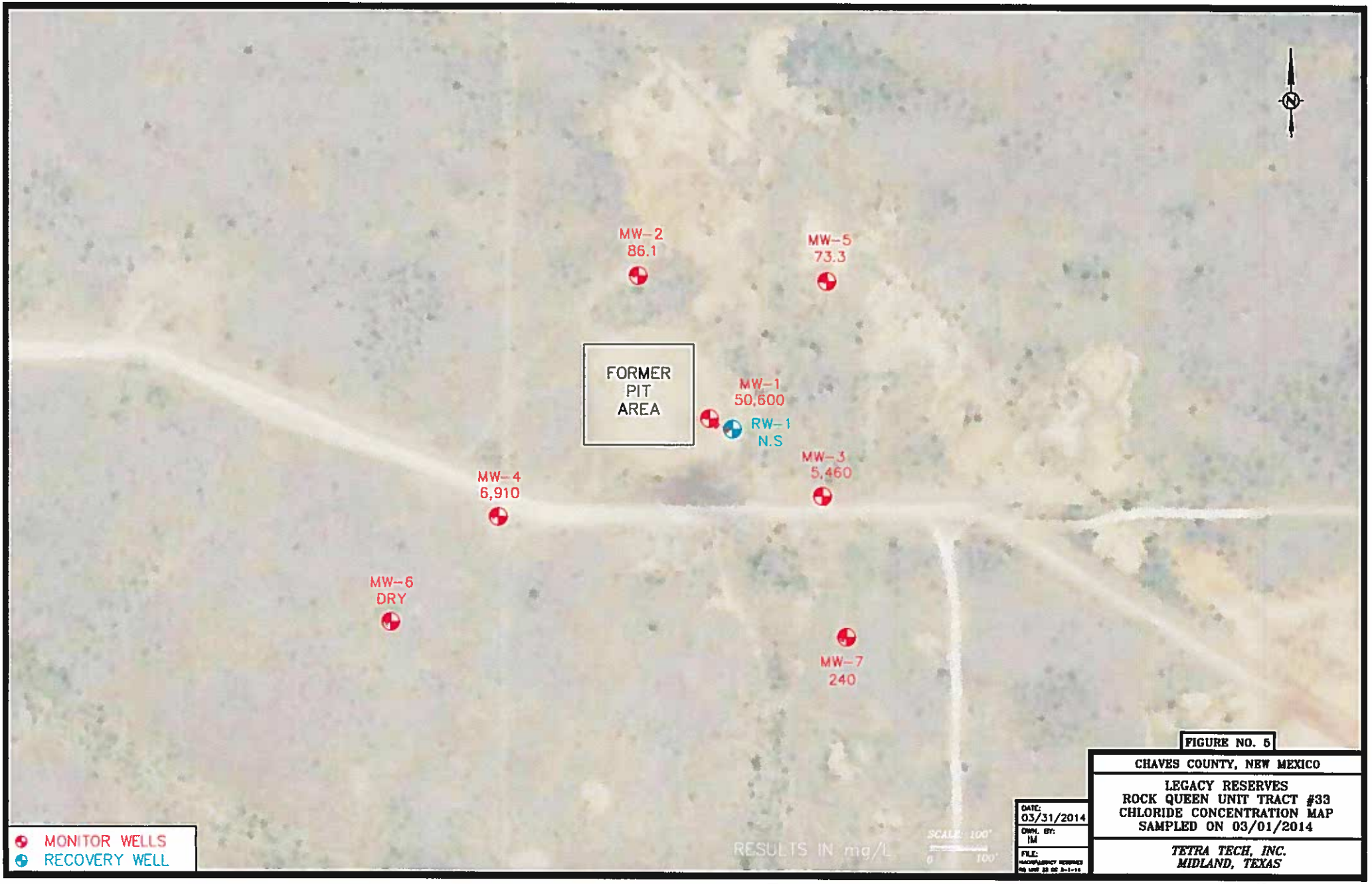


FIGURE NO. 5

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT TRACT #33
CHLORIDE CONCENTRATION MAP
SAMPLED ON 03/01/2014

TETRA TECH, INC.
MIDLAND, TEXAS

TABLES

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract 33 Tank Battery
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	12/28/09	12/10/09	4,417.04	153.75	112.14	4,304.90
	02/25/10			153.25	112.09	4,304.95
	07/12/10			153.25	112.07	4,304.97
	10/11/10			153.25	112.11	4,304.93
	01/17/11			153.25	112.04	4,305.00
	04/12/11			153.25	112.00	4,305.04
	07/27/11			153.25	112.79	4,304.25
	10/24/11			153.25	112.04	4,305.00
	01/03/12			153.25	112.09	4,304.95
	04/09/12			153.25	112.09	4,304.95
	07/23/12			153.25	112.08	4,304.96
	10/24/12			153.25	112.21	4,304.83
	01/29/13			153.25	112.20	4,304.84
	04/22/13			153.25	112.19	4,304.85
	07/24/13			153.25	112.25	4,304.79
	10/30/13			153.25	112.30	4,304.74
	03/26/14			153.25	112.25	4,304.79
MW-2	01/17/11	11/30/10	4,417.96	129.00	111.19	4,306.77
	04/12/11			129.00	111.18	4,306.78
	07/27/11			129.00	111.93	4,306.03
	10/24/11			129.00	111.21	4,306.75
	01/03/12			129.00	111.18	4,306.78
	04/09/12			129.00	111.21	4,306.75
	07/23/12			129.00	111.17	4,306.79
	10/24/12			129.00	111.27	4,306.69
	01/29/13			129.00	111.12	4,306.84
	04/22/13			129.00	111.19	4,306.77
	07/24/13			127.00	111.23	4,306.73
	10/30/13			127.00	111.28	4,306.68
	03/26/14			127.00	111.32	4,306.64

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract 33 Tank Battery
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	01/17/11	11/18/10	4,416.05	129.53	111.78	4,304.27
	04/12/11			129.53	111.75	4,304.30
	07/27/11			129.53	112.55	4,303.50
	10/24/11			129.53	111.78	4,304.27
	01/03/12			129.53	111.80	4,304.25
	04/09/12			129.53	111.76	4,304.29
	07/23/12			129.53	111.74	4,304.31
	10/24/12			129.53	111.85	4,304.20
	01/29/13			129.53	111.84	4,304.21
	04/22/13			129.53	111.82	4,304.23
	07/24/13			127.53	111.88	4,304.17
	10/30/13			127.53	111.92	4,304.13
	03/26/14			127.53	111.89	4,304.16
MW-4	01/17/11	11/30/10	4,417.87	128.45	115.08	4,302.79
	04/12/11			128.45	115.05	4,302.82
	07/27/11			128.45	115.85	4,302.02
	10/24/11			128.45	115.13	4,302.74
	01/03/12			128.45	115.11	4,302.76
	04/09/12			128.45	115.09	4,302.78
	07/23/12			128.45	115.13	4,302.74
	10/24/12			128.45	115.18	4,302.69
	01/29/13			128.45	115.14	4,302.73
	04/22/13			128.45	115.11	4,302.76
	07/24/13			128.45	115.12	4,302.75
	10/30/13			128.45	115.20	4,302.67
	03/26/14			128.45	115.18	4,302.69
MW-5	03/26/14	02/26/14	4,417.44		111.25	4,306.19
MW-6	03/26/14	02/26/14	4,415.28		DRY	DRY
MW-7	03/26/14	02/26/14	4,415.53		112.48	4,303.05

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract 33 Tank Battery
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)
RW-1	01/17/11	12/06/10	4,416.61	128.65	111.22	4,305.39
	04/12/11			128.65	111.03	4,305.58
	07/27/11			128.65	112.01	4,304.60
	10/24/11			128.65	111.21	4,305.40
	01/03/12			128.65	111.24	4,305.37
	04/09/12			128.65	111.23	4,305.38
	07/23/12			128.65	111.29	4,305.32
	10/24/12			128.65	111.38	4,305.23
	01/29/13			128.65	111.35	4,305.26
	04/22/13			128.65	111.38	4,305.23
	07/24/13			128.65	111.46	4,305.15
	10/30/13			128.65	111.58	4,305.03

Table 2
Legacy Reserves
Groundwater Analytical Results
Rock Queen Unit Tract #33 Tank Battery
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	12/28/09	607	156	1,080	13.3	<1.00	<1.00	134	134	99.3	3,220	5,430	2,160	7.33
	02/25/10	8,440	3,140	13,700	185.0	<1.00	<1.00	98	98	604	46,800	90,100	34,000	6.44
	07/13/10	-	-	-	-	-	-	-	-	613	63,500	102,000	-	-
	10/11/10	-	-	-	-	-	-	-	-	1,070	88,700	161,000	-	-
	01/21/11	-	-	-	-	-	-	-	-	1,050	81,200	134,000	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,010	77,400	116,000	-	-
	07/28/11	-	-	-	-	-	-	-	-	1,080	83,600	124,000	-	-
	10/28/11	-	-	-	-	-	-	-	-	1,070	73,300	120,000	-	-
	01/04/12	-	-	-	-	-	-	-	-	932	82,200	113,000	-	-
	04/12/12	-	-	-	-	-	-	-	-	1,070	89,400	111,000	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	69,500	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	1,090	74,300	115,000	-	-
	01/30/13	-	-	-	-	-	-	-	-	794	68,800	116,000	-	-
	04/23/13	7,440	3,470	31,900	167.0	<1.00	<1.00	145	145	945	57,000	111,000	32,900	6.16
	07/24/13	6,370	2,830	27,500	211.0	<20.0	<20.0	293	293	<12500	66,500	148,000	27,600	6.36
	10/30/13	7,020	3,340	28,900	207.0	<20.0	<20.0	143	143	881	81,100	94,900	31,300	6.54
	03/01/14	6,540	3,150	23,000	199	<20.0	<20.0	141	141	811	50,600	90,500	29,300	6.38
MW-2	01/21/11	-	-	-	-	-	-	-	-	124	55.6	2,010	-	-
	04/14/11	-	-	-	-	-	-	-	-	133	48.5	544	-	-
	07/28/11									171	55.1	576		
	10/28/11	-	-	-	-	-	-	-	-	163	45.4	566	-	-
	01/04/12	-	-	-	-	-	-	-	-	173	43.2	660	-	-
	04/12/12	-	-	-	-	-	-	-	-	167	42.4	598	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	51.9	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	98.2	29.7	624	-	-
	01/30/13	-	-	-	-	-	-	-	-	177	48.2	608	-	-
	04/23/13	66.4	23.3	114	0.550	<1.00	<1.00	150	150	180	38.1	848	262	7.98
	07/24/13	74.1	11.6	76	2.770	<20.0	<20.0	189	189	183	44.7	688	233	8.14
	10/30/13	85.1	16.2	82.4	5.260	<20.0	<20.0	171	171	213	47.4	636	279	7.75
	03/01/14	79.1	13.7	107	9.10	<20.0	<20.0	172	172	185	86.1	665	254	7.87

