1R – 1614

2014 GWMR

07 / 30 / 2014

LEGACY RESERVES

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 #13, Located in Unit Letter G, Section 36, Township 13 South, Range 31 East, Chaves Country, New Mexico (NMOCD 1RP#1614)

Mr. Von Gonten:

This report details the results of the Groundwater Aquifer Slug Test Evaluation for the Rock Queen Unit Tract Battery #13, located in Chaves County, New Mexico.

Additional Monitor Well Installation

Between January 28 and January 30, 2014, Tetra Tech was onsite to oversee the installation of two additional monitor wells (MW-7 and MW-8) for delineation purposes. Each of the two 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 26 to 40 feet bgs. From 26 and 40 feet below ground surface (bgs) to 80 to 100 feet bgs is a light tan brown sand with some sandstone intermixed. From 80 and 100 feet bgs to 175 feet bgs is a light brown fine sand with white clay intermixed with sandstone. From 180 feet to 193 is brown clay with red clay at 193 feet bgs. 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 153 to 157 feet bgs. The monitor wells were extended to depths of 193 and 180 feet bgs, respectively for MW-7 and MW-8. Monitor wells MW-7 and MW-8 had 40 feet of 0.02" screen installed at the base. From the top of the screens to the ground surface of the boring, the wells were completed with blank schedule 40 PVC casing. A sand filter pack, bentonite seal, and cement were installed in the annulus of each well. See Figure 3 detailing monitor well

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locations and Appendix B monitor well completion diagrams.

2014 Groundwater Gauging and Sampling Results

Tetra Tech was onsite March 25, 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 southeast. 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 was sampled for BTEX utilizing Method SW8021B, chlorides and sulfates utilizing Method E 300.0, TDS utilizing Method SM2540C, and general chemistry. The samples were collected and submitted to Trace Analysis (Trace) of Midland, Texas. All samples collected and submitted were below the NMWQCC standard of 0.01 milligrams per Liter (mg/L) benzene. Chlorides for the sampling period ranged from 36.2 mg/L in monitor well MW-8 to 8,010 mg/L in monitor well MW-2. Monitor wells MW-1, MW-3, MW-4, and MW-8 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 28 2014, Tetra Tech was onsite to perform slug tests on monitor wells MW-1 and MW-8. 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 4.84E-5 m/day and a T value of 1.714E-4 m^2/day. Monitor well MW-8 had a K value of 3.396E-7 m/day and a T value of 1.035E-7 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.

TETRA TECH

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

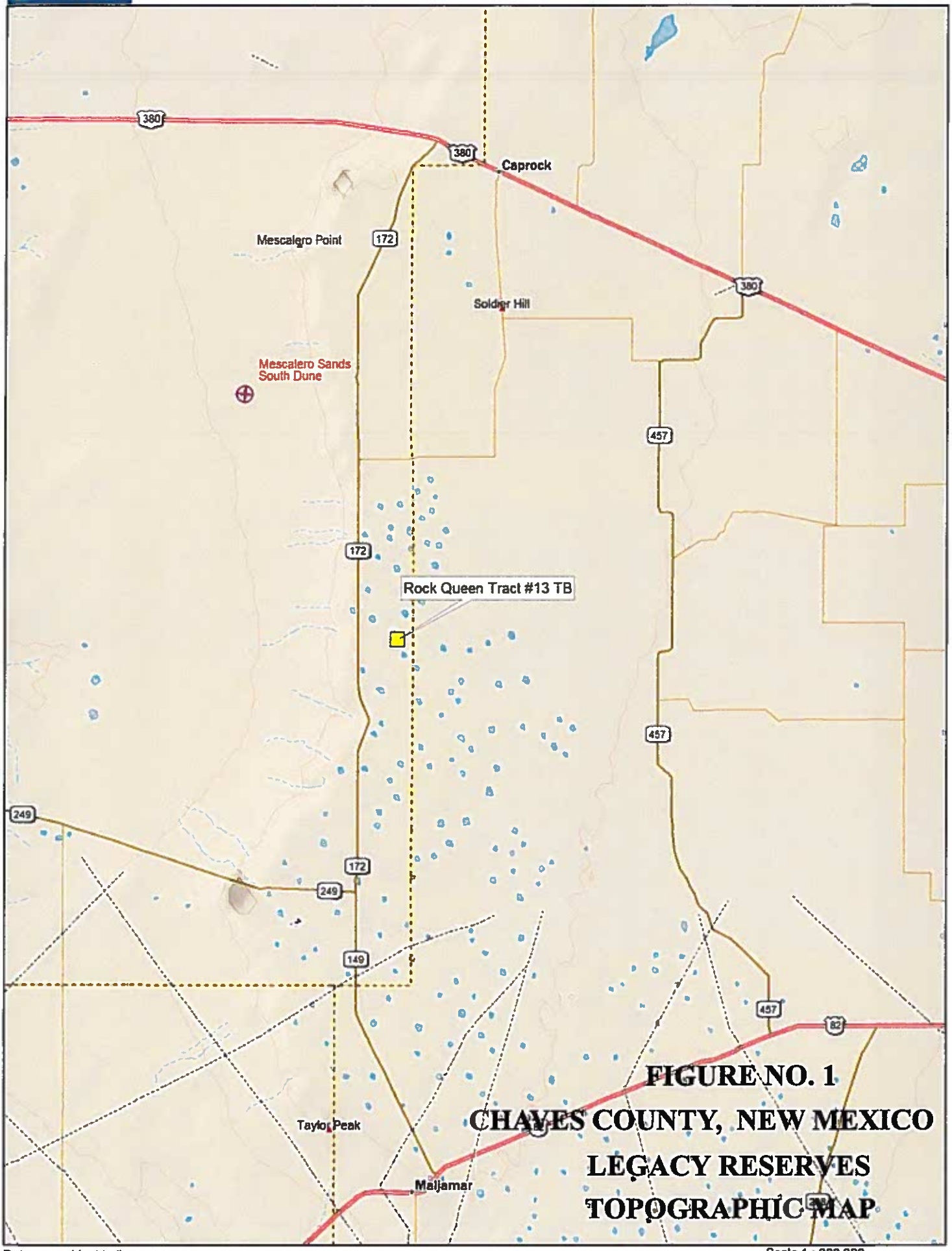


FIGURE NO. 1
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

TN
MN (7.7°E)

Scale 1 : 300,000
1" = 4.73 mi
Data Zoom 9-3

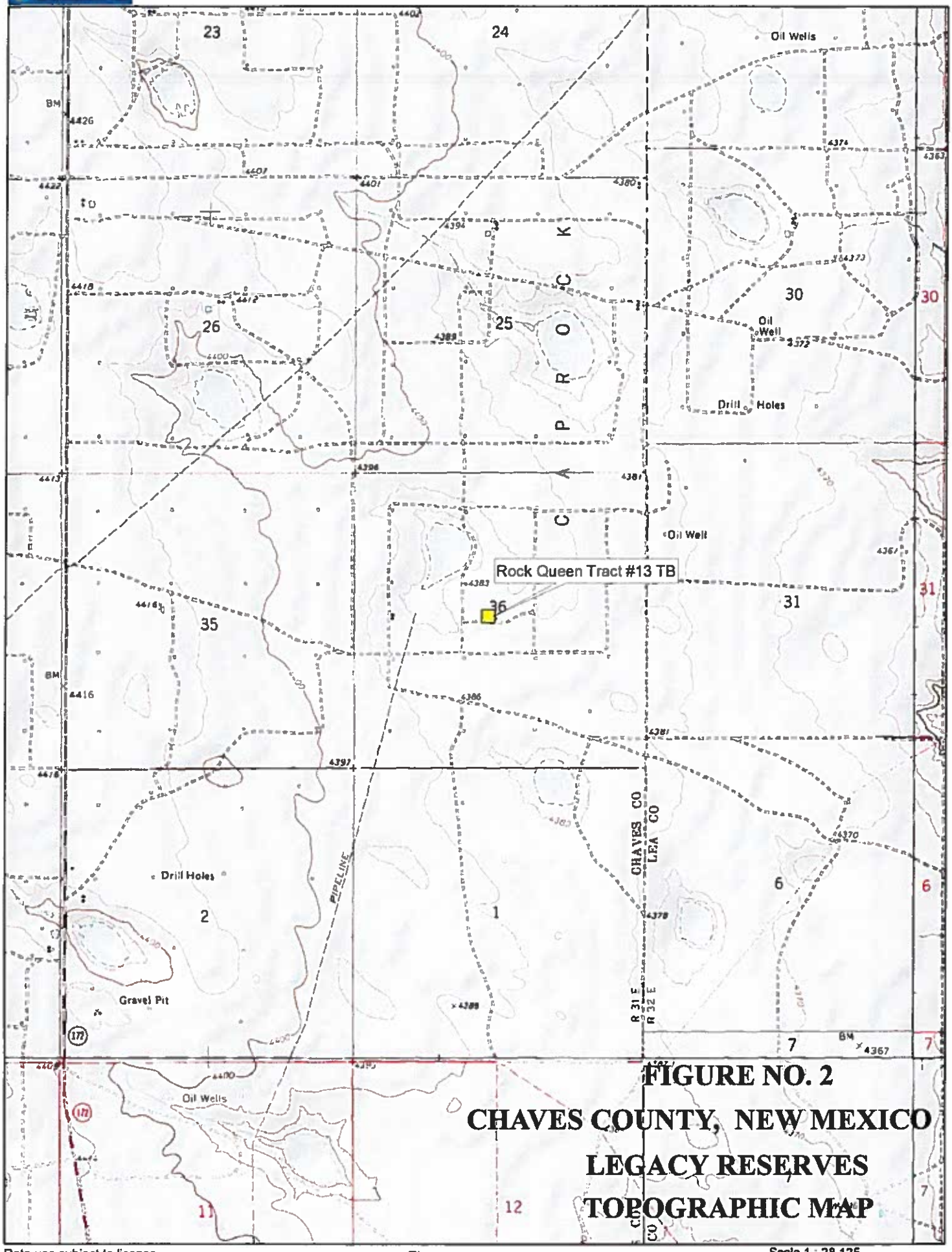


FIGURE NO. 2
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

TN

MN (7.7°E)