Table 2
Legacy Reserves
Groundwater Analytical Results
Rock Queen Unit Tract #33 Tank Battery
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	01/21/11	-	-	-	-	-	-	-	-	132	5,370	10,600	-	-
	04/14/11	-	-	-	-	-	-	-	-	126	5,420	6,180	-	-
	07/28/11									155	6,950	9,820		
	10/28/11	-	-	-	-	-	-	-	-	143	5,860	11,100	-	-
	01/04/12	-	-	-	-	-	-	-	-	150	6,380	10,200	-	-
	04/12/12	-	-	-	-	-	-	-	-	145	6,280	11,200	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	6,310	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	149	6,210	11,100	-	-
	01/30/13	-	-	-	-	-	-	-	-	236	6,910	11,600	-	-
	04/23/13	2,850	645	420	6.47	<1.00	<1.00	73.0	73.0	185	6,930	13,100	9,770	6.85
	07/24/13	2,370	470	365	15.50	<20.0	<20.0	74.0	74.0	<1250	6,190	13,400	7,850	7.18
	10/30/13	2,340	540	373	21.20	<20.0	<20.0	82.0	82.0	135	6,340	12,200	8,070	6.94
	03/01/14	2,610	467	352	18.6	<20.0	<20.0	73.0	73.0	149	5,460	11,000	8,440	6.76
MW-4	01/21/11	-	-	-	-	-	-	-	-	230	6,510	18,400	-	-
	04/14/11	-	-	-	-	-	-	-	-	236	7,410	25,400	-	-
	07/28/11									258	5,450	12,700		
	10/28/11	-	-	-	-	-	-	-	-	324	8,170	15,600	-	-
	01/04/12	-	-	-	-	-	-	-	-	247	8,320	20,300	-	-
	04/12/12	-	-	-	-	-	-	-	-	232	7,850	12,900	-	-
	07/24/12	-	-	-	-	-	-	-	-	-	8,270	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	281	8,000	9,800	-	-
	01/30/13	-	-	-	-	-	-	-	-	143	5,740	9,530	-	-
	04/23/13	2,680	615	2,110	7.61	<1.00	<1.00	72.0	72.0	278	9,640	16,600	9,220	6.99
	07/24/13	1,800	442	1,520	15.00	<20.0	<20.0	74.0	74.0	<1250	7,770	17,600	6,320	7.21
	10/30/13	1,820	460	1,700	18.00	<20.0	<20.0	105.0	105.0	238	7,250	14,700	6,450	7.09
	03/01/14	2,230	418	1,830	19.2	<20.0	<20.0	94.0	94.0	244	6,910	11,900	7,280	7.08
MW-5	03/01/14	68.2	9.51	76.2	5.40	<20.0	<20.0	192	192	124	73.3	562	209	7.80
MW-6	03/01/14	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY	DRY
MW-7	03/01/14	126	25.8	89.3	<1.00	<20.0	<20.0	237	237	121	240	698	421	7.64

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Tract #33 Tank Battery

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
RW-1	01/21/11	-	-	-	-	-	-	-	-	NS	NS	NS	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,070	83,700	122,000	-	-
	07/28/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/28/11	NS	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	NS
	04/12/12	-	-	-	-	-	-	-	-	NS	NS	NS	-	-
	07/24/12	-	-	-	-	-	-	-	-	NS	NS	NS	-	-
	10/25/12	-	-	-	-	-	-	-	-	NS	NS	NS	-	-
	01/30/13	-	-	-	-	-	-	-	-	NS	NS	NS	-	-
	04/23/13	NS	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	NS
	10/30/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	03/01/14	NS	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 Unit Tract 33 Tank Battery

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	12/28/09	<0.001	<0.001	<0.001	<0.001	<0.001
	02/25/10	<0.001	<0.001	<0.001	<0.001	<0.001
	07/13/10	0.002	0.0015	<0.001	<0.001	0.0035
	10/11/10	0.0048	<0.001	<0.001	<0.001	0.0048
	01/21/11	0.0121	0.0066	<0.001	<0.001	0.0187
	04/14/11	0.0076	<0.001	<0.001	<0.001	0.0076
	07/28/11	0.0114	<0.001	<0.001	<0.001	0.0114
	10/28/11	0.0020	<0.0010	<0.0010	0.0365	0.0385
	01/04/12	0.0068	0.0020	<0.0010	<0.0010	0.0088
	04/12/12	0.0089	<0.0010	<0.0010	<0.0010	0.0089
	10/25/12	0.0069	<0.0010	<0.0010	<0.0010	0.0069
	01/30/13	0.0045	<0.0010	<0.0010	<0.0010	<0.0010
	04/23/13	0.0038	<0.0010	<0.0010	<0.0010	0.0039
	07/24/13	0.0040	<0.0010	<0.0010	<0.0010	0.0040
	10/30/13	0.0026	0.0014	<0.001	<0.001	0.0040
	03/01/14	0.00210	<0.00100	<0.00100	<0.00300	0.00210
MW-2	01/21/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/04/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	10/25/12	<0.001	<0.001	<0.001	<0.001	<0.001
	01/30/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	04/23/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	07/24/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	10/30/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-3	01/21/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/04/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	10/25/12	<0.001	<0.001	<0.001	<0.001	<0.001
	01/30/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	04/23/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	07/24/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	10/30/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300

Table 3
Legacy Reserves
Groundwater Analytical Results
Rock Queen Unit Tract 33 Tank Battery
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-4	01/21/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/04/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	10/25/12	<0.001	<0.001	<0.001	<0.001	<0.001
	01/30/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	04/23/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	07/24/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	10/30/13	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-5	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-7	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
RW-1	01/21/11	NS	NS	NS	NS	NS
	04/14/11	0.0124	0.007	<0.001	0.0176	0.0370
	07/28/11	NS	NS	NS	NS	NS
	10/28/11	NS	NS	NS	NS	NS
	01/04/12	NS	NS	NS	NS	NS
	04/12/12	NS	NS	NS	NS	NS
	10/25/12	NS	NS	NS	NS	NS
	01/30/13	NS	NS	NS	NS	NS
	04/23/13	NS	NS	NS	NS	NS
	07/24/13	NS	NS	NS	NS	NS
	10/30/13	NS	NS	NS	NS	NS
	03/01/14	NS	NS	NS	NS	NS

NS Not Sampled

APPENDIX A
SOIL BORING LOGS

SAMPLE LOG

Boring/Well MW-5
GPS
Project Number 114-6401631
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #33 Tank Battery
Site Location Chaves, New Mexico
Letter E, Section 23, Township 13 South, Range 31 East
Total Depth 124'
Date Installed 02/13/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Caliche and sandstone (40%) and chert (10%)
10-11'	--	Caliche and sandstone (40%) and chert (10%)
15-16'	--	Caliche and sandstone (20%) and light tan fine sand (30%)
20-21'	--	Light tan fine sand
25-26'	--	Light tan fine sand
30-31'	--	Light 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'	--	Light brown fine sand
65-66'	--	Light brown fine sand
70-71'	--	Light brown fine sand
75-76'	--	Brown fine sand
80-81'	--	Brown fine sand
85-86'	--	Brown fine sand
90-91'	--	Brown fine sand
95-96'	--	Brown fine sand and sandstone (10%)
100-101'	--	Brown fine sand and sandstone (10%)
105-106'	--	Brown fine sand and sandstone (10%)
110-111'	--	Brown fine sand and gray/brown clay (50%)
115-116'	--	Brown fine sand and gray/brown clay (50%)
120-121'	--	Brown fine sand and gray/brown clay (50%)
125'	--	Blue to gray clay with red clay (10%)

Total Depth: 124'

SAMPLE LOG

Boring/Well MW-6
GPS
Project Number 114-6401631
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #33 Tank Battery
Site Location Chaves, New Mexico
Letter E, Section 23, Township 13 South, Range 31 East
Total Depth 118'
Date Installed 02/13/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Caliche and sandstone (30%)
10-11'	--	Caliche and sandstone (60%) and chert (20%)
15-16'	--	Caliche and sandstone (60%) and chert (20%)
20-21'	--	Light tan fine sand
25-26'	--	Light tan fine sand
30-31'	--	Light tan fine sand
35-36'	--	Tan fine sand
40-41'	--	Tan fine brown sand
45-46'	--	Tan fine brown sand
50-51'	--	Light brown fine sand
55-56'	--	Light brown fine sand
60-61'	--	Light brown fine sand
65-66'	--	Brown fine sand
70-71'	--	Brown fine sand
75-76'	--	Brown 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 and sandstone (20%)
105-106'	--	Brown fine sand and sandstone (20%)
110-111'	--	Red clay with blue clay (40%)
115-116'	--	Red clay
118'	--	Red clay

Total Depth: 118'

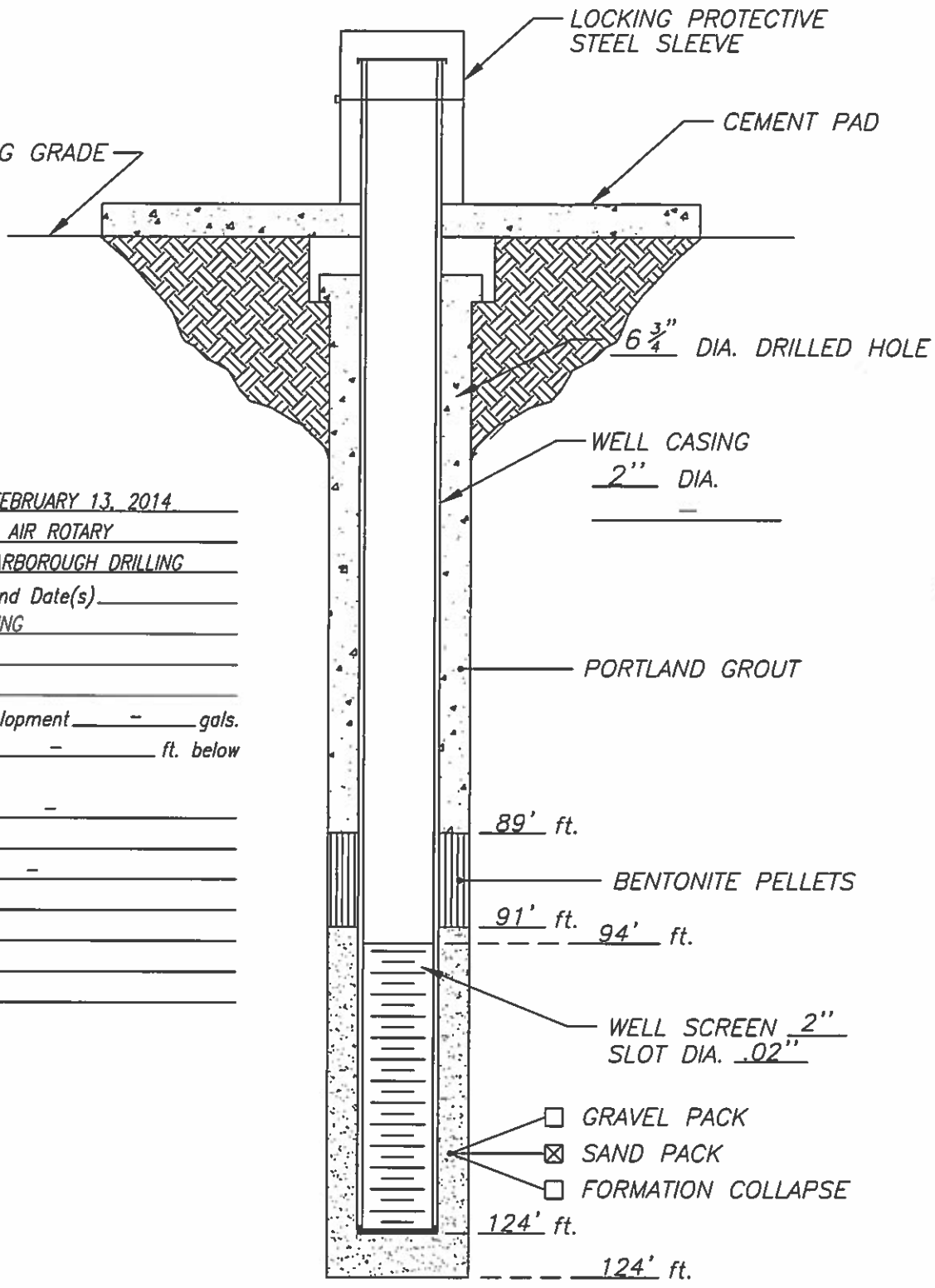
SAMPLE LOG

Boring/Well MW-7
GPS
Project Number 114-6401631
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #33 Tank Battery
Site Location Chaves, New Mexico
Letter E, Section 23, Township 13 South, Range 31 East
Total Depth 126'
Date Installed 02/13/14 to 02/14/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Caliche and sandstone (70%)
10-11'	--	Calich and sandstone (70%)
15-16'	--	Caliche with light tan fine sand (40%) and sandstone 20%)
20-21'	--	Tan fine sand
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'	--	Brown fine sand
80-81'	--	Brown fine sand
85-86'	--	Brown fine sand
90-91'	--	Brown fine sand
95-96'	--	Brown fine sand and sandstone (10%)
100-101'	--	Brown fine sand and sandstone (10%)
105-106'	--	Brown fine sand and sandstone (10%)
110-111'	--	Brown fine sand and sandstone (10%)
115-116'	--	Brown fine sand with blue clay (20%) and sandstone (30%)
118'-120'	--	Blue clay and red clay (50%)
125'	--	Blue clay and red clay (50%)

APPENDIX B
MONITOR WELL COMPLETION DIAGRAMS

WELL CONSTRUCTION LOG



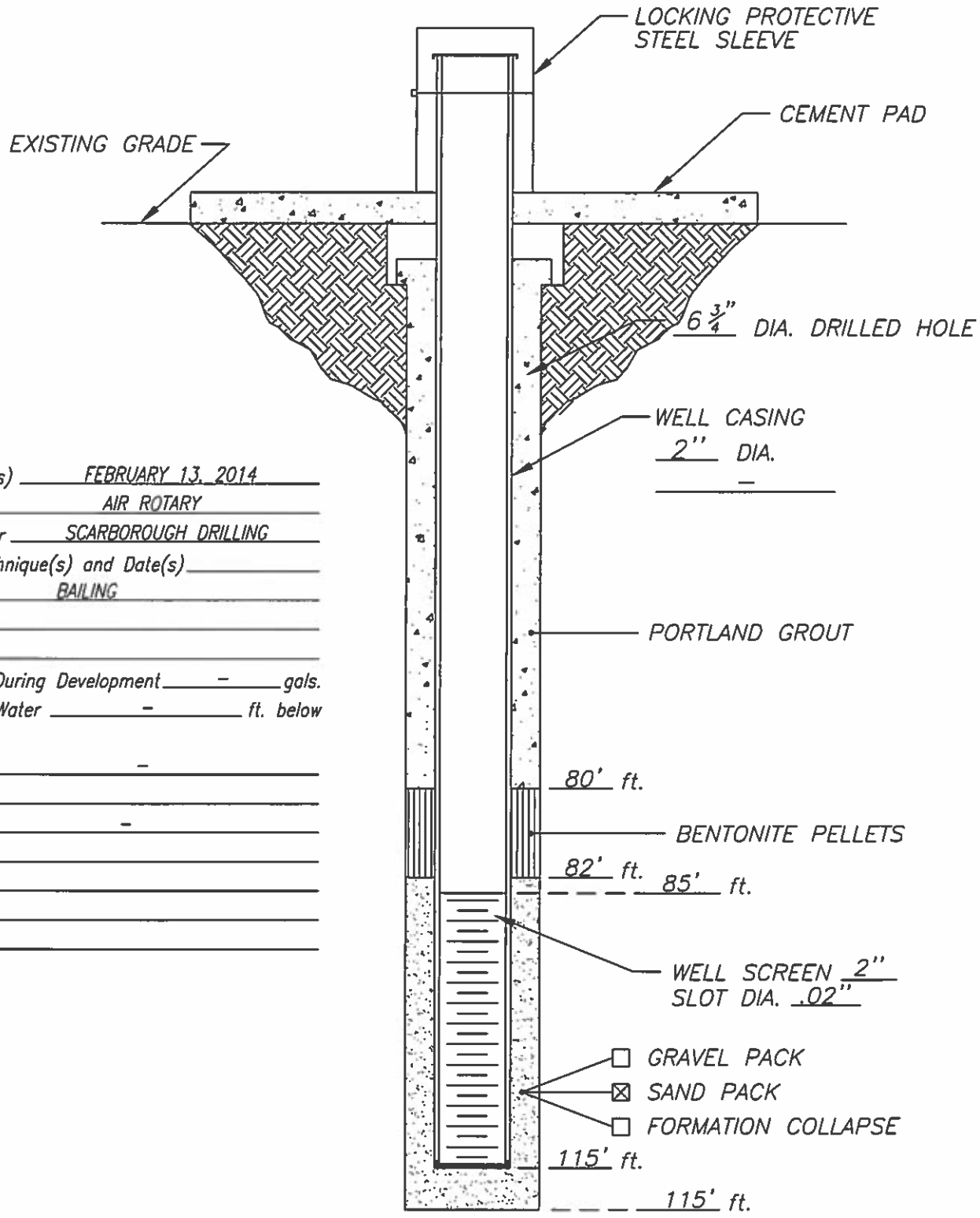
Installation Date(s) FEBRUARY 13, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) BAILING

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 TRACT #33	MW-5
	LOCATION: CHAVES COUNTY, NEW MEXICO	
	114-6401631	

WELL CONSTRUCTION LOG



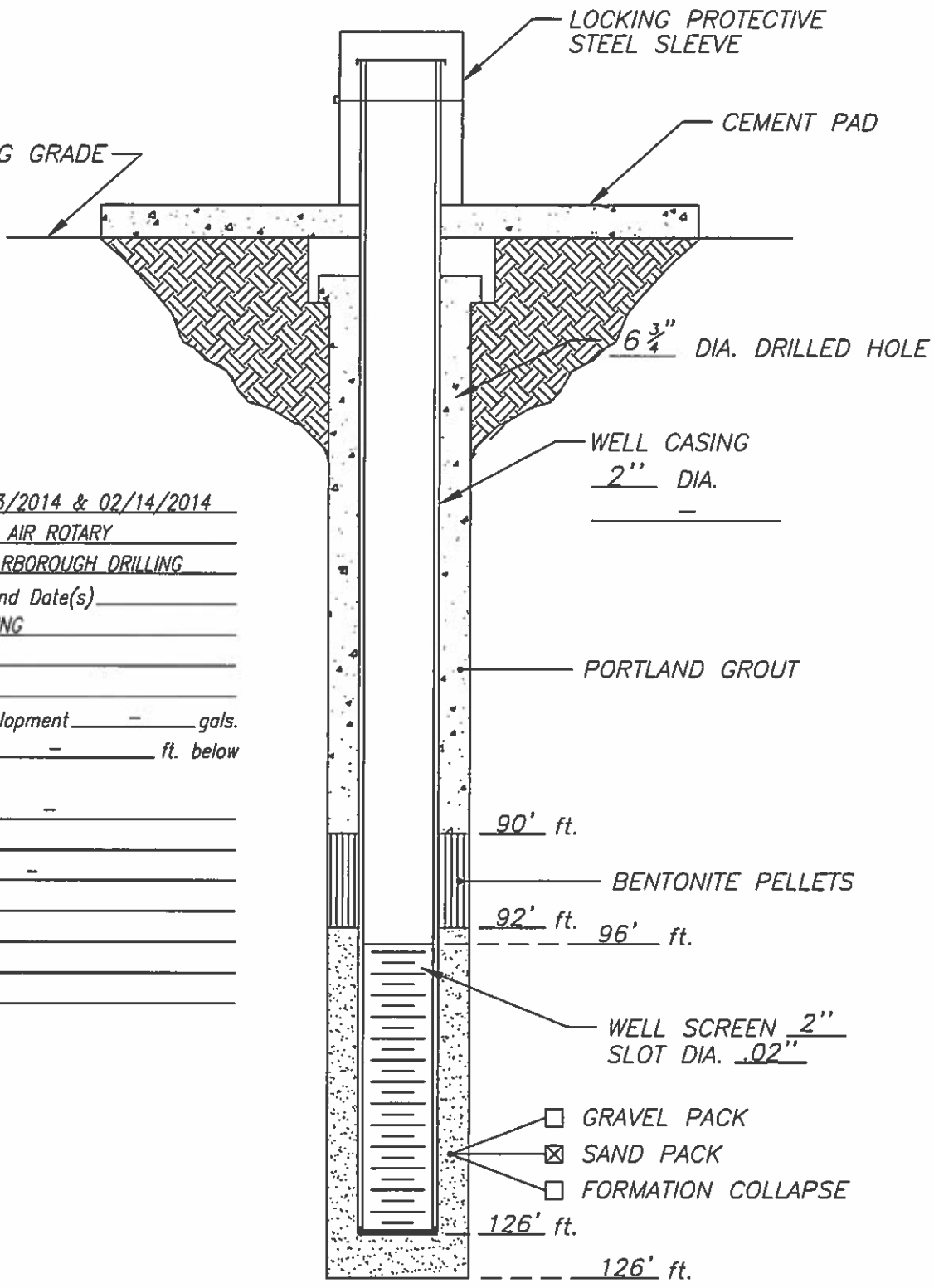
Installation Date(s) FEBRUARY 13, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s)
BAILING

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 TRACT #33	MW-6
	LOCATION: CHAVES COUNTY, NEW MEXICO	
	114-6401631	

WELL CONSTRUCTION LOG



Installation Date(s) 02/13/2014 & 02/14/2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) BAILING

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 TRACT #33	MW-7
	LOCATION: CHAVES COUNTY, NEW MEXICO	
	114-6401631	

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: March 21, 2014

Work Order: 14030403

Project Location: Chavez Co., NM
Project Name: Celero/Rock Queen #33
Project Number: 114-6401631