Scale 1 : 28,125

1" = 2,343.8 ft

Data Zoom 12-7

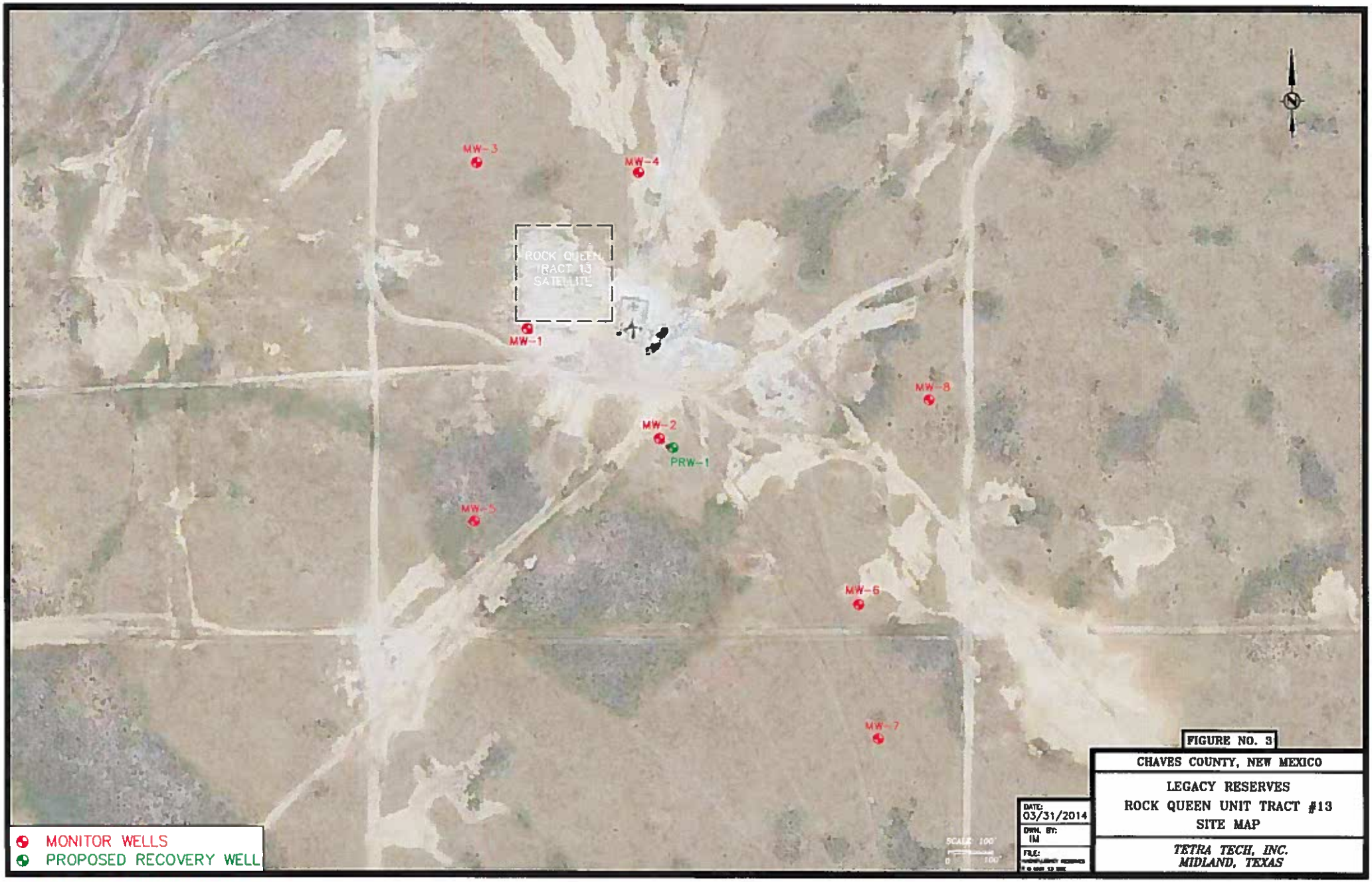


FIGURE NO. 3

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT TRACT #13
SITE MAP

TETRA TECH, INC.
MIDLAND, TEXAS

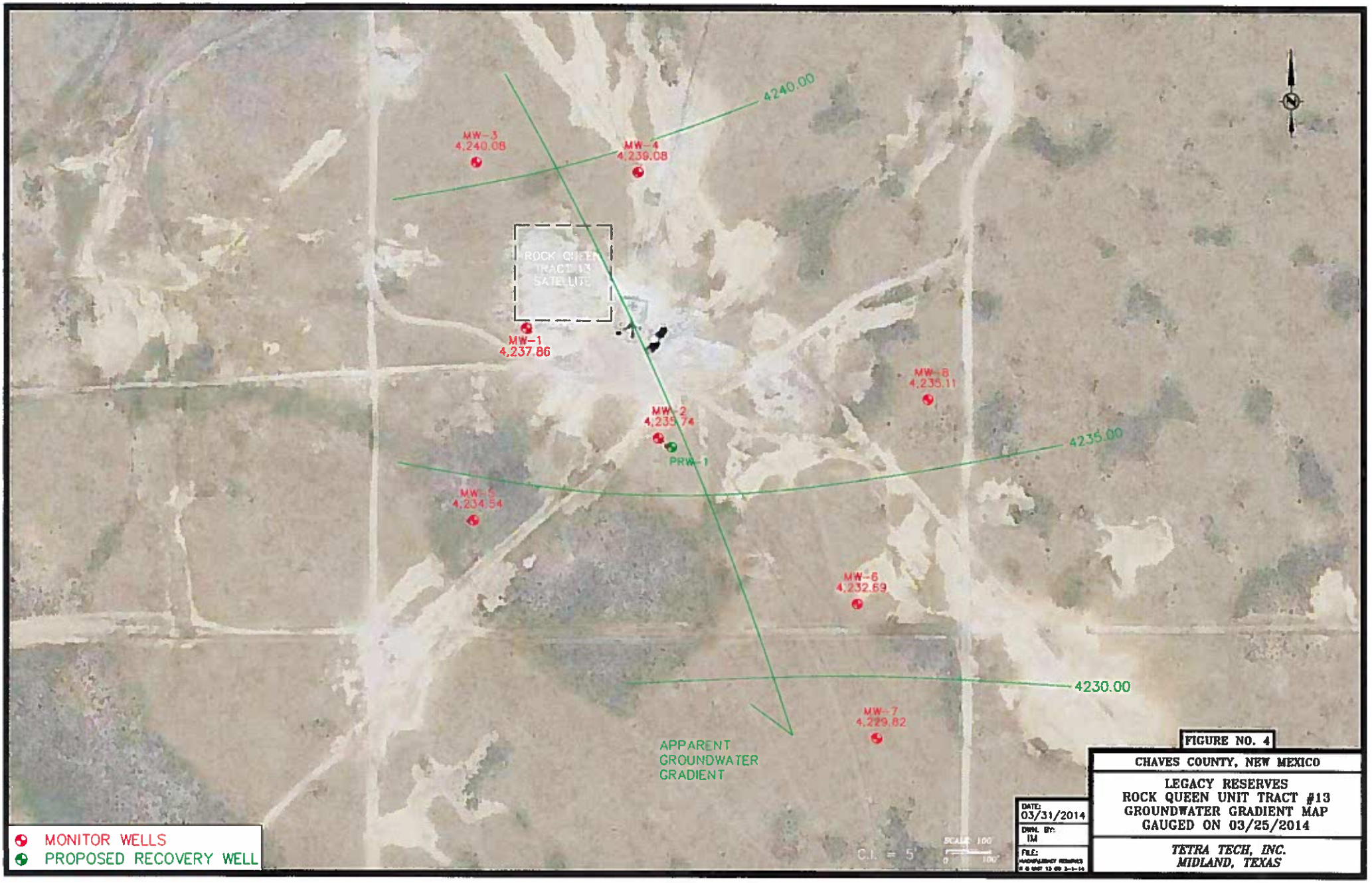


FIGURE NO. 4

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT TRACT #13
GROUNDWATER GRADIENT MAP
GAUGED ON 03/25/2014

TETRA TECH, INC.
MIDLAND, TEXAS

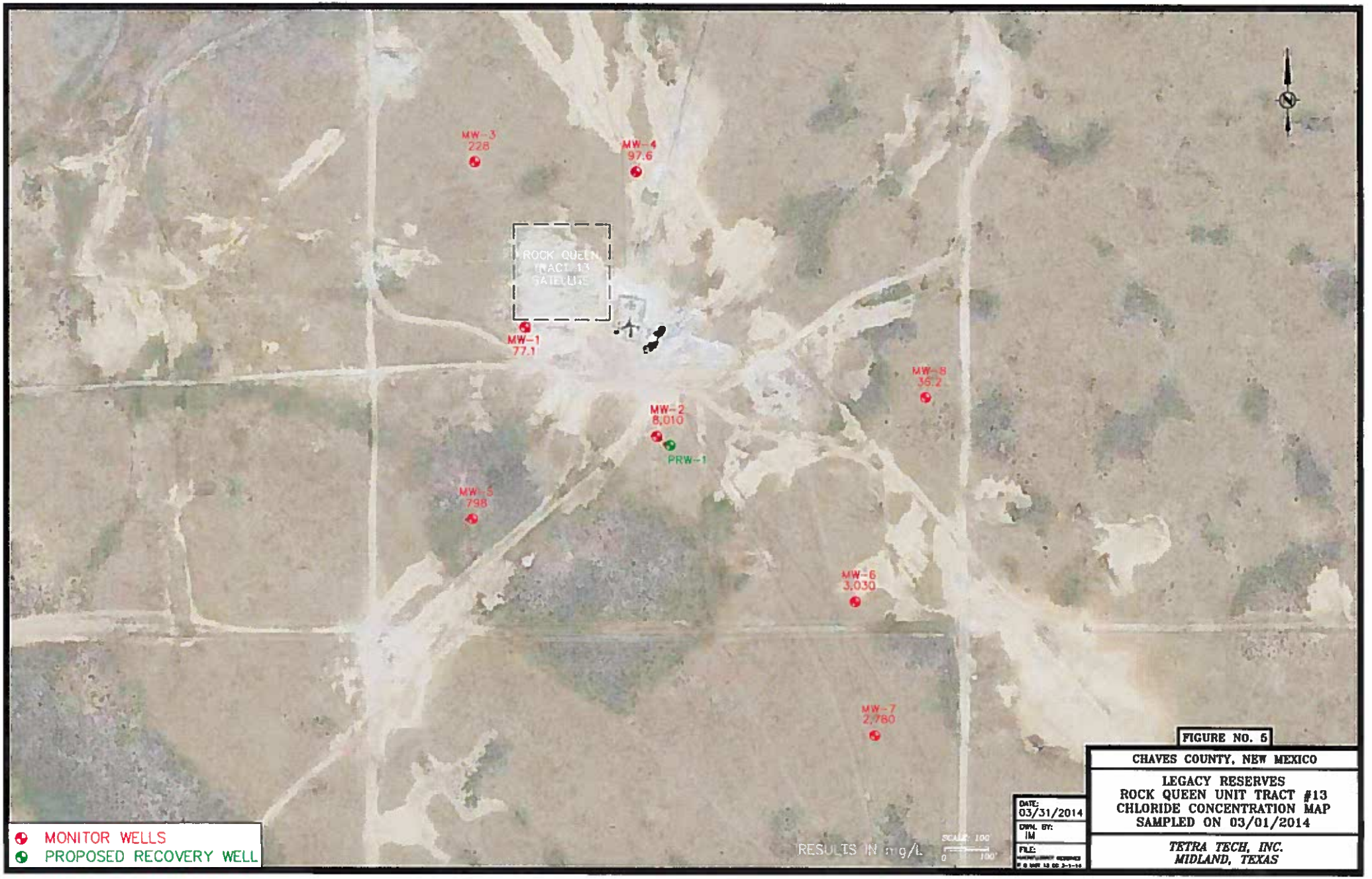


FIGURE NO. 6

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN UNIT TRACT #13
CHLORIDE CONCENTRATION MAP
SAMPLED ON 03/01/2014

DATE: 03/31/2014
DWN. BY: JM
FILE:

TETRA TECH, INC.
MIDLAND, TEXAS

TABLES

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract 13 Tank Battery
Chaves County, New Mexico

Monitor Well	Date Gauged	of Well Installation	Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Elevation (ft)
MW-1	05/30/07	05/25/07	4,388.74	161.50	117.52	4,271.22
	05/31/07				127.74	4,261.00
	02/05/08				150.41	4,238.33
	04/06/10				150.36	4,238.38
	07/12/10				150.42	4,238.32
	10/11/10				150.43	4,238.31
	01/17/11				150.40	4,238.34
	04/12/11				150.46	4,238.28
	07/28/11				151.32	4,237.42
	10/24/11				150.61	4,238.13
	01/03/12				150.70	4,238.04
	04/09/12				150.65	4,238.09
	07/25/12				150.64	4,238.10
	10/24/12				150.77	4,237.97
	01/29/13				150.68	4,238.06
	04/22/13				150.85	4,237.89
	07/24/13				150.83	4,237.91
	10/30/13				150.81	4,237.93
	03/25/14				150.88	4,237.86
MW-2	04/06/10	03/30/10	4,386.04	161.60	147.98	4,238.06
	07/12/10				150.00	4,236.04
	10/11/10				149.80	4,236.24
	01/17/11				149.96	4,236.08
	04/12/11				149.98	4,236.06
	07/28/11				150.91	4,235.13
	10/24/11				150.08	4,235.96
	01/03/12				150.21	4,235.83
	04/09/12				150.14	4,235.90
	07/25/12				150.18	4,235.86
	10/24/12				150.24	4,235.80
	01/29/13				150.17	4,235.87
	04/22/13				150.33	4,235.71
	07/24/13				150.27	4,235.77
	10/30/13				150.23	4,235.81
	03/25/14				150.30	4,235.74