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
356467	MW-1	water	2014-03-01	15:10	2014-03-03
356468	MW-2	water	2014-03-01	15:25	2014-03-03
356469	MW-3	water	2014-03-01	14:40	2014-03-03
356470	MW-4	water	2014-03-01	14:30	2014-03-03
356471	MW-5	water	2014-03-01	15:45	2014-03-03
356472	MW-7	water	2014-03-01	14:55	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 #33 were received by TraceAnalysis, Inc. on 2014-03-03 and assigned to work order 14030403. Samples for work order 14030403 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	92946	2014-03-06 at 08:02	109916	2014-03-06 at 14:03
Alkalinity	SM 2320B	92967	2014-03-07 at 07:46	109942	2014-03-07 at 11:47
BTEX	S 8021B	92889	2014-03-04 at 15:23	109894	2014-03-06 at 09:06
Ca, Dissolved	S 6010C	92914	2014-03-05 at 14:00	109917	2014-03-06 at 11:42
Ca, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Chloride (IC)	E 300.0	93166	2014-03-13 at 17:16	110189	2014-03-13 at 17:16
Chloride (IC)	E 300.0	93238	2014-03-18 at 12:04	110268	2014-03-18 at 12:04
Hardness	S 6010C	92914	2014-03-05 at 14:00	109917	2014-03-06 at 11:42
Hardness	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
K, Dissolved	S 6010C	92914	2014-03-05 at 14:00	109917	2014-03-06 at 11:42
K, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Mg, Dissolved	S 6010C	92914	2014-03-05 at 14:00	109917	2014-03-06 at 11:42
Mg, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Na, Dissolved	S 6010C	92914	2014-03-05 at 14:00	109917	2014-03-06 at 11:42
Na, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
pH	SM 4500-H+	92947	2014-03-04 at 08:23	110111	2014-03-04 at 14:45
SO4 (IC)	E 300.0	93166	2014-03-13 at 17:16	110189	2014-03-13 at 17:16
SO4 (IC)	E 300.0	93236	2014-03-17 at 17:12	110266	2014-03-17 at 17:12
TDS	SM 2540C	92892	2014-03-04 at 10:34	109913	2014-03-05 at 14:47
TDS	SM 2540C	92905	2014-03-05 at 07:46	109914	2014-03-06 at 13:54

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 14030403 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: 356467 - MW-1

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109916	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92946	Sample Preparation:	2014-03-06	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	**141**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**141**	mg/L as CaCo3	1	20.0

Sample: 356467 - MW-1

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109894	Date Analyzed:	2014-03-06	Analyzed By:	AK
Prep Batch:	92889	Sample Preparation:	2014-03-04	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene		3	**0.00210**	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)			0.0929	mg/L	1	0.100	93	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0736	mg/L	1	0.100	74	70 - 130

Sample: 356467 - MW-1

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Dissolved Calcium		2	**6540**		mg/L	10	1.00
Dissolved Potassium		2	**199**		mg/L	1	1.00
Dissolved Magnesium		2	**3150**		mg/L	10	1.00
Dissolved Sodium		2	**23000**		mg/L	100	1.00

Sample: 356467 - 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	**50600**		mg/L	5000	2.50

Sample: 356467 - MW-1

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Hardness (by ICP)			**29300**		mg eq CaCO3/L	1	0.00

Sample: 356467 - 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	**6.38**		s.u.	1	0.00

Sample: 356467 - 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	Result	RL Units	Dilution	RL
Sulfate		1	**811**	mg/L	50	2.50

Sample: 356467 - MW-1

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	109913	Date Analyzed:	2014-03-05	Analyzed By:	AR
Prep Batch:	92892	Sample Preparation:	2014-03-04	Prepared By:	AR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Total Dissolved Solids		3	**90500**	mg/L	50	2.50

Sample: 356468 - MW-2

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109916	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92946	Sample Preparation:	2014-03-06	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	**172**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**172**	mg/L as CaCo3	1	20.0

Sample: 356468 - MW-2

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109894	Date Analyzed:	2014-03-06	Analyzed By:	AK
Prep Batch:	92889	Sample Preparation:	2014-03-04	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	JU	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)			0.0723	mg/L	1	0.100	72	70 - 130

Sample: 356468 - MW-2

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**79.1**	mg/L	1	1.00
Dissolved Potassium		2	**9.10**	mg/L	1	1.00
Dissolved Magnesium		2	**13.7**	mg/L	1	1.00
Dissolved Sodium		2	**107**	mg/L	1	1.00

Sample: 356468 - 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	**86.1**	mg/L	5	2.50

Sample: 356468 - MW-2

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**254**	mg eq CaCO3/L	1	0.00

Sample: 356468 - 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	RL Result	Units	Dilution	RL
pH		3	**7.87**	s.u.	1	0.00

Sample: 356468 - 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	RL Result	Units	Dilution	RL
Sulfate		1	**185**	mg/L	5	2.50

Sample: 356468 - 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	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**665**	mg/L	1	2.50

Sample: 356469 - MW-3

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109916	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92946	Sample Preparation:	2014-03-06	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	**73.0**	mg/L as CaCo3	1	20.0
Total Alkalinity		a	**73.0**	mg/L as CaCo3	1	20.0

Sample: 356469 - MW-3

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109894	Date Analyzed:	2014-03-06	Analyzed By:	AK
Prep Batch:	92889	Sample Preparation:	2014-03-04	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)			0.0946	mg/L	1	0.100	95	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0708	mg/L	1	0.100	71	70 - 130

Sample: 356469 - MW-3

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Dissolved Calcium		a	**2610**	mg/L	10	1.00
Dissolved Potassium		a	**18.6**	mg/L	1	1.00
Dissolved Magnesium		a	**467**	mg/L	1	1.00

continued ...

sample 356469 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2	**352**	mg/L	1	1.00

Sample: 356469 - MW-3

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**5460**	mg/L	500	2.50

Sample: 356469 - MW-3

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**8440**	mg eq CaCO3/L	1	0.00

Sample: 356469 - 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	RL Result	Units	Dilution	RL
pH		3	**6.76**	s.u.	1	0.00

Sample: 356469 - 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	**149**		mg/L	5	2.50

Sample: 356469 - 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	**11000**		mg/L	10	2.50

Sample: 356470 - MW-4

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109916	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92946	Sample Preparation:	2014-03-06	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	**94.0**		mg/L as CaCo3	1	20.0
Total Alkalinity		3	**94.0**		mg/L as CaCo3	1	20.0

Sample: 356470 - MW-4

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109894	Date Analyzed:	2014-03-06	Analyzed By:	AK
Prep Batch:	92889	Sample Preparation:	2014-03-04	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)			0.0957	mg/L	1	0.100	96	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0718	mg/L	1	0.100	72	70 - 130

Sample: 356470 - MW-4

Laboratory: Lubbock
Analysis: Cations | Analytical Method: S 6010C | Prep Method: S 3005A
QC Batch: 109917 | Date Analyzed: 2014-03-06 | Analyzed By: LM
Prep Batch: 92914 | Sample Preparation: 2014-03-05 | Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**2230**	mg/L	10	1.00
Dissolved Potassium		2	**19.2**	mg/L	1	1.00
Dissolved Magnesium		2	**418**	mg/L	1	1.00
Dissolved Sodium		2	**1830**	mg/L	10	1.00

Sample: 356470 - 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	**6910**	mg/L	500	2.50

Sample: 356470 - MW-4

Laboratory: Lubbock
Analysis: Hardness | Analytical Method: S 6010C | Prep Method: N/A
QC Batch: 109917 | Date Analyzed: 2014-03-06 | Analyzed By: LM
Prep Batch: 92914 | Sample Preparation: 2014-03-05 | Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**7280**	mg eq CaCO3/L	1	0.00

Sample: 356470 - 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	**7.08**	s.u.	1	0.00

Sample: 356470 - MW-4

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	RL Result	Units	Dilution	RL
Sulfate		1	**244**	mg/L	10	2.50

Sample: 356470 - 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	**11900**	mg/L	10	2.50

Sample: 356471 - 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	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	**192**	mg/L as CaCo3	1	20.0
Total Alkalinity		a	**192**	mg/L as CaCo3	1	20.0

Sample: 356471 - MW-5

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109894	Date Analyzed:	2014-03-06	Analyzed By:	AK
Prep Batch:	92889	Sample Preparation:	2014-03-04	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)			0.0944	mg/L	1	0.100	94	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0722	mg/L	1	0.100	72	70 - 130

Sample: 356471 - MW-5

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		a	**68.2**	mg/L	1	1.00
Dissolved Potassium		a	**5.40**	mg/L	1	1.00
Dissolved Magnesium		a	**9.51**	mg/L	1	1.00

continued ...

sample 356471 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2	**76.2**	mg/L	1	1.00

Sample: 356471 - MW-5

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**73.3**	mg/L	5	2.50

Sample: 356471 - MW-5

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	109917	Date Analyzed:	2014-03-06	Analyzed By:	LM
Prep Batch:	92914	Sample Preparation:	2014-03-05	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**209**	mg eq CaCO3/L	1	0.00

Sample: 356471 - MW-5

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	**7.80**	s.u.	1	0.00

Sample: 356471 - MW-5

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	**124**	mg/L	5	2.50

Sample: 356471 - 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	**562**	mg/L	1	2.50

Sample: 356472 - 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	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	**237**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**237**	mg/L as CaCo3	1	20.0

Sample: 356472 - MW-7

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109894	Date Analyzed:	2014-03-06	Analyzed By:	AK
Prep Batch:	92889	Sample Preparation:	2014-03-04	Prepared By:	AK

Parameter	Flag	Cert	Result	RL	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)			0.0941	mg/L	1	0.100	94	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0706	mg/L	1	0.100	71	70 - 130

Sample: 356472 - 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	Result	RL	Units	Dilution	RL
Dissolved Calcium		2	**126**		mg/L	1	1.00
Dissolved Potassium	U	2	<1.00		mg/L	1	1.00
Dissolved Magnesium		2	**25.8**		mg/L	1	1.00
Dissolved Sodium		2	**89.3**		mg/L	1	1.00

Sample: 356472 - MW-7

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	Result	RL	Units	Dilution	RL
Chloride		1	**240**		mg/L	10	2.50

Sample: 356472 - 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	RL Result	Units	Dilution	RL
Hardness (by ICP)			**421**	mg eq CaCO3/L	1	0.00

Sample: 356472 - MW-7

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	**7.64**	s.u.	1	0.00

Sample: 356472 - MW-7

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	**121**	mg/L	5	2.50

Sample: 356472 - MW-7

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	**698**	mg/L	1	2.50

Method Blanks

Method Blank (1) QC Batch: 109894

QC Batch: 109894 | Date Analyzed: 2014-03-06 | Analyzed By: AK
Prep Batch: 92889 | QC Preparation: 2014-03-04 | 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	0.00170	mg/L	0.003

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)			0.0793	mg/L	1	0.100	79	70 - 130

Method Blank (1) QC Batch: 109913

QC Batch: 109913 | Date Analyzed: 2014-03-05 | Analyzed By: AR
Prep Batch: 92892 | QC Preparation: 2014-03-04 | Prepared By: AR

Parameter	Flag	Cert	MDL Result	Units	RL
Total Dissolved Solids		3	4.00	mg/L	2.5

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: 109916

QC Batch: 109916 | Date Analyzed: 2014-03-06 | Analyzed By: AR
Prep Batch: 92946 | QC Preparation: 2014-03-06 | 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: 109917

QC Batch: 109917 | Date Analyzed: 2014-03-06 | Analyzed By: LM
Prep Batch: 92914 | QC Preparation: 2014-03-05 | 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: 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: 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: 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: 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

Duplicates (1) Duplicated Sample: 356464

QC Batch:	109913	Date Analyzed:	2014-03-05	Analyzed By:	AR
Prep Batch:	92892	QC Preparation:	2014-03-04	Prepared By:	AR

Param	Flag	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	3	184000	183000	mg/L	100	0	10

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: 356470

QC Batch:	109916	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92946	QC Preparation:	2014-03-06	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	79.0	94.0	mg/L as CaCo3	1	17	20

continued ...

duplicate continued ...