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract 13 Tank Battery
Chaves County, New Mexico

Monitor Well	Date Gauged	of Well Installation	Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Elevation (ft)
MW-3	04/06/10	03/31/10	4,388.48	161.90	147.78	4,240.70
	07/12/10				147.79	4,240.69
	10/11/10				147.89	4,240.59
	01/17/11				147.89	4,240.59
	04/12/11				147.96	4,240.52
	07/28/11				148.87	4,239.61
	10/24/11				148.13	4,240.35
	01/03/12				148.25	4,240.23
	04/09/12				148.20	4,240.28
	07/25/12				148.18	4,240.30
	10/24/12				148.32	4,240.16
	01/29/13				148.23	4,240.25
	04/22/13				149.01	4,239.47
	07/24/13				149.05	4,239.43
	10/30/13				149.06	4,239.42
	03/25/14				148.40	4,240.08
MW-4	04/06/10	03/31/10	4,388.12	161.85	148.59	4,239.53
	07/12/10				148.62	4,239.50
	10/11/10				148.63	4,239.49
	01/17/11				148.56	4,239.56
	04/12/11				148.63	4,239.49
	07/28/11				149.59	4,238.53
	10/24/11				148.77	4,239.35
	01/03/12				148.91	4,239.21
	04/09/12				148.83	4,239.29
	07/25/12				148.84	4,239.28
	10/24/12				148.97	4,239.15
	01/29/13				148.88	4,239.24
	04/22/13				149.03	4,239.09
	07/24/13				149.01	4,239.11
	10/30/13				148.95	4,239.17
	03/25/14				149.04	4,239.08

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract 13 Tank Battery
Chaves County, New Mexico

Monitor Well	Date Gauged	of Well Installation	Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Elevation (ft)
MW-5	01/17/11	12/02/10	4,383.81	177.60	148.91	4,234.90
	04/12/11				148.98	4,234.83
	07/28/11				149.90	4,233.91
	10/24/11				149.09	4,234.72
	01/03/12				149.25	4,234.56
	04/09/12				149.14	4,234.67
	07/25/12				149.17	4,234.64
	10/24/12				149.23	4,234.58
	01/29/13				149.19	4,234.62
	04/22/13				149.31	4,234.50
	07/24/13				149.30	4,234.51
	10/30/13				149.26	4,234.55
	03/25/14				149.27	4,234.54
MW-6	01/17/11	12/03/10	4,387.81	169.65	154.88	4,232.93
	04/12/11				154.86	4,232.95
	07/28/11				155.79	4,232.02
	10/24/11				154.93	4,232.88
	01/03/12				155.10	4,232.71
	04/09/12				155.00	4,232.81
	07/25/12				155.00	4,232.81
	10/24/12				155.12	4,232.69
	01/29/13				155.01	4,232.80
	04/22/13				155.18	4,232.63
	07/24/13				155.13	4,232.68
	10/30/13				155.09	4,232.72
	03/25/14				155.12	4,232.69
MW-7	03/25/14	02/26/14	4,387.72		157.90	4,229.82
MW-8	03/25/14	02/26/14	4,388.31		153.20	4,235.11

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Tract 13 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	06/01/07	282	24.4	2,020	20.1	<1.00	8.00	652	660	91.1	3,270	7,245	804	7.02
	04/06/10	130	7.61	11.40	5.96	<1.00	<1.00	226	226	42.7	43.6	699	356	8.28
	07/12/10	-	-	-	-	-	-	-	-	37.2	38.8	1,130	-	-
	10/11/10	-	-	-	-	-	-		-	49.6	52.3	445	-	-
	01/20/11	-	-	-	-	-	-	-	-	48.8	44.5	447	-	-
	04/13/11	-	-	-	-	-	-	-	-	52.4	52.7	481	-	-
	08/01/11	-	-	-	-	-	-	-	-	68.4	64.1	465	-	-
	10/26/11	-	-	-	-	-	-	-	-	55.4	63.3	492	-	-
	01/05/12	-	-	-	-	-	-	-	-	63.1	46.9	636	-	-
	04/12/12	-	-	-	-	-	-	-	-	45.3	49.6	443	-	-
	07/26/12	-	-	-	-	-	-	-	-	-	59.2	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	65.3	60.2	466	-	-
	01/30/13	-	-	-	-	-	-	-	-	53.2	73.1	464	-	-
	04/24/13	132	4.02	16.8	4.83	<1.00	<1.00	225	225	60.4	51.2	614	345	7.53
	07/24/13	138	1.50	16.0	7.00	<20.0	<20.0	223	223	56.6	69.4	533	350	7.47
	10/30/13	122	<10.0	61.5	<10.0	<20.0	<20.0	214	214	52.4	76.0	942	317	7.51
	03/01/14	148	2.79	37.2	8.99	<20.0	<20.0	223	223	51.1	77.1	584	381	7.37
MW-2	04/06/10	520	73.0	925	15.5	<1.00	<1.00	125	125	133.0	2,250	5,890	1,600	7.70
	07/12/10	-	-	-	-	-	-	-	-	189.0	9,870	27,200	-	-
	10/11/10	-	-	-	-	-	-	-	-	203.0	7,750	15,300	-	-
	01/20/11	-	-	-	-	-	-	-	-	202.0	9,070	15,200	-	-
	04/13/11	-	-	-	-	-	-	-	-	193.0	9,380	16,900	-	-
	08/01/11	-	-	-	-	-	-	-	-	148.0	8,450	9,760	-	-
	10/26/11	-	-	-	-	-	-	-	-	<292	8,870	18,700	-	-
	01/05/12	-	-	-	-	-	-	-	-	177	8,950	14,000	-	-
	04/12/12	-	-	-	-	-	-	-	-	184	9,990	19,400	-	-
	07/26/12	-	-	-	-	-	-	-	-	-	9,400	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	184	8,830	11,500	-	-
	01/30/13	-	-	-	-	-	-	-	-	191	9,650	15,600	-	-
	04/24/13	2,270	369	4,840	30.2	<1.00	<1.00	133	133	219	12,800	23,000	7,190	6.66
	07/24/13	1,550	243	3,320	44.6	<20.0	<20.0	125	125	<2500	9,980	20,900	4,870	6.62
	10/30/13	1,150	174	2,550	26.2	<20.0	<20.0	132	132	155	8,300	17,200	3,590	6.96
	03/01/14	1,590	205	3,570	40.1	<20.0	<20.0	149	149	176	8,010	16,500	4,810	6.71

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Tract 13 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	04/06/10	76.1	10.3	78.7	4.33	<1.00	<1.00	183	183	116.0	58.4	696	232	8.26
	07/12/10	-	-	-	-	-	-	-	-	64.0	83.6	562	-	-
	10/11/10	-	-	-	-	-	-	-	-	84.5	170.0	608	-	-
	01/20/11	-	-	-	-	-	-	-	-	62.0	133.0	535	-	-
	04/13/11	-	-	-	-	-	-	-	-	84.1	148.0	630	-	-
	08/01/11	-	-	-	-	-	-	-	-	61.5	166.0	812	-	-
	10/26/11	-	-	-	-	-	-	-	-	65.5	225	1,110	-	-
	01/05/12	-	-	-	-	-	-	-	-	62.1	210	678	-	-
	04/12/12	-	-	-	-	-	-	-	-	45.4	124	519	-	-
	07/26/12	-	-	-	-	-	-	-	-	-	169	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	64.7	163	518	-	-
	01/30/13	-	-	-	-	-	-	-	-	58.0	189	1,530	-	-
	04/24/13	135	6.25	153	6.26	<1.00	<1.00	215	215	61.7	314	724	363	7.49
	07/24/13	145	4.31	71.5	8.57	<20.0	<20.0	188	188	47.1	197	710	380	7.59
	10/30/13	132	<10.0	69.7	<10.0	<20.0	<20.0	194	194	51.6	244	834	345	7.50
	03/01/14	159	6.66	78.6	7.94	<20.0	<20.0	192	192	51.0	228	810	424	7.37
MW-4	04/06/10	89.5	11.5	40.5	3.34	<1.00	<1.00	145	145	116.0	58.2	506	270	8.35
	07/12/10	-	-	-	-	-	-	-	-	48.5	147.0	630	-	-
	10/11/10	-	-	-	-	-	-	-	-	56.4	163.0	616	-	-
	01/20/11	-	-	-	-	-	-	-	-	50.8	210.0	534	-	-
	04/13/11	-	-	-	-	-	-	-	-	49.4	174.0	604	-	-
	08/01/11	-	-	-	-	-	-	-	-	48.7	224	690	-	-
	10/26/11	-	-	-	-	-	-	-	-	50.2	188	626	-	-
	01/05/12	-	-	-	-	-	-	-	-	47.8	194	556	-	-
	04/12/12	-	-	-	-	-	-	-	-	46.8	169	555	-	-
	07/26/12	-	-	-	-	-	-	-	-	-	178	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	54.0	165	530	-	-
	01/30/13	-	-	-	-	-	-	-	-	48.1	135	616	-	-
	04/24/13	127	10.5	76.1	0.570	<1.00	<1.00	208	208	47.6	157	672	360	7.41
	07/24/13	133	4.61	58.5	5.37	<20.0	<20.0	194	194	45.8	136	702	350	7.01
	10/30/13	99.3	<10.0	42.7	<10.0	<20.0	<20.0	199	199	46.0	108	608	257	7.36
	03/01/14	123	3.01	53.0	5.67	<20.0	<20.0	200	200	44.7	97.6	586	320	7.42

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Tract 13 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-5	01/20/11	-	-	-	-	-	-	-	-	128.0	5,690	7,890	-	-
	04/13/11	-	-	-	-	-	-	-	-	336.0	17,700	27,000	-	-
	08/01/11	-	-	-	-	-	-	-	-	77.2	2,800	4,140	-	-
	10/26/11	-	-	-	-	-	-	-	-	63.0	481	1,220	-	-
	01/05/12	-	-	-	-	-	-	-	-	46.6	1,200	2,060	-	-
	04/12/12	-	-	-	-	-	-	-	-	44.3	2,000	3,820	-	-
	07/26/12	-	-	-	-	-	-	-	-	-	753	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	37.9	723	1,210	-	-
	01/30/13	-	-	-	-	-	-	-	-	32.9	840	1,780	-	-
	04/24/13	398	30.4	104	1.57	<1.00	<1.00	166	166	42.4	813	2,320	1,120	6.68
	07/24/13	246	14.7	78.9	9.87	<20.0	<20.0	176	176	<125	350	1,420	675	6.90
	10/30/13	231	13.8	76.9	<10.0	<20.0	<20.0	183	183	36.7	439	1,410	634	7.17
	03/01/14	381	37.6	181	12.6	<20.0	<20.0	169	169	37.6	798	2,160	1,110	7.12
MW-6	01/20/11	-	-	-	-	-	-	-	-	<250	2,880	4,690	-	-
	04/13/11	-	-	-	-	-	-	-	-	85.2	3,010	4,890	-	-
	08/01/11	-	-	-	-	-	-	-	-	59.3	2,130	2,930	-	-
	10/26/11	-	-	-	-	-	-	-	-	68.0	2,550	4,940	-	-
	01/05/12	-	-	-	-	-	-	-	-	70.4	2,960	4,610	-	-
	04/12/12	-	-	-	-	-	-	-	-	64.0	3,260	5,500	-	-
	07/26/12	-	-	-	-	-	-	-	-	-	2,570	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	90.2	2,040	3,240	-	-
	01/30/13	-	-	-	-	-	-	-	-	75.0	2,200	3,820	-	-
	04/24/13	23.6	69.6	2,360	86.9	<1.00	<1.00	196	196	116	3,820	5,860	346	7.72
	07/24/13	26.5	5.97	1,440	34.6	<20.0	<20.0	201	201	61.1	1,830	4,030	91.0	7.95
	10/30/13	20.5	<10.0	1,250	26.8	<20.0	<20.0	217	217	88.0	2,280	3,580	62.0	8.16
	03/01/14	39.5	41.6	2,020	72.0	<20.0	<20.0	183	183	67.5	3,030	5,230	270	7.70
MW-7	03/01/14	84.4	25.0	1,940	33.2	<20.0	<20.0	321	321	108	2,780	4,730	314	7.77
MW-8	03/01/14	37.5	<1.00	67.5	6.72	<20.0	<20.0	215	215	25.1	36.2	353	93.6	7.61