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Alkalinity	J	79.0	94.0	mg/L as CaCo3	1	17	20

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

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	J	7.06	7.08	s.u.	1	0	10

Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

QC Batch: 109894 | Date Analyzed: 2014-03-06 | Analyzed By: AK
Prep Batch: 92889 | QC Preparation: 2014-03-04 | Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		a	0.105	mg/L	1	0.100	<0.000238	105	70 - 130
Toluene		a	0.111	mg/L	1	0.100	<0.000181	111	70 - 130
Ethylbenzene		a	0.109	mg/L	1	0.100	<0.000247	109	70 - 130
Xylene		a	0.335	mg/L	1	0.300	0.0017	111	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	0.107	mg/L	1	0.100	<0.000238	107	70 - 130	2	20
Toluene		a	0.114	mg/L	1	0.100	<0.000181	114	70 - 130	3	20
Ethylbenzene		a	0.113	mg/L	1	0.100	<0.000247	113	70 - 130	4	20
Xylene		a	0.344	mg/L	1	0.300	0.0017	114	70 - 130	3	20

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

Surrogate	LCS Result	LCSD Result	Units	Dil.	Spike Amount	LCS Rec.	LCSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	0.100	0.102	mg/L	1	0.100	100	102	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0957	0.0953	mg/L	1	0.100	96	95	70 - 130

Laboratory Control Spike (LCS-1)

QC Batch: 109913 | Date Analyzed: 2014-03-05 | Analyzed By: AR
Prep Batch: 92892 | QC Preparation: 2014-03-04 | Prepared By: AR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		a	990	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.

continued ...

control spikes continued ...

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Total Dissolved Solids		3	1080	mg/L	1	1000	<2.50	108	90 - 110	9	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: 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		3	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		3	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: 109917 | Date Analyzed: 2014-03-06 | Analyzed By: LM
Prep Batch: 92914 | QC Preparation: 2014-03-05 | Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	55.8	mg/L	1	52.5	<0.0441	106	85 - 115
Dissolved Potassium		2	55.3	mg/L	1	57.5	<0.0443	96	85 - 115
Dissolved Magnesium		2	54.9	mg/L	1	52.5	<0.0296	104	85 - 115
Dissolved Sodium		2	55.1	mg/L	1	52.5	<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	55.7	mg/L	1	52.5	<0.0441	106	85 - 115	0	20
Dissolved Potassium		2	55.5	mg/L	1	57.5	<0.0443	96	85 - 115	0	20

continued ...

control spikes continued ...

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Dissolved Magnesium		2	55.3	mg/L	1	52.5	<0.0296	105	85 - 115	1	20
Dissolved Sodium		2	56.2	mg/L	1	52.5	<0.172	107	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: 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: 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.

continued ...

control spikes continued ...

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
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: 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.

Matrix Spike (MS-1) Spiked Sample: 356459

QC Batch: 109894 | Date Analyzed: 2014-03-06 | Analyzed By: AK
Prep Batch: 92889 | QC Preparation: 2014-03-04 | Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		3	0.106	mg/L	1	0.100	<0.000238	106	70 - 130
Toluene		3	0.110	mg/L	1	0.100	<0.000181	110	70 - 130
Ethylbenzene		3	0.106	mg/L	1	0.100	<0.000247	106	70 - 130
Xylene		3	0.322	mg/L	1	0.300	0.0006	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	0.107	mg/L	1	0.100	<0.000238	107	70 - 130	1	20
Toluene		3	0.110	mg/L	1	0.100	<0.000181	110	70 - 130	0	20
Ethylbenzene		3	0.107	mg/L	1	0.100	<0.000247	107	70 - 130	1	20
Xylene		3	0.326	mg/L	1	0.300	0.0006	108	70 - 130	1	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)	0.0995	0.100	mg/L	1	0.1	100	100	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0927	0.0926	mg/L	1	0.1	93	93	70 - 130

Matrix Spike (MS-1) Spiked Sample: 356309

QC Batch: 109917 | Date Analyzed: 2014-03-06 | Analyzed By: LM
Prep Batch: 92914 | QC Preparation: 2014-03-05 | Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	762	mg/L	1	525	177.8	111	75 - 125
Dissolved Potassium		2	620	mg/L	1	575	53.38	98	75 - 125
Dissolved Magnesium		2	724	mg/L	1	525	151.3	109	75 - 125
Dissolved Sodium		2	1090	mg/L	1	525	492.9	114	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	760	mg/L	1	525	177.8	111	75 - 125	0	20
Dissolved Potassium		2	627	mg/L	1	575	53.38	100	75 - 125	1	20
Dissolved Magnesium		2	716	mg/L	1	525	151.3	108	75 - 125	1	20
Dissolved Sodium		2	1070	mg/L	1	525	492.9	110	75 - 125	2	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: 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: 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
Prep Batch: 93238

Date Analyzed: 2014-03-18
QC Preparation: 2014-03-18

Analyzed By: JR
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.

Calibration Standards

Standard (CCV-1)

QC Batch: 109894 | Date Analyzed: 2014-03-06 | 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	0.108	108	80 - 120	2014-03-06
Toluene		3	mg/L	0.100	0.113	113	80 - 120	2014-03-06
Ethylbenzene		3	mg/L	0.100	0.108	108	80 - 120	2014-03-06
Xylene		3	mg/L	0.300	0.333	111	80 - 120	2014-03-06

Standard (CCV-2)

QC Batch: 109894 | Date Analyzed: 2014-03-06 | 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	0.111	111	80 - 120	2014-03-06
Toluene		3	mg/L	0.100	0.111	111	80 - 120	2014-03-06
Ethylbenzene		3	mg/L	0.100	0.108	108	80 - 120	2014-03-06
Xylene		3	mg/L	0.300	0.328	109	80 - 120	2014-03-06

Standard (CCV-3)

QC Batch: 109894 | Date Analyzed: 2014-03-06 | 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	2014-03-06
Toluene		3	mg/L	0.100	0.105	105	80 - 120	2014-03-06
Ethylbenzene		3	mg/L	0.100	0.102	102	80 - 120	2014-03-06
Xylene		3	mg/L	0.300	0.309	103	80 - 120	2014-03-06

Standard (ICV-1)

QC Batch: 109916 Date Analyzed: 2014-03-06 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		-	2014-03-06
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	234		-	2014-03-06
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-06
Total Alkalinity		3	mg/L as CaCo3	250	253	101	90 - 110	2014-03-06

Standard (CCV-1)

QC Batch: 109916 Date Analyzed: 2014-03-06 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		-	2014-03-06
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	268		-	2014-03-06
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-06
Total Alkalinity		3	mg/L as CaCo3	250	269	108	90 - 110	2014-03-06

Standard (ICV-1)

QC Batch: 109917 Date Analyzed: 2014-03-06 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	52.7	103	90 - 110	2014-03-06
Dissolved Potassium		2	mg/L	55.0	56.7	103	90 - 110	2014-03-06
Dissolved Magnesium		2	mg/L	51.0	51.6	101	90 - 110	2014-03-06
Dissolved Sodium		2	mg/L	51.0	51.3	100	90 - 110	2014-03-06

Standard (CCV-1)

QC Batch: 109917 Date Analyzed: 2014-03-06 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	50.2	98	90 - 110	2014-03-06
Dissolved Potassium		2	mg/L	55.0	55.5	101	90 - 110	2014-03-06
Dissolved Magnesium		2	mg/L	51.0	48.8	96	90 - 110	2014-03-06
Dissolved Sodium		2	mg/L	51.0	50.0	98	90 - 110	2014-03-06

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 (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

continued ...

standard continued ...

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
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 (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 (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-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-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

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	T104704219-13-9	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

Attachments

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

14030403

Analysis Request of Chain of Custody Record

PAGE: 1 OF: 1

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

CLIENT NAME: Celero | SITE MANAGER: Greg Pope

PROJECT NO.: 114-6401631 | PROJECT NAME: Rock Queen Tract #33

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. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, SO4, ALK, HARDNESS	
356467	3/1/14	1510	W		X	MW-1	6		X		X		X											X			X		6
468		1525				MW-2																							8
469		1440				MW-3																							7
470		1430				MW-4																							7
471		1545				MW-5																							7
						~~MW-6~~																							
472		1455	W		X	MW-7	6		X		X		X											X			X		7

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: 16:20
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:

TETRA TECH CONTACT PERSON: GREG POPE

Results by: STE

RUSH Charges Authorized: Yes No

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

SAMPLE CONDITION WHEN RECEIVED: -0.8

REMARKS: Midland - BTEX/TPH/Alk Lubbock Cations/Hardness / EP - SO4/Cl

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

Cation-Anion Balance Sheet

DATE: 3/21/2014

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
356467	6540	3150	23000	199	141.00	811	50600				90500	
356468	79.1	13.7	107	9.1	172.00	185	86.1				665	
356469	2610	467	352	18.6	73.00	149	5460				11000	
356470	2230	418	1830	19.2	94.00	244	6910				11900	
356471	68.2	9.51	76.2	5.4	192.00	124	73.3				562	
356472	126	25.8	89.3	0	237.00	121	240				698	

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*
356467	326.35	259.21	1000.50	5.09	2.82	16.89	1427.43	0.00	0.00	0.00	1591.15	1447.13	4.740144274
356468	3.95	1.13	4.65	0.23	3.44	3.85	2.43	0.00	0.00	0.00	9.96	9.72	1.225261938
356469	130.24	38.43	15.31	0.48	1.46	3.10	154.03	0.00	0.00	0.00	184.46	158.59	7.540537874
356470	111.28	34.40	79.61	0.49	1.88	5.08	194.93	0.00	0.00	0.00	225.77	201.89	5.58366231
356471	3.40	0.78	3.31	0.14	3.84	2.58	2.07	0.00	0.00	0.00	7.64	8.49	5.275792296
356472	6.29	2.12	3.88	0.00	4.74	2.52	6.77	0.00	0.00	0.00	12.30	14.03	6.58921531

	EC/Cation	EC/Anion				
356467	159114.992	144713.102	range	0	to	0
356468	996.1741	972.0581	range	0	to	0
356469	18445.6218	15858.878	range	0	to	0
356470	22577.0356	20189.118	range	0	to	0
356471	763.85899	848.9473	range	0	to	0
356472	1229.5032	1402.962	range	0	to	0

TDS/EC	TDS/Cat		TDS/Anion	
#DIV/0!	0.57		0.63	needs to be 0.55-0.77
#DIV/0!	0.67		0.68	needs to be 0.55-0.77
#DIV/0!	0.60		0.69	needs to be 0.55-0.77
#DIV/0!	0.53		0.59	needs to be 0.55-0.77
#DIV/0!	0.74		0.66	needs to be 0.55-0.77
#DIV/0!	0.57		0.50	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 33 MW-1\RQTract33MW-1slu
Title: Falling-Head Slug Test
Date: 04/28/14
Time: 15:34:50

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Date: 03/26/14
Test Well: MW-1slugin

AQUIFER DATA

Saturated Thickness: 39.75 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.403 ft
Static Water Column Height: 29.07 ft
Casing Radius: 0.083 ft
Well Radius: 0.281 ft
Well Skin Radius: 1. ft
Screen Length: 39.75 ft
Total Well Penetration Depth: 39.75 ft

No. of Observations: 89

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	29.5	2760.	29.17
120.	29.47	2820.	29.15
180.	29.45	2880.	29.15
240.	29.43	2940.	29.13
300.	29.42	3000.	29.15
360.	29.41	3060.	29.16
420.	29.39	3120.	29.13
480.	29.38	3180.	29.12
540.	29.37	3240.	29.12
600.	29.36	3300.	29.13
660.	29.36	3360.	29.13
720.	29.33	3420.	29.13
780.	29.34	3480.	29.11
840.	29.34	3540.	29.1
900.	29.32	3600.	29.09
960.	29.31	3660.	29.09
1020.	29.31	3720.	29.1
1080.	29.31	3780.	29.11
1140.	29.3	3840.	29.09
1200.	29.29	3900.	29.09
1260.	29.28	3960.	29.07
1320.	29.26	4020.	29.08
1380.	29.26	4080.	29.07
1440.	29.25	4140.	29.09
1500.	29.24	4200.	29.08
1560.	29.24	4260.	29.07
1620.	29.23	4320.	29.07
1680.	29.25	4380.	29.07
1740.	29.23	4440.	29.06
1800.	29.22	4500.1	29.07
1860.	29.22	4560.2	29.06

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1920.	29.21	4620.	29.06
1980.	29.21	4680.1	29.07
2040.	29.2	4740.1	29.07
2100.	29.2	4800.	29.08
2160.	29.19	4860.	29.03
2220.	29.18	4920.	29.07
2280.	29.19	4980.	29.05
2340.	29.17	5040.	29.06
2400.	29.17	5100.	29.07
2460.	29.17	5160.	29.06
2520.	29.18	5220.	29.05
2580.	29.16	5280.	29.06
2640.	29.16	5340.	29.06
2700.	29.15		

SOLUTION

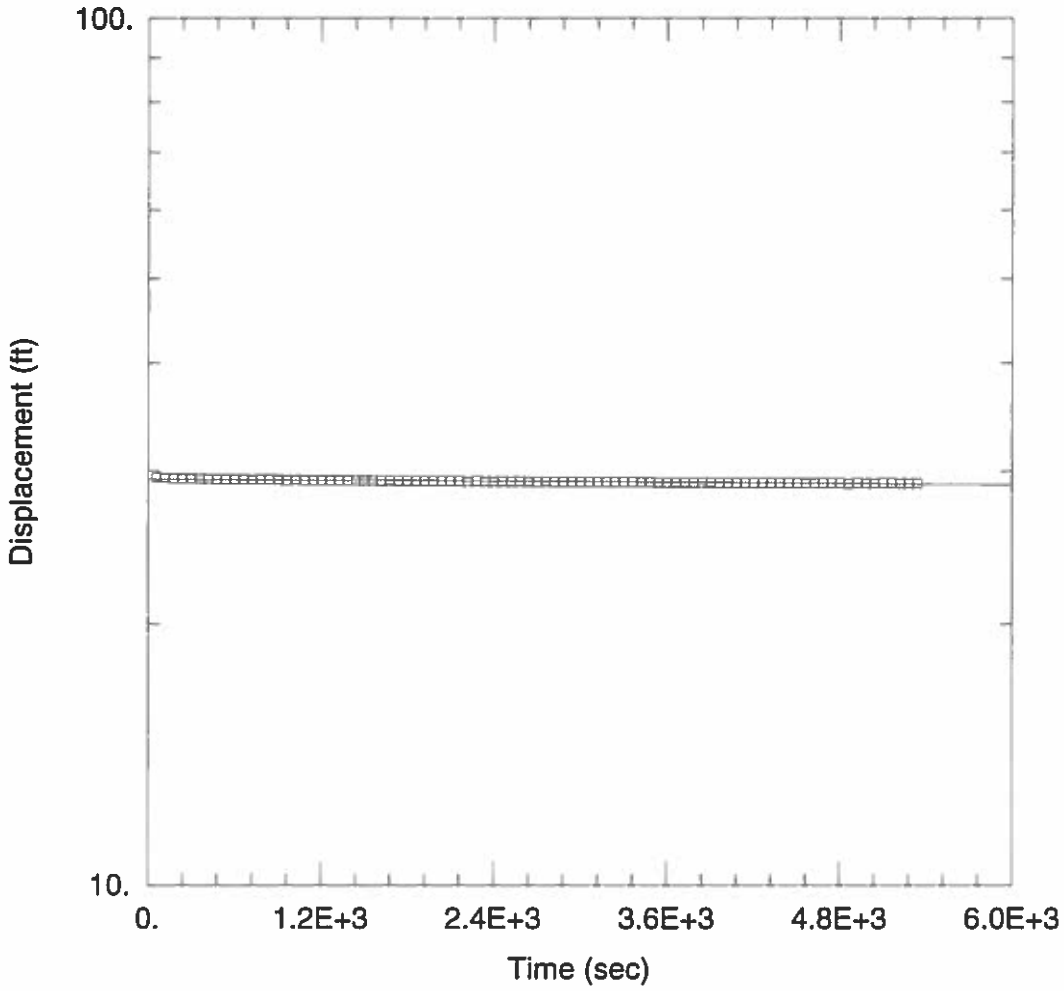
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	9.443E-6	m/day
y0	29.38	ft

K = 1.093E-8 cm/sec
T = K*b = 0.0001144 m²/day (1.324E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract33MW-1slugin.aqt
Date: 04/28/14 Time: 15:35:08

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-1slugin
Test Date: 03/26/14

AQUIFER DATA

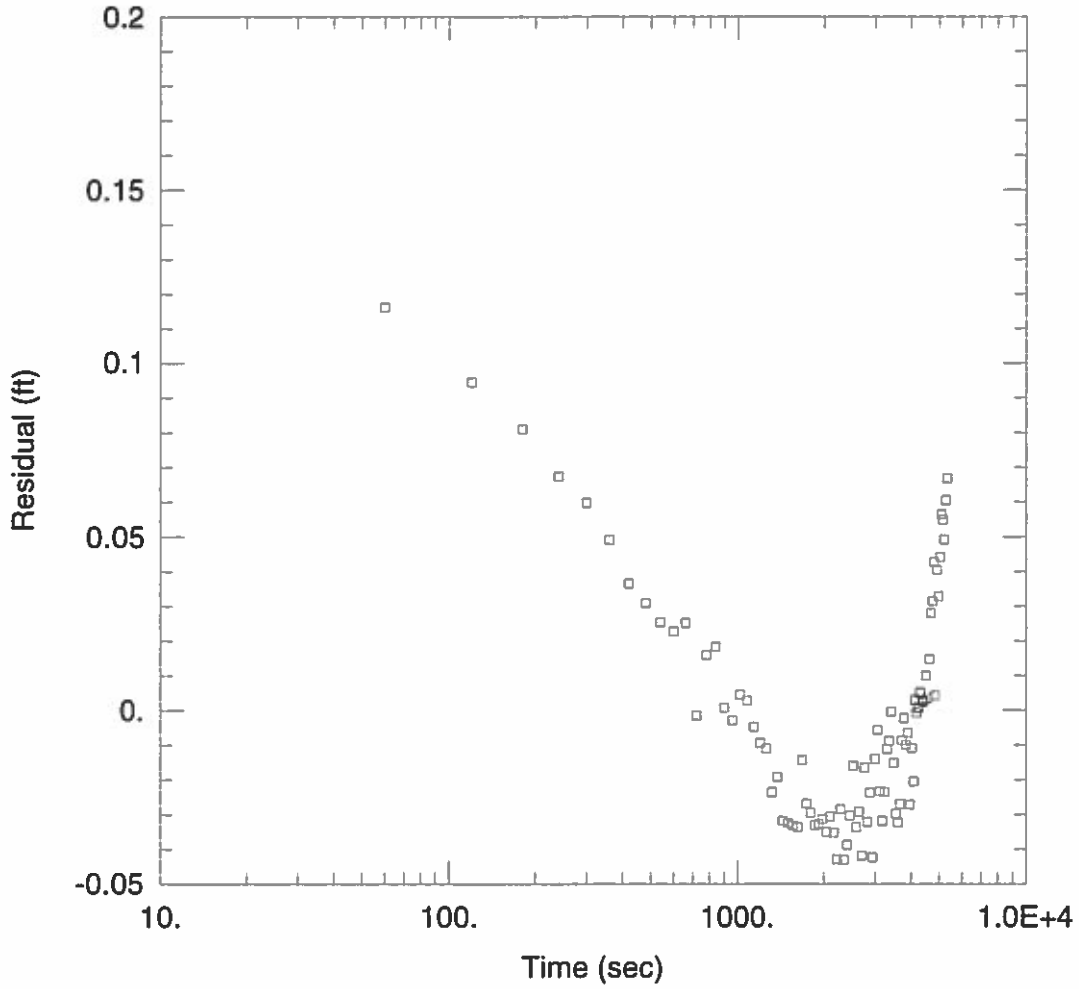
Saturated Thickness: 39.75 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.403 ft
Total Well Penetration Depth: 39.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 29.07 ft
Screen Length: 39.75 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 9.443E-6 m/day
y0 = 29.38 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract33MW-1slugin.aqt
Date: 04/28/14 Time: 15:35:15

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-1slugin
Test Date: 03/26/14