NS - Not sampled

(-) Not Analyzed

Table 3
Legacy Reserves
Groundwater Analytical Results
Rock Queen Unit Tract 13 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	04/06/10	<0.001	<0.001	<0.001	<0.001	<0.001
	07/12/10	<0.001	<0.001	<0.001	<0.001	<0.001
	10/11/10	<0.001	<0.001	<0.001	<0.001	<0.001
	01/20/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/13/11	<0.001	<0.001	<0.001	<0.001	<0.001
	08/01/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/26/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/05/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/26/12	<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	<0.001	<0.001	<0.001	<0.001	<0.001
	04/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-2	04/06/10	<0.001	<0.001	<0.001	<0.001	<0.001
	07/12/10	<0.001	<0.001	<0.001	<0.001	<0.001
	10/11/10	<0.001	<0.001	<0.001	<0.001	<0.001
	01/20/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/13/11	<0.001	<0.001	<0.001	<0.001	<0.001
	08/01/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/26/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/05/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/26/12	<0.001	<0.001	<0.001	<0.001	<0.001
	10/25/12	<0.001	<0.001	<0.001	0.00290	0.00290
	01/30/13	<0.001	<0.001	<0.001	<0.001	<0.001
	04/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-3	04/06/10	<0.001	<0.001	<0.001	<0.001	<0.001
	07/12/10	<0.001	<0.001	<0.001	<0.001	<0.001
	10/11/10	<0.001	<0.001	<0.001	<0.001	<0.001
	01/20/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/13/11	<0.001	<0.001	<0.001	<0.001	<0.001
	08/01/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/26/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/05/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/26/12	<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	<0.001	<0.001	<0.001	<0.001	<0.001
	04/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300

Table 3

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Tract 13 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	04/06/10	<0.001	<0.001	<0.001	<0.001	<0.001
	07/12/10	<0.001	<0.001	<0.001	<0.001	<0.001
	10/11/10	<0.001	<0.001	<0.001	<0.001	<0.001
	01/20/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/13/11	<0.001	<0.001	<0.001	<0.001	<0.001
	08/01/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/26/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/05/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/26/12	<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	<0.001	<0.001	<0.001	<0.001	<0.001
	04/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-5	01/20/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/13/11	<0.001	<0.001	<0.001	<0.001	<0.001
	08/01/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/26/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/05/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/26/12	<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	<0.001	<0.001	<0.001	<0.001	<0.001
	04/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-6	01/20/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/13/11	<0.001	<0.001	<0.001	<0.001	<0.001
	08/01/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/26/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/05/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/26/12	<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	<0.001	<0.001	<0.001	<0.001	<0.001
	04/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/30/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
	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
MW-8	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300

APPENDIX A
SOIL BORING LOGS

SAMPLE LOG

Boring/Well MW-7
GPS 33.14444 -103.77370
Project Number 115-6403132A
Client: Celero Energy II, LP
Site Name Rock Queen Tract 13 Tank Battery
Site Location Chaves County, New Mexico
Letter K, Section 36, Township 13 South, Range 31 East
Total Depth 193
Date Installed: 1/29/14 - 1/30/14

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
5-6	--	Caliche, sandstone (40%) and chert (5%)
10-11	--	Caliche, sandstone (40%) and chert (5%)
15-16	--	Caliche and sandstone (10%)
20-21	--	Caliche, sandstone (50%) and chert (10%)
25-26	--	Caliche, sandstone (20%) and chert (5%)
30-31	--	Light tan fine grained sand and sandstone (30%)
35-36	--	Light tan fine grained sand and sandstone (15%)
40-41	--	Light brown fine grained sand and sandstone (15%)
45-45	--	Light brown fine grained sand and sandstone (10%)
50-51	--	Light brown fine grained sand
55-56	--	Light brown fine grained sand
60-61	--	Light brown fine grained sand
65-66	--	Light brown fine grained sand
70-71	--	Light brown fine grained sand
75-79	--	Light brown fine grained sand
80-81	--	Light brown fine grained sand
85-89	--	Light brown fine grained sand with white clay (10%)
90-91	--	Light brown fine grained sand with white clay (10%)
95-96	--	Light brown fine grained sand with white clay (10%)
100-101	--	Light brown fine grained sand with white clay (10%)
105-106	--	Light brown find grained sand with white clay (30%)
110-111	--	Light brown find grained sand with white clay (30%)

SAMPLE LOG

Boring/Well MW-7
GPS 33.14444 -103.77370
Project Number 115-6403132A
Client: Celero Energy II, LP
Site Name Rock Queen Tract 13 Tank Battery
Site Location Chaves County, New Mexico
Letter K, Section 36, Township 13 South, Range 31 East
Total Depth 193
Date Installed: 1/29/14 - 1/30/14

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
115-116	--	Light brown fine grained sand, white clay (10%) and sandsgtone (30%)
120-121	--	Light brown fine grained sand, white clay (10%) and sandsgtone (30%)
125-126	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
130-131	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
135-136	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
140-141	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
145-146	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
150-151	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
155-156	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
160-161	--	Light brown fine graind sand, white clay (20%) and sandstone (50%)
165-166	--	Brown fine grained sand, sandstone (10%), and white and brown clay (30%)
170-171	--	Brown fine grained sand, sandstone (10%), and white and brown clay (30%)
175-176	--	Brown fine grained sand, sandstone (10%), and white and brown clay (30%)
180-181	--	Brown fine grained sand and brown clay (40%)
185-186	--	Brown fine grained sand and brown clay (40%)
190-191	--	Brown fine grained sand, red and white clay (40%) and sandstone (20%)
193	--	Brown fine grained sand, sandstone (20%) and red clay (50%)

Total Depth: 193'

SAMPLE LOG

Boring/Well MW-8
GPS 33.14658 -103.77309
Project Number 114-6401630
Client: Celero Energy II, LP
Site Name Rock Queen Tract 13 Tank Battery
Site Location Chaves County, New Mexico
Letter K, Section 36, Township 13 South, Range 31 East
Total Depth 180
Date Installed: 1/28/14 - 1/29/14

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
5-6	--	Caliche, sandstone (30%) and chert (15%)
10-11	--	Caliche, sandstone (20%) and chert (20%)
15-16	--	Caliche, sandstone (10%) and chert (10%)
20-21	--	Caliche, sandstone (10%) and chert (10%)
25-26	--	Caliche and sandstone (10%)
30-31	--	Caliche
35-36	--	Caliche
40-41	--	Caliche
45-45	--	Tan medium grained sand
50-51	--	Tan medium grained sand
55-56	--	Tan medium grained sand
60-61	--	Light brown medium to fine grained sand
65-66	--	Light brown medium to fine grained sand
70-71	--	Light brown medium to fine grained sand
75-79	--	Light brown fine grained sand
80-81	--	Light brown fine grained sand
85-89	--	Light brown fine grained sand
90-91	--	Light brown fine grained sand
95-96	--	Light brown fine grained sand
100-101	--	Light brown fine grained sand
105-106	--	Light brown fine grained sand and clay (20%)
110-111	--	Light brown fine grained sand and white clay (10%)

SAMPLE LOG

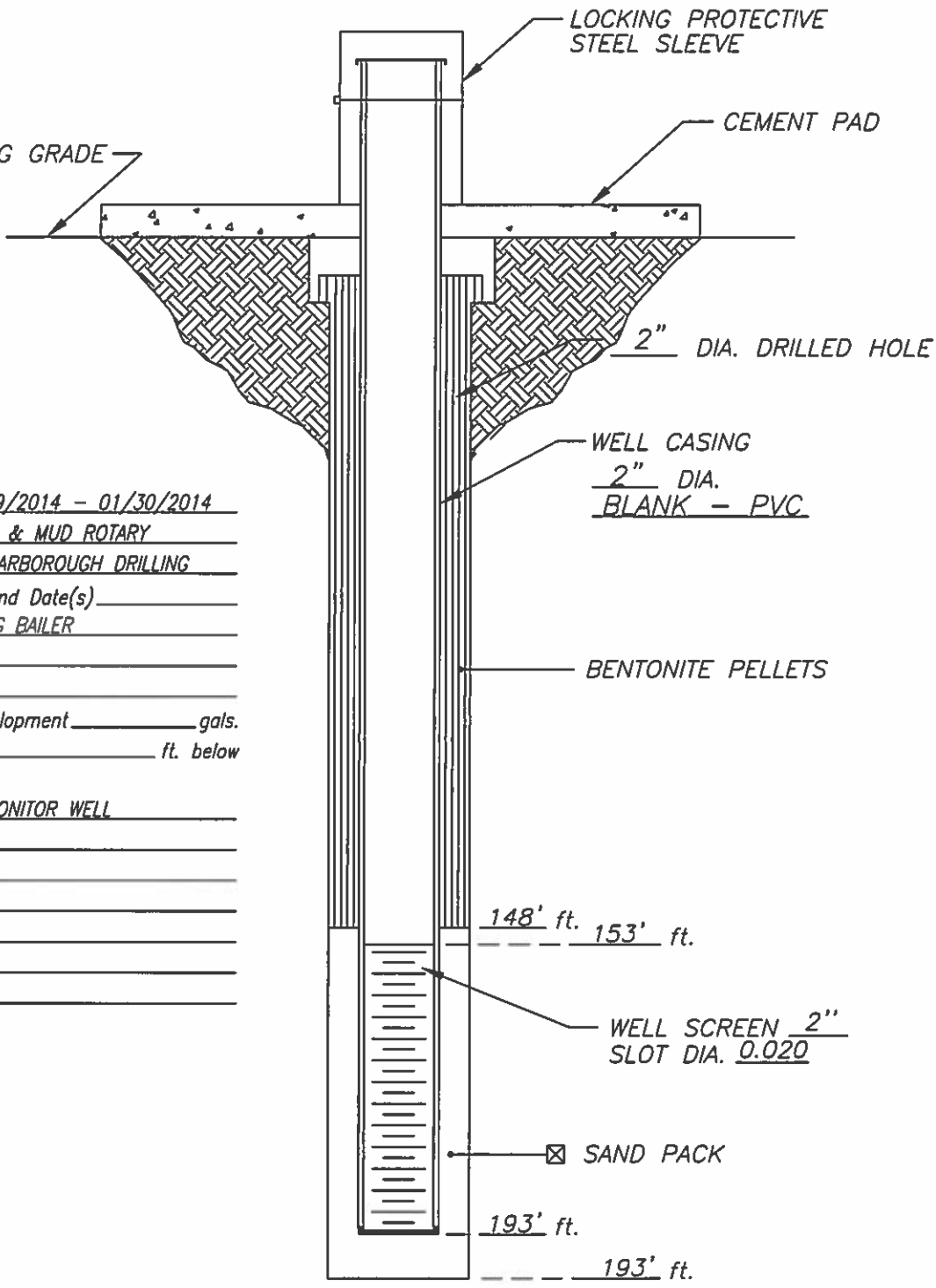
Boring/Well MW-8
GPS 33.14658 -103.77309
Project Number 114-6401630
Client: Celero Energy II, LP
Site Name Rock Queen Tract 13 Tank Battery
Site Location Chaves County, New Mexico
Letter K, Section 36, Township 13 South, Range 31 East
Total Depth 180
Date Installed: 1/28/14 - 1/29/14

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
115-116	--	Light brown fine grained sand, white clay (10%) and sandsgtone (15%)
120-121	--	Light brown fine grained sand, white clay (20%) and sandsgtone (20%)
125-126	--	Light brown fine graind sand, white clay (10%) and sandstone (50%)
130-131	--	Light brown fine graind sand, white clay (10%) and sandstone (50%)
135-136	--	Light brown fine graind sand, white clay (10%) and sandstone (50%)
140-141	--	Light brown fine graind sand, white clay (10%) and sandstone (50%)
145-146	--	Light brown fine grained sand, white clay (10%) and sandstone (80%)
150-151	--	Light brown fine grained sand, white clay (15%) and sandstone (80%)
155-156	--	Light brown fine grained sand, white clay (15%) and sandstone (80%)
160-161	--	Light brown fine grained sand, white clay (15%) and sandstone (80%)
165-166	--	Light brown fine grained sand, white clay (15%) and sandstone (80%)
170-171	--	Light brown fine grained sand, white clay (15%) and sandstone (80%)
175-176	--	Sand stone and brown clay (10%)
180-181	--	Fine brown sand (5%), white clay (10%) and brown clay (75%)

Total Depth: 180'

APPENDIX B
MONITOR WELL COMPLETION DIAGRAMS

WELL CONSTRUCTION LOG



Installation Date(s) 01/29/2014 - 01/30/2014
Drilling Method AIR & MUD ROTARY
Drilling Contractor SCHARBOROUGH DRILLING
Development Technique(s) and Date(s) RIG BAILER

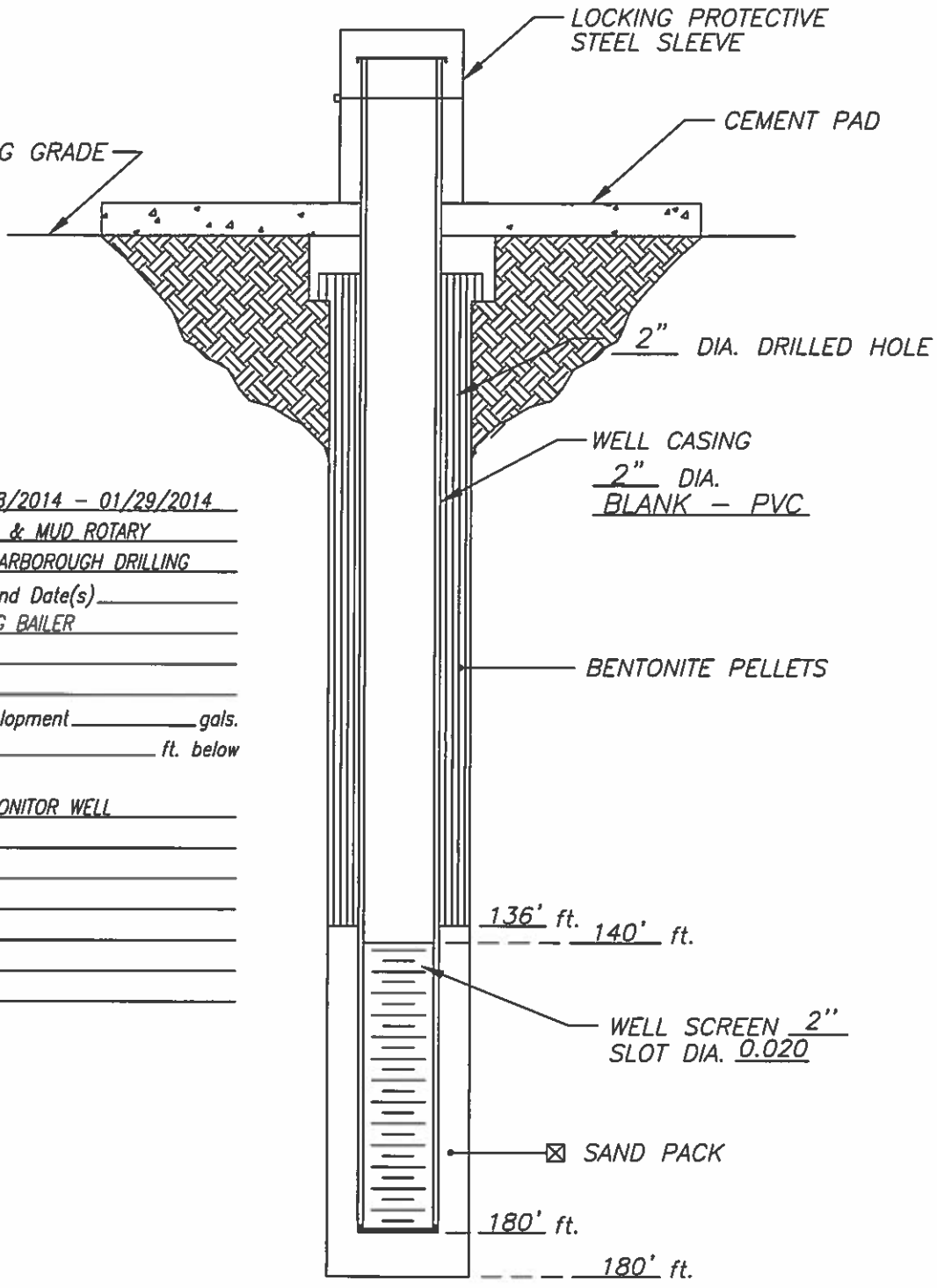
Water Removed During Development _____ gals.
Static Depth to Water _____ ft. below Ground Level
Well Purpose MONITOR WELL

Remarks

DATE: 02/10/2013	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: ROCK QUEEN TRACT 13 TB	MW-7
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401630

WELL CONSTRUCTION LOG



Installation Date(s) 01/28/2014 – 01/29/2014
Drilling Method AIR & MUD ROTARY
Drilling Contractor SCHARBOROUGH DRILLING
Development Technique(s) and Date(s) RIG BAILER

Water Removed During Development _____ gals.
Static Depth to Water _____ ft. below Ground Level
Well Purpose MONITOR WELL

Remarks

DATE: 02/10/2013	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: ROCK QUEEN TRACT 13 TB	MW–8
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401630

APPENDIX C
LABORATORY ANALYTICAL RESULTS

TRACEANALYSIS, INC.

6701 Aberdeen Avenue, Suite 9 Lubbock, Texas 79424 800-378-1296 806-794-1296 FAX 806-794-1296
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: 14030417

Project Location: Chavez Co., NM
Project Name: Celero/Rock Queen Unit Tract #13
Project Number: 114-6401630

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
356520	MW-1	water	2014-03-01	11:00	2014-03-03
356521	MW-2	water	2014-03-01	10:40	2014-03-03
356522	MW-3	water	2014-03-01	11:25	2014-03-03
356523	MW-4	water	2014-03-01	11:15	2014-03-03
356524	MW-5	water	2014-03-01	10:50	2014-03-03
356525	MW-6	water	2014-03-01	10:15	2014-03-03
356526	MW-7	water	2014-03-01	10:25	2014-03-03
356527	MW-8	water	2014-03-01	10:05	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

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Case Narrative

Samples for project Celero/Rock Queen Unit Tract #13 were received by TraceAnalysis, Inc. on 2014-03-03 and assigned to work order 14030417. Samples for work order 14030417 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	93157	2014-03-07 at 10:43	110193	2014-03-07 at 13:27
Alkalinity	SM 2320B	93157	2014-03-07 at 10:43	110194	2014-03-10 at 13:32
BTEX	S 8021B	92992	2014-03-08 at 10:07	109973	2014-03-09 at 20:19
BTEX	S 8021B	93006	2014-03-10 at 10:18	109990	2014-03-10 at 11:28
Ca, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Chloride (IC)	E 300.0	93147	2014-03-11 at 15:29	110165	2014-03-11 at 15:26
Chloride (IC)	E 300.0	93149	2014-03-07 at 22:57	110167	2014-03-07 at 22:57
Chloride (IC)	E 300.0	93190	2014-03-12 at 23:05	110217	2014-03-12 at 23:05
Chloride (IC)	E 300.0	93206	2014-03-14 at 18:53	110230	2014-03-14 at 18:53
Hardness	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
K, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Mg, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Na, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
pH	SM 4500-H+	92947	2014-03-04 at 08:23	110112	2014-03-04 at 15:46
pH	SM 4500-H+	92947	2014-03-04 at 08:23	110113	2014-03-04 at 15:48
SO4 (IC)	E 300.0	93147	2014-03-11 at 15:29	110165	2014-03-11 at 15:26
SO4 (IC)	E 300.0	93149	2014-03-07 at 22:57	110167	2014-03-07 at 22:57
TDS	SM 2540C	92966	2014-03-06 at 07:28	110085	2014-03-07 at 17:43
TDS	SM 2540C	92983	2014-03-06 at 14:23	110086	2014-03-12 at 14:55

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 14030417 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: 356520 - MW-1

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**223**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**223**	mg/L as CaCo3	1	20.0

Sample: 356520 - MW-1

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109990	Date Analyzed:	2014-03-10	Analyzed By:	AK
Prep Batch:	93006	Sample Preparation:	2014-03-10	Prepared By:	AK

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

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0976	mg/L	1	0.100	98	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0699	mg/L	1	0.100	70	70 - 130

Sample: 356520 - MW-1

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Dissolved Calcium		2	**148**		mg/L	1	1.00
Dissolved Potassium		2	**8.99**		mg/L	1	1.00
Dissolved Magnesium		2	**2.79**		mg/L	1	1.00
Dissolved Sodium	Qr,Q•	2	**37.2**		mg/L	1	1.00

Sample: 356520 - MW-1

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110167	Date Analyzed:	2014-03-07	Analyzed By:	JR
Prep Batch:	93149	Sample Preparation:	2014-03-07	Prepared By:	JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Chloride		1	**77.1**		mg/L	5	2.50

Sample: 356520 - MW-1

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Hardness (by ICP)			**381**		mg eq CaCO3/L	1	0.00

Sample: 356520 - MW-1

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

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
pH		3	**7.37**		s.u.	1	0.00

Sample: 356520 - MW-1

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110167	Date Analyzed:	2014-03-07	Analyzed By:	JR
Prep Batch:	93149	Sample Preparation:	2014-03-07	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**51.1**	mg/L	5	2.50

Sample: 356520 - MW-1

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110085	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92966	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**584**	mg/L	1	2.50

Sample: 356521 - MW-2

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**149**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**149**	mg/L as CaCo3	1	20.0

Sample: 356521 - MW-2

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109973	Date Analyzed:	2014-03-09	Analyzed By:	AK
Prep Batch:	92992	Sample Preparation:	2014-03-08	Prepared By:	AK

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

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0959	mg/L	1	0.100	96	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0695	mg/L	1	0.100	70	70 - 130

Sample: 356521 - MW-2

Laboratory: Lubbock
Analysis: Cations | Analytical Method: S 6010C | Prep Method: S 3005A
QC Batch: 110300 | Date Analyzed: 2014-03-18 | Analyzed By: LM
Prep Batch: 93203 | Sample Preparation: 2014-03-17 | Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**1590**	mg/L	10	1.00
Dissolved Potassium		2	**40.1**	mg/L	1	1.00
Dissolved Magnesium		2	**205**	mg/L	10	1.00
Dissolved Sodium	Q1,Q4	2	**3570**	mg/L	10	1.00

Sample: 356521 - MW-2

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**8010**	mg/L	500	2.50

Sample: 356521 - MW-2

Laboratory: Lubbock
Analysis: Hardness | Analytical Method: S 6010C | Prep Method: N/A
QC Batch: 110300 | Date Analyzed: 2014-03-18 | Analyzed By: LM
Prep Batch: 93203 | Sample Preparation: 2014-03-17 | Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**4810**	mg eq CaCO3/L	10	0.00

Sample: 356521 - MW-2

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

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

Sample: 356521 - MW-2

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110167	Date Analyzed:	2014-03-07	Analyzed By:	JR
Prep Batch:	93149	Sample Preparation:	2014-03-07	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**176**	mg/L	5	2.50

Sample: 356521 - MW-2

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110085	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92966	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**16500**	mg/L	10	2.50

Sample: 356522 - MW-3

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**192**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**192**	mg/L as CaCo3	1	20.0

Sample: 356522 - MW-3

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109990	Date Analyzed:	2014-03-10	Analyzed By:	AK
Prep Batch:	93006	Sample Preparation:	2014-03-10	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)			0.0988	mg/L	1	0.100	99	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0702	mg/L	1	0.100	70	70 - 130