AQUIFER DATA

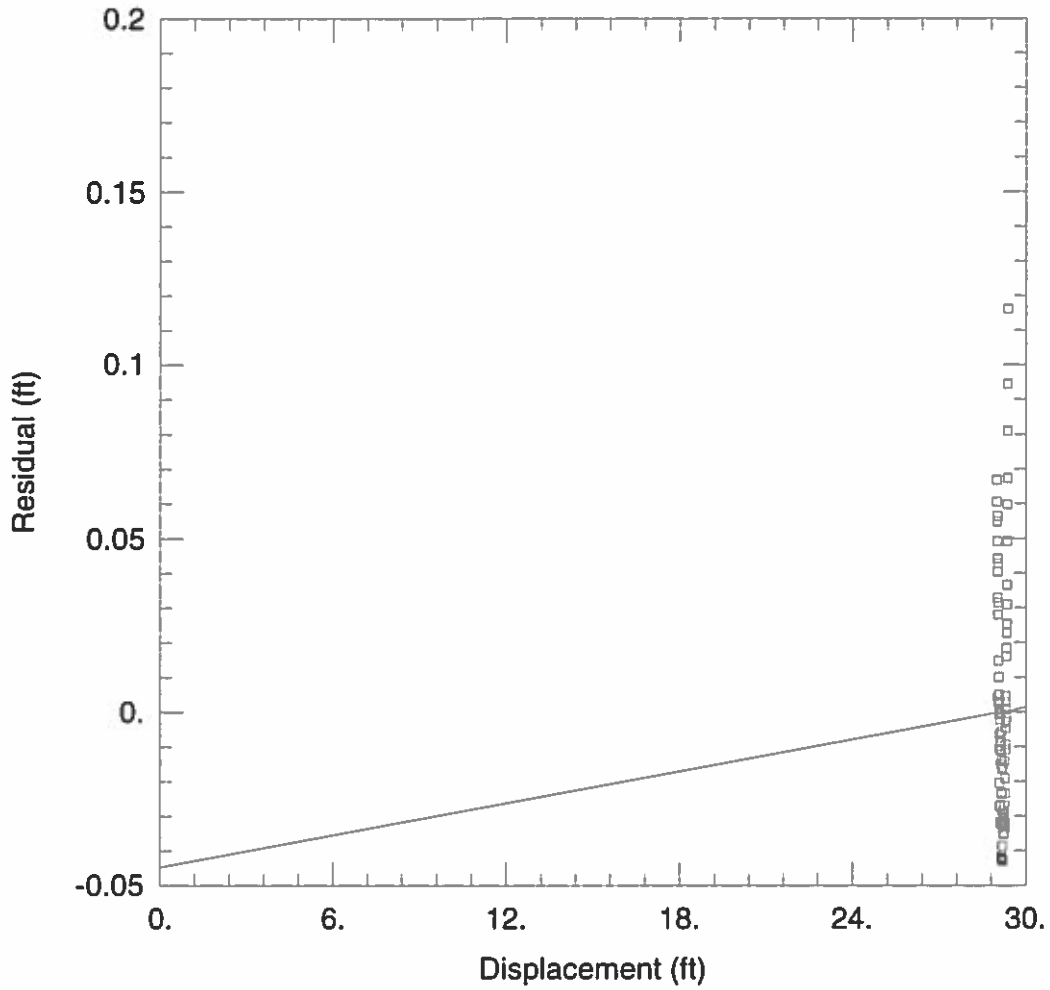
Saturated Thickness: 39.75 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.403 ft
Total Well Penetration Depth: 39.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 29.07 ft
Screen Length: 39.75 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:\...\RQTract33MW-1slugin.aqt
Date: 04/28/14 Time: 15:35:24

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-1slugin
Test Date: 03/26/14

AQUIFER DATA

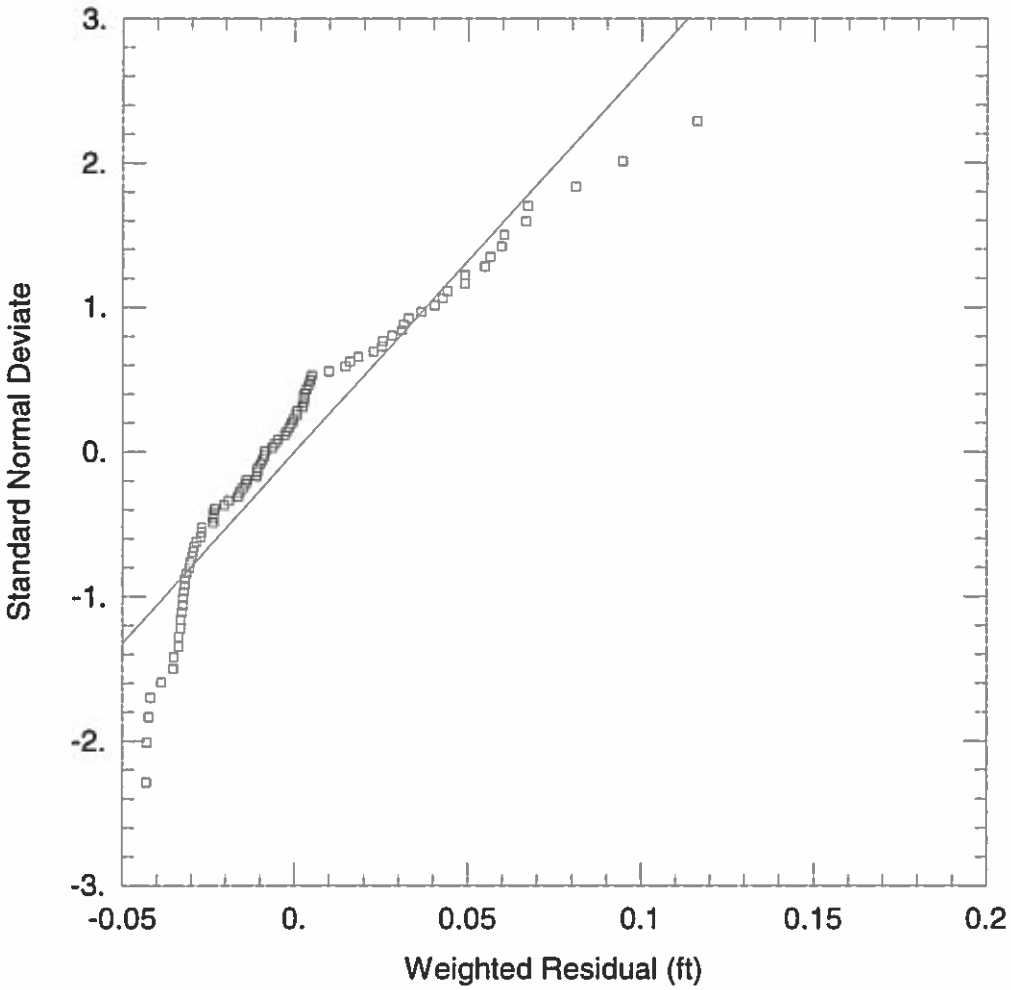
Saturated Thickness: 39.75 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.403 ft
Total Well Penetration Depth: 39.75 ft
Casing Radius: 0.083 ft
Static Water Column Height: 29.07 ft
Screen Length: 39.75 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:\...\RQTract33MW-1slugin.aqt
Date: 04/28/14 Time: 15:35:32

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-1slugin
Test Date: 03/26/14

AQUIFER DATA

Saturated Thickness: 39.75 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.403 ft Static Water Column Height: 29.07 ft
Total Well Penetration Depth: 39.75 ft Screen Length: 39.75 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\RQ Tract 33 MW-4\RQTract33MW-4slu
Title: Falling-Head Slug Test
Date: 04/28/14
Time: 15:37:06

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Date: 03/26/14
Test Well: MW-4slugin

AQUIFER DATA

Saturated Thickness: 14.43 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.613 ft
Static Water Column Height: 10.57 ft
Casing Radius: 0.083 ft
Well Radius: 0.281 ft
Well Skin Radius: 1. ft
Screen Length: 14.43 ft
Total Well Penetration Depth: 14.43 ft

No. of Observations: 55

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	11.07	1740.	10.62
120.	11.03	1800.	10.62
180.	11.02	1860.	10.61
240.	11.	1920.	10.58
300.	10.96	1980.	10.59
360.	10.92	2040.	10.59
420.	10.89	2100.	10.61
480.	10.86	2160.	10.6
540.	10.85	2220.	10.58
600.	10.81	2280.	10.58
660.	10.81	2340.	10.61
720.	10.79	2400.	10.59
780.	10.78	2460.	10.58
840.	10.74	2520.	10.57
900.	10.73	2580.	10.58
960.	10.73	2640.	10.56
1020.	10.71	2700.	10.58
1080.	10.69	2760.	10.57
1140.	10.68	2820.	10.57
1200.	10.68	2880.	10.56
1260.	10.66	2940.	10.56
1320.	10.68	3000.	10.56
1380.	10.65	3060.	10.56
1440.	10.64	3120.	10.56
1500.	10.64	3180.	10.57
1560.	10.64	3240.	10.56
1620.	10.62	3300.	10.55
1680.	10.63		

SOLUTION

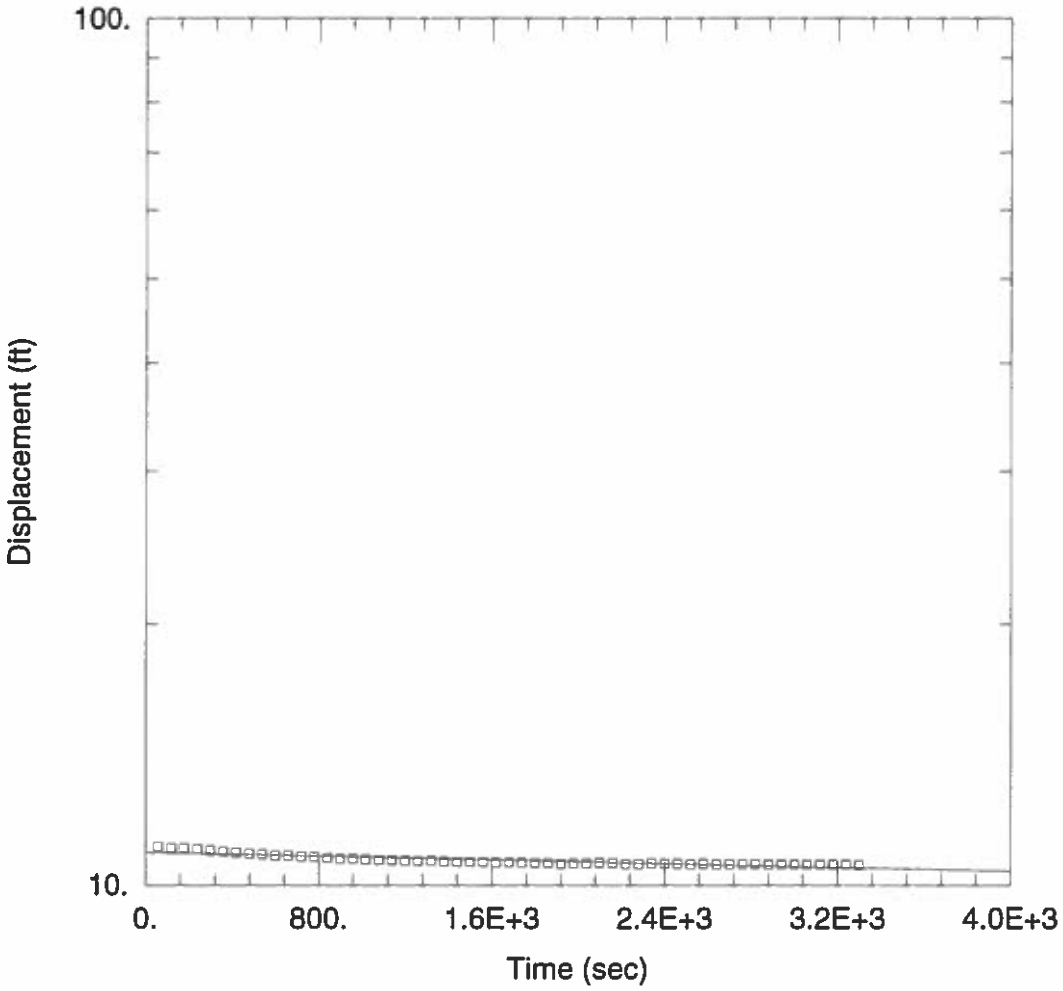
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	0.0001008	m/day
y0	10.9	ft

K = 1.166E-7 cm/sec
T = K*b = 0.0004432 m²/day (5.13E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract33MW-4slugin.aqt
Date: 04/28/14 Time: 15:37:13

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-4slugin
Test Date: 03/26/14