Sample: 356522 - MW-3

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**159**	mg/L	1	1.00
Dissolved Potassium		2	**7.94**	mg/L	1	1.00
Dissolved Magnesium		2	**6.66**	mg/L	1	1.00

continued ...

sample 356522 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qr,Q*	2	**78.6**	mg/L	1	1.00

Sample: 356522 - MW-3

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110167	Date Analyzed:	2014-03-07	Analyzed By:	JR
Prep Batch:	93149	Sample Preparation:	2014-03-07	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**228**	mg/L	10	2.50

Sample: 356522 - MW-3

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**424**	mg eq CaCO3/L	1	0.00

Sample: 356522 - MW-3

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
pH		3	**7.37**	s.u.	1	0.00

Sample: 356522 - MW-3

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110167	Date Analyzed:	2014-03-07	Analyzed By:	JR
Prep Batch:	93149	Sample Preparation:	2014-03-07	Prepared By:	JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Sulfate		1	**51.0**		mg/L	10	2.50

Sample: 356522 - MW-3

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110085	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92966	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Total Dissolved Solids		3	**810**		mg/L	1	2.50

Sample: 356523 - MW-4

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

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Hydroxide Alkalinity	U	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	**200**		mg/L as CaCo3	1	20.0
Total Alkalinity		3	**200**		mg/L as CaCo3	1	20.0

Sample: 356523 - MW-4

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109973	Date Analyzed:	2014-03-09	Analyzed By:	AK
Prep Batch:	92992	Sample Preparation:	2014-03-08	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)			0.0987	mg/L	1	0.100	99	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0701	mg/L	1	0.100	70	70 - 130

Sample: 356523 - MW-4

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**123**	mg/L	1	1.00
Dissolved Potassium		2	**5.67**	mg/L	1	1.00
Dissolved Magnesium		2	**3.01**	mg/L	1	1.00
Dissolved Sodium	Qe, Q8	2	**53.0**	mg/L	1	1.00

Sample: 356523 - MW-4

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	Sample Preparation:	2014-03-11	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	Q8	1	**97.6**	mg/L	5	2.50

Sample: 356523 - MW-4

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**320**	mg eq CaCO3/L	1	0.00

Sample: 356523 - MW-4

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110113	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	**7.42**	s.u.	1	0.00

Sample: 356523 - MW-4

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	Sample Preparation:	2014-03-11	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**44.7**	mg/L	5	2.50

Sample: 356523 - MW-4

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110086	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92983	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**586**	mg/L	1	2.50

Sample: 356524 - MW-5

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	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	**169**	mg/L as CaCo3	1	20.0
Total Alkalinity		a	**169**	mg/L as CaCo3	1	20.0

Sample: 356524 - MW-5

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109973	Date Analyzed:	2014-03-09	Analyzed By:	AK
Prep Batch:	92992	Sample Preparation:	2014-03-08	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		a	<0.00100	mg/L	1	0.00100
Xylene		a	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0972	mg/L	1	0.100	97	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0699	mg/L	1	0.100	70	70 - 130

Sample: 356524 - MW-5

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		a	**381**	mg/L	1	1.00
Dissolved Potassium		a	**12.6**	mg/L	1	1.00
Dissolved Magnesium		a	**37.6**	mg/L	1	1.00

continued ...

sample 356524 continued ...

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Dissolved Sodium	Q1,Q8	2	**181**		mg/L	1	1.00

Sample: 356524 - MW-5

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	Sample Preparation:	2014-03-11	Prepared By:	JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Chloride	Q8	1	**798**		mg/L	50	2.50

Sample: 356524 - MW-5

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Hardness (by ICP)			**1110**		mg eq CaCO3/L	1	0.00

Sample: 356524 - MW-5

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110113	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	**7.12**		s.u.	1	0.00

Sample: 356524 - MW-5

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	Sample Preparation:	2014-03-11	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**37.6**	mg/L	5	2.50

Sample: 356524 - MW-5

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110086	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92983	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**2160**	mg/L	2	2.50

Sample: 356525 - MW-6

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**183**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**183**	mg/L as CaCo3	1	20.0

Sample: 356525 - MW-6

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109990	Date Analyzed:	2014-03-10	Analyzed By:	AK
Prep Batch:	93006	Sample Preparation:	2014-03-10	Prepared By:	AK

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

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.100	mg/L	1	0.100	100	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0713	mg/L	1	0.100	71	70 - 130

Sample: 356525 - MW-6

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**39.5**	mg/L	1	1.00
Dissolved Potassium		2	**72.0**	mg/L	1	1.00
Dissolved Magnesium		2	**41.6**	mg/L	1	1.00
Dissolved Sodium	Q1 Q2	2	**2020**	mg/L	10	1.00

Sample: 356525 - MW-6

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110217	Date Analyzed:	2014-03-12	Analyzed By:	JR
Prep Batch:	93190	Sample Preparation:	2014-03-12	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**3030**	mg/L	100	2.50

Sample: 356525 - MW-6

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**270**	mg eq CaCO3/L	1	0.00

Sample: 356525 - MW-6

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110113	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	**7.70**	s.u.	1	0.00

Sample: 356525 - MW-6

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	Sample Preparation:	2014-03-11	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**67.5**	mg/L	5	2.50

Sample: 356525 - MW-6

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110086	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92983	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**5230**	mg/L	5	2.50

Sample: 356526 - MW-7

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	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	**321**	mg/L as CaCo3	1	20.0
Total Alkalinity		a	**321**	mg/L as CaCo3	1	20.0

Sample: 356526 - MW-7

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109973	Date Analyzed:	2014-03-09	Analyzed By:	AK
Prep Batch:	92992	Sample Preparation:	2014-03-08	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)			0.0962	mg/L	1	0.100	96	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0697	mg/L	1	0.100	70	70 - 130

Sample: 356526 - MW-7

Laboratory:	Lubbock				
Analysis:	Cations	Analytical Method:	S 6010C	Prep Method:	S 3005A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		a	**84.4**	mg/L	1	1.00
Dissolved Potassium		a	**33.2**	mg/L	1	1.00
Dissolved Magnesium		a	**25.0**	mg/L	1	1.00

continued ...

sample 356526 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Qr,Qs	2	**1940**	mg/L	10	1.00

Sample: 356526 - MW-7

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110217	Date Analyzed:	2014-03-12	Analyzed By:	JR
Prep Batch:	93190	Sample Preparation:	2014-03-12	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**2780**	mg/L	100	2.50

Sample: 356526 - MW-7

Laboratory:	Lubbock				
Analysis:	Hardness	Analytical Method:	S 6010C	Prep Method:	N/A
QC Batch:	110300	Date Analyzed:	2014-03-18	Analyzed By:	LM
Prep Batch:	93203	Sample Preparation:	2014-03-17	Prepared By:	PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**314**	mg eq CaCO3/L	1	0.00

Sample: 356526 - MW-7

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110113	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	**7.77**	s.u.	1	0.00

Sample: 356526 - MW-7

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	Sample Preparation:	2014-03-11	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**108**	mg/L	5	2.50

Sample: 356526 - MW-7

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110086	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92983	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**4730**	mg/L	5	2.50

Sample: 356527 - MW-8

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	110194	Date Analyzed:	2014-03-10	Analyzed By:	AR
Prep Batch:	93157	Sample Preparation:	2014-03-11	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**215**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**215**	mg/L as CaCo3	1	20.0

Sample: 356527 - MW-8

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	109973	Date Analyzed:	2014-03-09	Analyzed By:	AK
Prep Batch:	92992	Sample Preparation:	2014-03-08	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)			0.101	mg/L	1	0.100	101	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0708	mg/L	1	0.100	71	70 - 130

Sample: 356527 - MW-8

Laboratory: Lubbock
Analysis: Cations | Analytical Method: S 6010C | Prep Method: S 3005A
QC Batch: 110300 | Date Analyzed: 2014-03-18 | Analyzed By: LM
Prep Batch: 93203 | Sample Preparation: 2014-03-17 | Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**37.5**	mg/L	1	1.00
Dissolved Potassium		2	**6.72**	mg/L	1	1.00
Dissolved Magnesium	U	2	<1.00	mg/L	1	1.00
Dissolved Sodium	Qr, Q4	2	**67.5**	mg/L	1	1.00

Sample: 356527 - MW-8

Laboratory: El Paso
Analysis: Chloride (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110165 | Date Analyzed: 2014-03-11 | Analyzed By: JR
Prep Batch: 93147 | Sample Preparation: 2014-03-11 | Prepared By: JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	Q4	1	**36.2**	mg/L	1	2.50

Sample: 356527 - MW-8

Laboratory: Lubbock
Analysis: Hardness | Analytical Method: S 6010C | Prep Method: N/A
QC Batch: 110300 | Date Analyzed: 2014-03-18 | Analyzed By: LM
Prep Batch: 93203 | Sample Preparation: 2014-03-17 | Prepared By: PM

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**93.6**	mg eq CaCO3/L	1	0.00

Sample: 356527 - MW-8

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110113	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	**7.61**	s.u.	1	0.00

Sample: 356527 - MW-8

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	Sample Preparation:	2014-03-11	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**25.1**	mg/L	1	2.50

Sample: 356527 - MW-8

Laboratory:	Midland				
Analysis:	TDS	Analytical Method:	SM 2540C	Prep Method:	N/A
QC Batch:	110086	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92983	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**353**	mg/L	1	2.50

Method Blanks

Method Blank (1) QC Batch: 109973

QC Batch:	109973	Date Analyzed:	2014-03-09	Analyzed By:	AK
Prep Batch:	92992	QC Preparation:	2014-03-08	Prepared By:	AK

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

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0997	mg/L	1	0.100	100	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0717	mg/L	1	0.100	72	70 - 130

Method Blank (1) QC Batch: 109990

QC Batch:	109990	Date Analyzed:	2014-03-10	Analyzed By:	AK
Prep Batch:	93006	QC Preparation:	2014-03-10	Prepared By:	AK

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

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0997	mg/L	1	0.100	100	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0728	mg/L	1	0.100	73	70 - 130

Method Blank (1) QC Batch: 110085

QC Batch:	110085	Date Analyzed:	2014-03-07	Analyzed By:	AR
Prep Batch:	92966	QC Preparation:	2014-03-06	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: 110086

QC Batch:	110086	Date Analyzed:	2014-03-12	Analyzed By:	AR
Prep Batch:	92983	QC Preparation:	2014-03-06	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: 110165

QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	QC Preparation:	2014-03-11	Prepared By:	JR

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

Method Blank (1) QC Batch: 110165

QC Batch:	110165	Date Analyzed:	2014-03-11	Analyzed By:	JR
Prep Batch:	93147	QC Preparation:	2014-03-11	Prepared By:	JR

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

Method Blank (1) QC Batch: 110167

QC Batch:	110167	Date Analyzed:	2014-03-07	Analyzed By:	JR
Prep Batch:	93149	QC Preparation:	2014-03-07	Prepared By:	JR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1	1.26	mg/L	2.5

Method Blank (1) QC Batch: 110167

QC Batch:	110167	Date Analyzed:	2014-03-07	Analyzed By:	JR
Prep Batch:	93149	QC Preparation:	2014-03-07	Prepared By:	JR

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

Method Blank (1) QC Batch: 110193

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

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

Method Blank (1) QC Batch: 110194

QC Batch:	110194	Date Analyzed:	2014-03-10	Analyzed By:	AR
Prep Batch:	93157	QC Preparation:	2014-03-07	Prepared By:	AR

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

continued ...

method blank continued ...