AQUIFER DATA

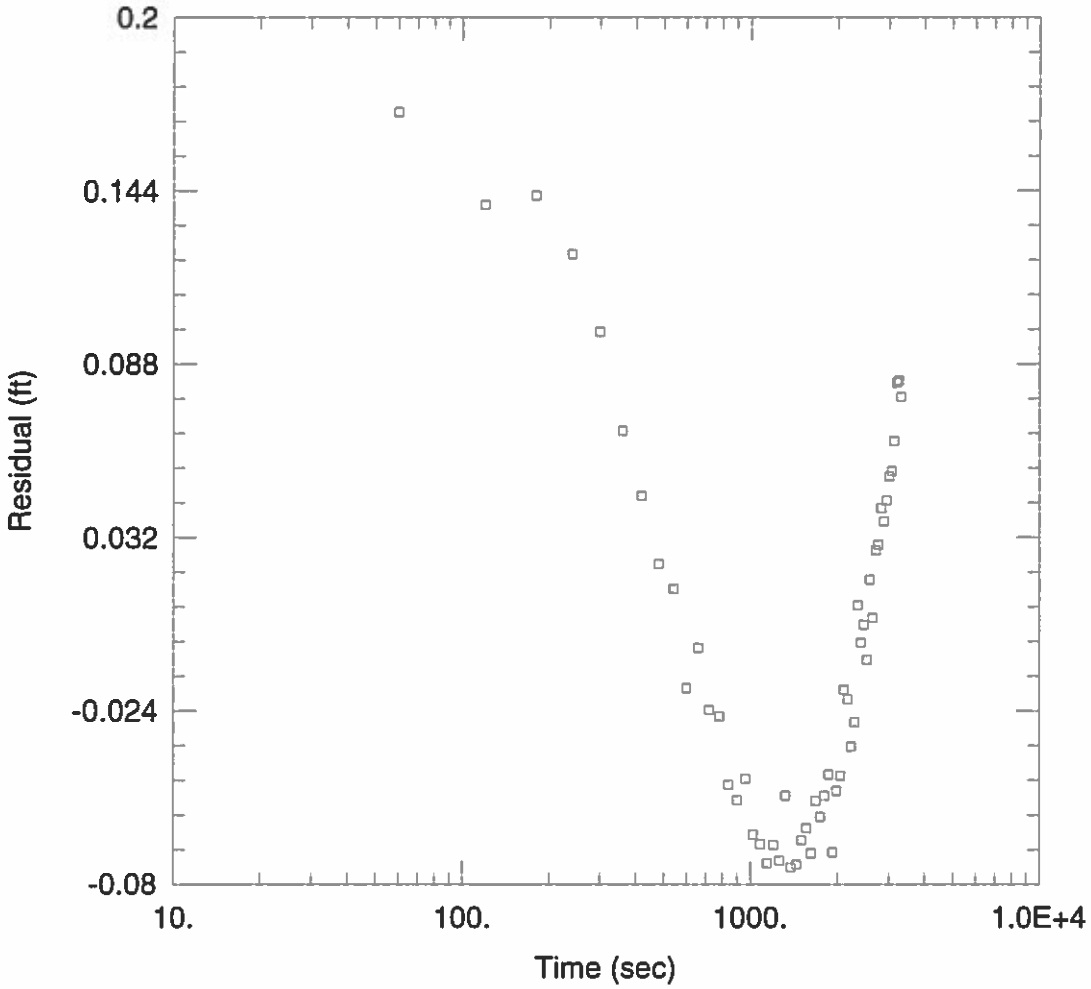
Saturated Thickness: 14.43 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.613 ft Static Water Column Height: 10.57 ft
Total Well Penetration Depth: 14.43 ft Screen Length: 14.43 ft
Casing Radius: 0.083 ft Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 0.0001008 m/day y0 = 10.9 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract33MW-4slugin.aqt
Date: 04/28/14 Time: 15:37:20

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-4slugin
Test Date: 03/26/14

AQUIFER DATA

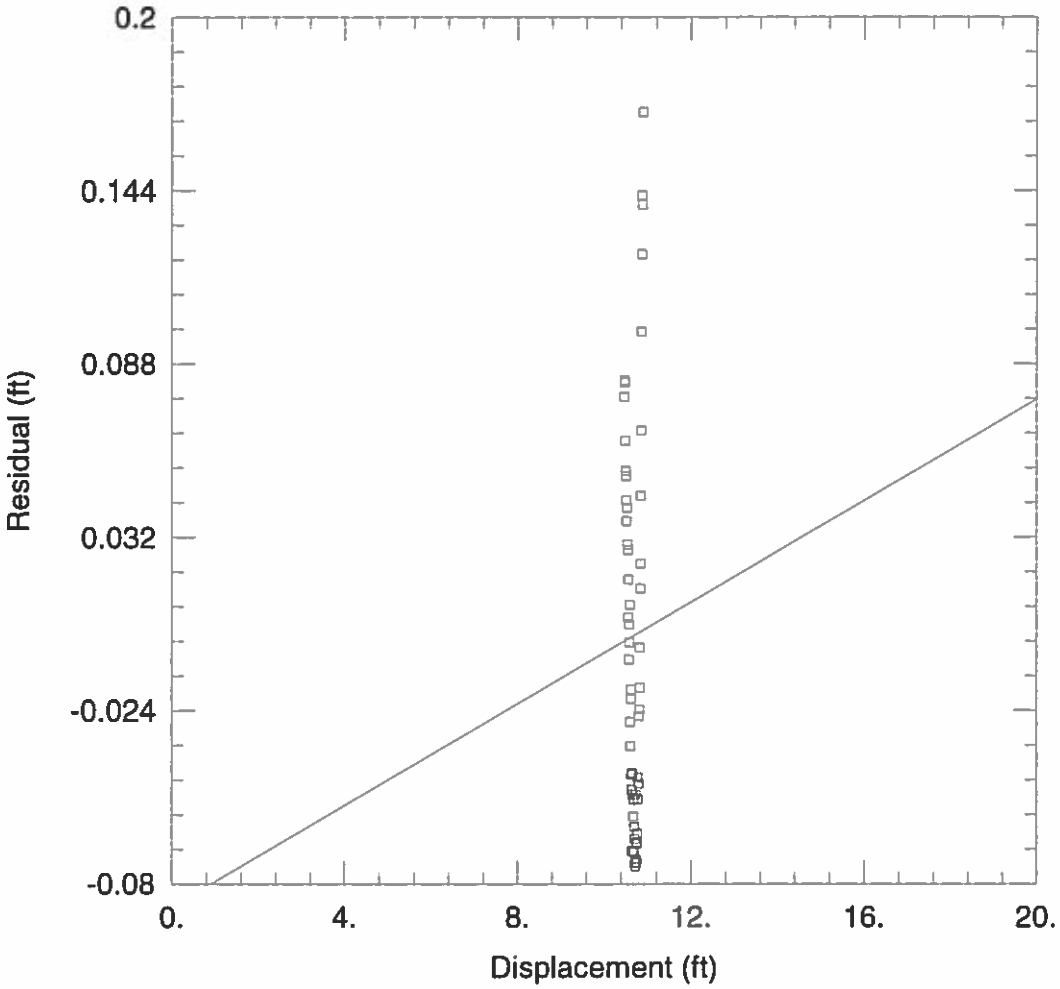
Saturated Thickness: 14.43 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.613 ft
Total Well Penetration Depth: 14.43 ft
Casing Radius: 0.083 ft
Static Water Column Height: 10.57 ft
Screen Length: 14.43 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:\...\RQTract33MW-4slugin.aqt
Date: 04/28/14 Time: 15:37:26

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-4slugin
Test Date: 03/26/14

AQUIFER DATA

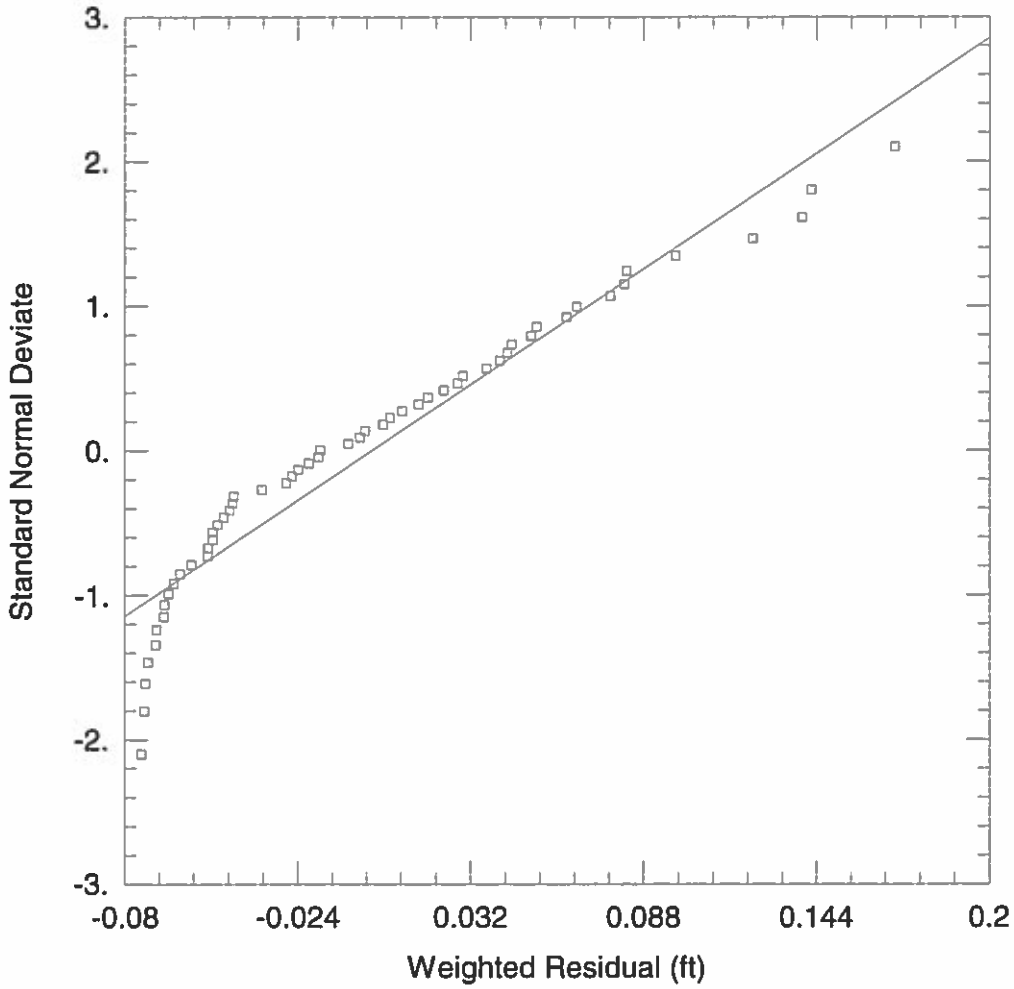
Saturated Thickness: 14.43 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.613 ft
Total Well Penetration Depth: 14.43 ft
Casing Radius: 0.083 ft
Static Water Column Height: 10.57 ft
Screen Length: 14.43 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:\...\RQTract33MW-4slugin.aqt
Date: 04/28/14 Time: 15:37:34

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract33
Test Well: MW-4slugin
Test Date: 03/26/14

AQUIFER DATA

Saturated Thickness: 14.43 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.613 ft
Total Well Penetration Depth: 14.43 ft
Casing Radius: 0.083 ft
Static Water Column Height: 10.57 ft
Screen Length: 14.43 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

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