Parameter	Flag	Cert	MDL Result	Units	RL
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: 110217

QC Batch: 110217 Date Analyzed: 2014-03-12 Analyzed By: JR
Prep Batch: 93190 QC Preparation: 2014-03-12 Prepared By: JR

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

Method Blank (1) QC Batch: 110230

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

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

Method Blank (1) QC Batch: 110300

QC Batch: 110300 Date Analyzed: 2014-03-18 Analyzed By: LM
Prep Batch: 93203 QC Preparation: 2014-03-17 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

Duplicates (1) Duplicated Sample: 356501

QC Batch: 110085 | Date Analyzed: 2014-03-07 | Analyzed By: AR
Prep Batch: 92966 | QC Preparation: 2014-03-06 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	3	60400	66700	mg/L	50	10	10

Duplicates (1) Duplicated Sample: 356535

QC Batch: 110086 | Date Analyzed: 2014-03-12 | Analyzed By: AR
Prep Batch: 92983 | QC Preparation: 2014-03-06 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Total Dissolved Solids	3	61000	61000	mg/L	50	0	10

Duplicates (1) Duplicated Sample: 356484

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

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

Duplicates (1) Duplicated Sample: 356523

QC Batch: 110113 | Date Analyzed: 2014-03-04 | Analyzed By: AR
Prep Batch: 92947 | QC Preparation: 2014-03-04 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	3	7.35	7.42	s.u.	1	1	10

Duplicates (1) Duplicated Sample: 356523

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

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity	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	203	200	mg/L as CaCo3	1	2	20
Total Alkalinity	J	203	200	mg/L as CaCo3	1	2	20

Duplicates (1) Duplicated Sample: 356539

QC Batch: 110194 | Date Analyzed: 2014-03-10 | Analyzed By: AR
Prep Batch: 93157 | QC Preparation: 2014-03-07 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity	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	116	123	mg/L as CaCo3	1	6	20
Total Alkalinity	J	116	123	mg/L as CaCo3	1	6	20

Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

QC Batch: 109973 | Date Analyzed: 2014-03-09 | Analyzed By: AK
Prep Batch: 92992 | QC Preparation: 2014-03-08 | Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		a	0.107	mg/L	1	0.100	<0.000238	107	70 - 130
Toluene		a	0.107	mg/L	1	0.100	<0.000181	107	70 - 130
Ethylbenzene		a	0.102	mg/L	1	0.100	<0.000247	102	70 - 130
Xylene		a	0.312	mg/L	1	0.300	<0.000189	104	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	0.110	mg/L	1	0.100	<0.000238	110	70 - 130	3	20
Toluene		a	0.110	mg/L	1	0.100	<0.000181	110	70 - 130	3	20
Ethylbenzene		a	0.106	mg/L	1	0.100	<0.000247	106	70 - 130	4	20
Xylene		a	0.322	mg/L	1	0.300	<0.000189	107	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)	0.101	0.102	mg/L	1	0.100	101	102	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0864	0.0869	mg/L	1	0.100	86	87	70 - 130

Laboratory Control Spike (LCS-1)

QC Batch: 109990 | Date Analyzed: 2014-03-10 | Analyzed By: AK
Prep Batch: 93006 | QC Preparation: 2014-03-10 | Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		a	0.106	mg/L	1	0.100	<0.000238	106	70 - 130
Toluene		a	0.107	mg/L	1	0.100	<0.000181	107	70 - 130
Ethylbenzene		a	0.103	mg/L	1	0.100	<0.000247	103	70 - 130
Xylene		a	0.314	mg/L	1	0.300	<0.000189	105	70 - 130

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Benzene		3	0.110	mg/L	1	0.100	<0.000238	110	70 - 130	4	20
Toluene		3	0.111	mg/L	1	0.100	<0.000181	111	70 - 130	4	20
Ethylbenzene		3	0.106	mg/L	1	0.100	<0.000247	106	70 - 130	3	20
Xylene		3	0.322	mg/L	1	0.300	<0.000189	107	70 - 130	2	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)	0.102	0.102	mg/L	1	0.100	102	102	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0878	0.0869	mg/L	1	0.100	88	87	70 - 130

Laboratory Control Spike (LCS-1)

QC Batch: 110085 | Date Analyzed: 2014-03-07 | Analyzed By: AR
Prep Batch: 92966 | QC Preparation: 2014-03-06 | Prepared By: AR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		3	1010	mg/L	1	1000	<2.50	101	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	1010	mg/L	1	1000	<2.50	101	90 - 110	0	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: 110086 | Date Analyzed: 2014-03-12 | Analyzed By: AR
Prep Batch: 92983 | QC Preparation: 2014-03-06 | Prepared By: AR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Total Dissolved Solids		3	1010	mg/L	1	1000	<2.50	101	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	1040	mg/L	1	1000	<2.50	104	90 - 110	3	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: 110165 | Date Analyzed: 2014-03-11 | Analyzed By: JR
Prep Batch: 93147 | QC Preparation: 2014-03-11 | Prepared By: JR

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

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

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

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

Laboratory Control Spike (LCS-1)

QC Batch: 110165 | Date Analyzed: 2014-03-11 | Analyzed By: JR
Prep Batch: 93147 | QC Preparation: 2014-03-11 | Prepared By: JR

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

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

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

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

Laboratory Control Spike (LCS-1)

QC Batch: 110167 | Date Analyzed: 2014-03-07 | Analyzed By: JR
Prep Batch: 93149 | QC Preparation: 2014-03-07 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.3	mg/L	1	25.0	<0.678	105	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	26.4	mg/L	1	25.0	<0.678	106	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: 110167 | Date Analyzed: 2014-03-07 | Analyzed By: JR
Prep Batch: 93149 | QC Preparation: 2014-03-07 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	26.4	mg/L	1	25.0	<0.0260	106	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	26.6	mg/L	1	25.0	<0.0260	106	90 - 110	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: 110217 | Date Analyzed: 2014-03-12 | Analyzed By: JR
Prep Batch: 93190 | QC Preparation: 2014-03-12 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	26.2	mg/L	1	25.0	<0.678	105	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	26.2	mg/L	1	25.0	<0.678	105	90 - 110	0	20

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

Laboratory Control Spike (LCS-1)

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

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

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

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

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

Laboratory Control Spike (LCS-1)

QC Batch: 110300 | Date Analyzed: 2014-03-18 | Analyzed By: LM
Prep Batch: 93203 | QC Preparation: 2014-03-17 | Prepared By: PM

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	52.9	mg/L	1	50.0	<0.0441	106	85 - 115
Dissolved Potassium		2	52.1	mg/L	1	50.0	<0.0443	104	85 - 115
Dissolved Magnesium		2	51.8	mg/L	1	50.0	<0.0296	104	85 - 115
Dissolved Sodium		2	52.2	mg/L	1	50.0	<0.172	104	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	53.5	mg/L	1	50.0	<0.0441	107	85 - 115	1	20
Dissolved Potassium		2	52.6	mg/L	1	50.0	<0.0443	105	85 - 115	1	20
Dissolved Magnesium		2	51.8	mg/L	1	50.0	<0.0296	104	85 - 115	0	20
Dissolved Sodium		2	53.5	mg/L	1	50.0	<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.

Matrix Spike (MS-1) Spiked Sample: 356496

QC Batch: 109973 | Date Analyzed: 2014-03-09 | Analyzed By: AK
Prep Batch: 92992 | QC Preparation: 2014-03-08 | Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		3	0.116	mg/L	1	0.100	<0.000238	116	70 - 130
Toluene		3	0.116	mg/L	1	0.100	<0.000181	116	70 - 130
Ethylbenzene		3	0.111	mg/L	1	0.100	<0.000247	111	70 - 130
Xylene		3	0.337	mg/L	1	0.300	<0.000189	112	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	0.113	mg/L	1	0.100	<0.000238	113	70 - 130	3	20
Toluene		3	0.113	mg/L	1	0.100	<0.000181	113	70 - 130	3	20
Ethylbenzene		3	0.110	mg/L	1	0.100	<0.000247	110	70 - 130	1	20
Xylene		3	0.334	mg/L	1	0.300	<0.000189	111	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)	0.102	0.102	mg/L	1	0.1	102	102	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0882	0.0893	mg/L	1	0.1	88	89	70 - 130

Matrix Spike (MS-1) Spiked Sample: 356537

QC Batch: 109990 | Date Analyzed: 2014-03-10 | Analyzed By: AK
Prep Batch: 93006 | QC Preparation: 2014-03-10 | Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		3	0.111	mg/L	1	0.100	<0.000238	111	70 - 130
Toluene		3	0.111	mg/L	1	0.100	<0.000181	111	70 - 130
Ethylbenzene		3	0.108	mg/L	1	0.100	<0.000247	108	70 - 130
Xylene		3	0.327	mg/L	1	0.300	<0.000189	109	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	0.112	mg/L	1	0.100	<0.000238	112	70 - 130	1	20
Toluene		3	0.106	mg/L	1	0.100	<0.000181	106	70 - 130	5	20
Ethylbenzene		3	0.0890	mg/L	1	0.100	<0.000247	89	70 - 130	19	20
Xylene		3	0.269	mg/L	1	0.300	<0.000189	90	70 - 130	20	20

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

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matrix spikes continued ...

Surrogate	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
Surrogate	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	0.103	0.0929	mg/L	1	0.1	103	93	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0884	0.0827	mg/L	1	0.1	88	83	70 - 130

Matrix Spike (MS-1) Spiked Sample: 356527

QC Batch: 110165 | Date Analyzed: 2014-03-11 | Analyzed By: JR
Prep Batch: 93147 | QC Preparation: 2014-03-11 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride	Q*	Q*	1740	mg/L	55.6	1390	<37.7	122	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	Q*	Q*	1730	mg/L	55.6	1390	<37.7	122	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: 356527

QC Batch: 110165 | Date Analyzed: 2014-03-11 | Analyzed By: JR
Prep Batch: 93147 | QC Preparation: 2014-03-11 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1620	mg/L	55.6	1390	25.1	115	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	1620	mg/L	55.6	1390	25.1	115	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: 357168

QC Batch: 110167 | Date Analyzed: 2014-03-07 | Analyzed By: JR
Prep Batch: 93149 | QC Preparation: 2014-03-07 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	1960	mg/L	55.6	1390	429	110	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	1950	mg/L	55.6	1390	429	109	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: 357168

QC Batch: 110167 | Date Analyzed: 2014-03-07 | Analyzed By: JR
Prep Batch: 93149 | QC Preparation: 2014-03-07 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1710	mg/L	55.6	1390	207	108	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	1700	mg/L	55.6	1390	207	107	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: 356462

QC Batch: 110217 | Date Analyzed: 2014-03-12 | Analyzed By: JR
Prep Batch: 93190 | QC Preparation: 2014-03-12 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	388	mg/L	11.1	278	86.2	108	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	388	mg/L	11.1	278	86.2	108	80 - 120	0	20

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

Matrix Spike (MS-1) Spiked Sample: 358042

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

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

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

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

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

Matrix Spike (MS-1) Spiked Sample: 356497

QC Batch: 110300 | Date Analyzed: 2014-03-18 | Analyzed By: LM
Prep Batch: 93203 | QC Preparation: 2014-03-17 | Prepared By: PM

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	3230	mg/L	10	500	2709	104	75 - 125
Dissolved Potassium		2	762	mg/L	1	500	212.8	110	75 - 125
Dissolved Magnesium		2	1720	mg/L	10	500	1223	99	75 - 125
Dissolved Sodium	Q+	Q+ 2	20700	mg/L	100	500	14520	1236	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	3180	mg/L	10	500	2709	94	75 - 125	2	20
Dissolved Potassium		2	793	mg/L	1	500	212.8	116	75 - 125	4	20
Dissolved Magnesium		2	1660	mg/L	10	500	1223	87	75 - 125	4	20
Dissolved Sodium	Qr,Q+	Qr,Q+ 2	14000	mg/L	100	500	14520	-104	75 - 125	39	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: 109973 | Date Analyzed: 2014-03-09 | 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	2014-03-09
Toluene		3	mg/L	0.100	0.109	109	80 - 120	2014-03-09
Ethylbenzene		3	mg/L	0.100	0.105	105	80 - 120	2014-03-09
Xylene		3	mg/L	0.300	0.320	107	80 - 120	2014-03-09

Standard (CCV-2)

QC Batch: 109973 | Date Analyzed: 2014-03-09 | 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	0.113	113	80 - 120	2014-03-09
Toluene		3	mg/L	0.100	0.113	113	80 - 120	2014-03-09
Ethylbenzene		3	mg/L	0.100	0.109	109	80 - 120	2014-03-09
Xylene		3	mg/L	0.300	0.330	110	80 - 120	2014-03-09

Standard (CCV-3)

QC Batch: 109973 | Date Analyzed: 2014-03-09 | 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	2014-03-09
Toluene		3	mg/L	0.100	0.108	108	80 - 120	2014-03-09
Ethylbenzene		3	mg/L	0.100	0.102	102	80 - 120	2014-03-09
Xylene		3	mg/L	0.300	0.312	104	80 - 120	2014-03-09

Standard (CCV-1)

QC Batch: 109990 | Date Analyzed: 2014-03-10 | 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	0.105	105	80 - 120	2014-03-10
Toluene		3	mg/L	0.100	0.105	105	80 - 120	2014-03-10
Ethylbenzene		3	mg/L	0.100	0.102	102	80 - 120	2014-03-10
Xylene		3	mg/L	0.300	0.309	103	80 - 120	2014-03-10

Standard (CCV-2)

QC Batch: 109990 | Date Analyzed: 2014-03-10 | 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	0.106	106	80 - 120	2014-03-10
Toluene		3	mg/L	0.100	0.106	106	80 - 120	2014-03-10
Ethylbenzene		3	mg/L	0.100	0.102	102	80 - 120	2014-03-10
Xylene		3	mg/L	0.300	0.310	103	80 - 120	2014-03-10

Standard (CCV-3)

QC Batch: 109990 | Date Analyzed: 2014-03-10 | 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	2014-03-10
Toluene		3	mg/L	0.100	0.104	104	80 - 120	2014-03-10
Ethylbenzene		3	mg/L	0.100	0.100	100	80 - 120	2014-03-10
Xylene		3	mg/L	0.300	0.307	102	80 - 120	2014-03-10

Standard (ICV-1)

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

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

Standard (CCV-1)

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

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

Standard (ICV-1)

QC Batch: 110113 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	6.99	100	98 - 102	2014-03-04

Standard (CCV-1)

QC Batch: 110113 Date Analyzed: 2014-03-04 Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		3	s.u.	7.00	6.93	99	98 - 102	2014-03-04

Standard (CCV-1)

QC Batch: 110165 Date Analyzed: 2014-03-11 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	24.6	98	90 - 110	2014-03-11

Standard (CCV-1)

QC Batch: 110165 Date Analyzed: 2014-03-11 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	2014-03-11

Standard (CCV-2)

QC Batch: 110165 Date Analyzed: 2014-03-11 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	2014-03-11

Standard (CCV-2)

QC Batch: 110165 Date Analyzed: 2014-03-11 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	25.0	100	90 - 110	2014-03-11

Standard (CCV-3)

QC Batch: 110165 Date Analyzed: 2014-03-11 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	24.6	98	90 - 110	2014-03-11

Standard (CCV-3)

QC Batch: 110165 Date Analyzed: 2014-03-11 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	2014-03-11

Standard (CCV-1)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (CCV-1)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (CCV-2)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (CCV-2)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (CCV-3)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (CCV-3)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (CCV-4)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (CCV-4)

QC Batch: 110167 Date Analyzed: 2014-03-07 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	2014-03-07

Standard (ICV-1)

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

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

Standard (CCV-1)

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

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

Standard (ICV-1)

QC Batch: 110194 | Date Analyzed: 2014-03-10 | 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	28.0		-	2014-03-10
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	230		-	2014-03-10
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-10
Total Alkalinity		3	mg/L as CaCo3	250	258	103	90 - 110	2014-03-10

Standard (CCV-1)

QC Batch: 110194 | Date Analyzed: 2014-03-10 | 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		-	2014-03-10
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	252		-	2014-03-10
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-10
Total Alkalinity		3	mg/L as CaCo3	250	256	102	90 - 110	2014-03-10

Standard (CCV-1)

QC Batch: 110217 | Date Analyzed: 2014-03-12 | 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	2014-03-12

Standard (CCV-2)

QC Batch: 110217 | Date Analyzed: 2014-03-12 | 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	2014-03-12

Standard (CCV-3)

QC Batch: 110217 Date Analyzed: 2014-03-12 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	2014-03-12

Standard (CCV-1)

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

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

Standard (CCV-2)

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

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

Standard (CCV-3)

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

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

Standard (CCV-4)

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

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

Standard (ICV-1)

QC Batch: 110300 Date Analyzed: 2014-03-18 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	52.3	102	90 - 110	2014-03-18
Dissolved Potassium		2	mg/L	55.0	55.9	102	90 - 110	2014-03-18
Dissolved Magnesium		2	mg/L	51.0	52.1	102	90 - 110	2014-03-18
Dissolved Sodium		2	mg/L	51.0	51.4	101	90 - 110	2014-03-18

Standard (CCV-1)

QC Batch: 110300 Date Analyzed: 2014-03-18 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	45.9	90	90 - 110	2014-03-18
Dissolved Potassium		2	mg/L	55.0	50.8	92	90 - 110	2014-03-18
Dissolved Magnesium		2	mg/L	51.0	46.6	91	90 - 110	2014-03-18
Dissolved Sodium		2	mg/L	51.0	47.6	93	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.

14030417

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.: 114-6401630
PROJECT NAME: Rock Queen Tract #13

ANALYSIS REQUEST (Circle or Specify Method No.)

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, SO4,	ALK, HARDNESS				
358520	3/1/14	1100	W		X	MW-1	6		X		X		X												X				X					8
521		1040	W		X	MW-2																												7
522		1125	W		X	MW-3																												8
523		1115	W		X	MW-4																												8
524		1050	W		X	MW-5																												7
525		1015	W		X	MW-6																												7
526		1025	W		X	MW-7																												7
527		1005	W		X	MW-8																												8

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

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

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

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: STD

RUSH Charges Authorized: Yes No

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

SAMPLE CONDITION WHEN RECEIVED: -0.8

REMARKS: ~~MW-7 rec'd w/ one VOA broken~~ Midland - TDS/BTEX/pH/alk
Lubbock - cations/hardness ED - Cl/SO4

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

14030417

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.: 114-6401630
PROJECT NAME: Rock Queen Tract #13

ANALYSIS REQUEST (Circle or Specify Method No.)

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, SO4, ALK, HARDNESS	
356520	3/11/14	1100	W		X	MW-1	6		X		X		X												X				X	8
521	↓	1040	W		X	MW-2	↓		↓		↓		↓												↓				↓	7
522	↓	1125	W		X	MW-3	↓		↓		↓		↓												↓				↓	8
523	↓	1115	W		X	MW-4	↓		↓		↓		↓												↓				↓	8
524	↓	1050	W		X	MW-5	↓		↓		↓		↓												↓				↓	7
525	↓	1015	W		X	MW-6	↓		↓		↓		↓												↓				↓	7
526	↓	1025	W		X	MW-7	↓		↓		↓		↓												↓				↓	7
527	↓	1005	W		X	MW-8	↓		↓		↓		↓												↓				↓	8

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

RELINQUISHED BY: (Signature) [signature] Date: 03/03/14 Time: 1621
RECEIVED BY: (Signature) [signature] Date: 3/3/14 Time: 16:20

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

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

SAMPLED BY: (Print & Initial) CF/TH Date: Time:
SAMPLE SHIPPED BY: (Circle) FEDEX BUS AIRBILL #: 6:30 95 510 HAND DELIVERED (circled) UPS OTHER:
TETRA TECH CONTACT PERSON: GREG POPE
Results by: STD
RUSH Charges Authorized: Yes No

SAMPLE CONDITION WHEN RECEIVED: -0.8

REMARKS: ~~MW-7 acid lot [illegible]~~ Midland - TDS/BTEX/pH/alk
Lubbock - cations/hardness ED - Cl/SO4

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

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
356520	148	2.79	37.2	8.99	223.00	51.1	77.1				584	
356521	1590	205	3570	40.1	149.00	176	8010				16500	
356522	159	6.66	78.6	7.94	192.00	51	228				810	
356523	123	3.01	53	5.67	200.00	44.7	97.6				586	
356524	381	37.6	181	12.6	169.00	37.6	798				2160	
356525	39.5	41.6	2020	72	183.00	67.5	3030				5230	
356526	84.4	25	1940	33.2	321.00	108	2780				4730	
356527	37.5	0	67.5	6.72	215.00	25.1	36.2				353	

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*
356520	7.39	0.23	1.62	0.23	4.46	1.06	2.17	0.00	0.00	0.00	9.46	7.70	10.27896573
356521	79.34	16.87	155.30	1.03	2.98	3.66	225.96	0.00	0.00	0.00	252.53	232.61	4.107038261
356522	7.93	0.55	3.42	0.20	3.84	1.06	6.43	0.00	0.00	0.00	12.10	11.33	3.288056741
356523	6.14	0.25	2.31	0.15	4.00	0.93	2.75	0.00	0.00	0.00	8.84	7.68	6.973303652
356524	19.01	3.09	7.87	0.32	3.38	0.78	22.51	0.00	0.00	0.00	30.30	26.67	6.366515268
356525	1.97	3.42	87.87	1.84	3.66	1.41	85.48	0.00	0.00	0.00	95.11	90.54	2.458647971
356526	4.21	2.06	84.39	0.85	6.42	2.25	78.42	0.00	0.00	0.00	91.51	87.09	2.472393879
356527	1.87	0.00	2.94	0.17	4.30	0.52	1.02	0.00	0.00	0.00	4.98	5.84	7.986435338

	EC/Cation	EC/Anion				
356520	946.29533	769.8893	range	0	to	0
356521	25253.1208	23260.642	range	0	to	0
356522	1210.43566	1133.37	range	0	to	0
356523	883.59315	768.395	range	0	to	0
356524	3030.1812	2667.4412	range	0	to	0
356525	9510.6074	9054.165	range	0	to	0
356526	9150.8066	8709.236	range	0	to	0
356527	497.93976	584.3784	range	0	to	0

TDS/EC	TDS/Cat		TDS/Anion	
#DIV/0!	0.62		0.76	needs to be 0.55-0.77
#DIV/0!	0.65		0.71	needs to be 0.55-0.77
#DIV/0!	0.67		0.71	needs to be 0.55-0.77
#DIV/0!	0.66		0.76	needs to be 0.55-0.77
#DIV/0!	0.71		0.81	needs to be 0.55-0.77
#DIV/0!	0.55		0.58	needs to be 0.55-0.77
#DIV/0!	0.52		0.54	needs to be 0.55-0.77
#DIV/0!	0.71		0.60	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 13 MW-1\RQTract13MW-1slu
Title: Falling-Head Slug Test
Date: 04/28/14
Time: 15:02:00

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Date: 03/28/14
Test Well: MW-1slugin

AQUIFER DATA

Saturated Thickness: 11.62 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.716 ft
Static Water Column Height: 9.674 ft
Casing Radius: 0.083 ft
Well Radius: 0.281 ft
Well Skin Radius: 1. ft
Screen Length: 11.62 ft
Total Well Penetration Depth: 11.62 ft

No. of Observations: 59

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	9.665	1860.	9.749
120.	9.653	1920.	9.76
180.	9.589	1980.	9.798
240.	10.39	2040.	9.744
300.	10.25	2100.	9.762
360.	10.11	2160.	9.761
420.	10.04	2220.	9.772
480.	9.98	2280.	9.765
540.	9.949	2340.	9.751
600.	9.901	2400.	9.752
660.	9.875	2460.	9.762
720.	9.852	2520.	9.755
780.	9.844	2580.	9.757
840.	9.817	2640.	9.754
900.	9.82	2700.	9.766
960.	9.799	2760.	9.763
1020.	9.786	2820.	9.763
1080.	9.783	2880.	9.772
1140.	9.773	2940.	9.77
1200.	9.762	3000.	9.766
1260.	9.773	3060.	9.773
1320.	9.761	3120.	9.761
1380.	9.754	3180.	9.767
1440.	9.768	3240.	9.755
1500.	9.765	3300.	9.764
1560.	9.751	3360.	9.768
1620.	9.77	3420.	9.764
1680.	9.758	3480.	9.767
1740.	9.754	3540.	9.758
1800.	9.754		

SOLUTION

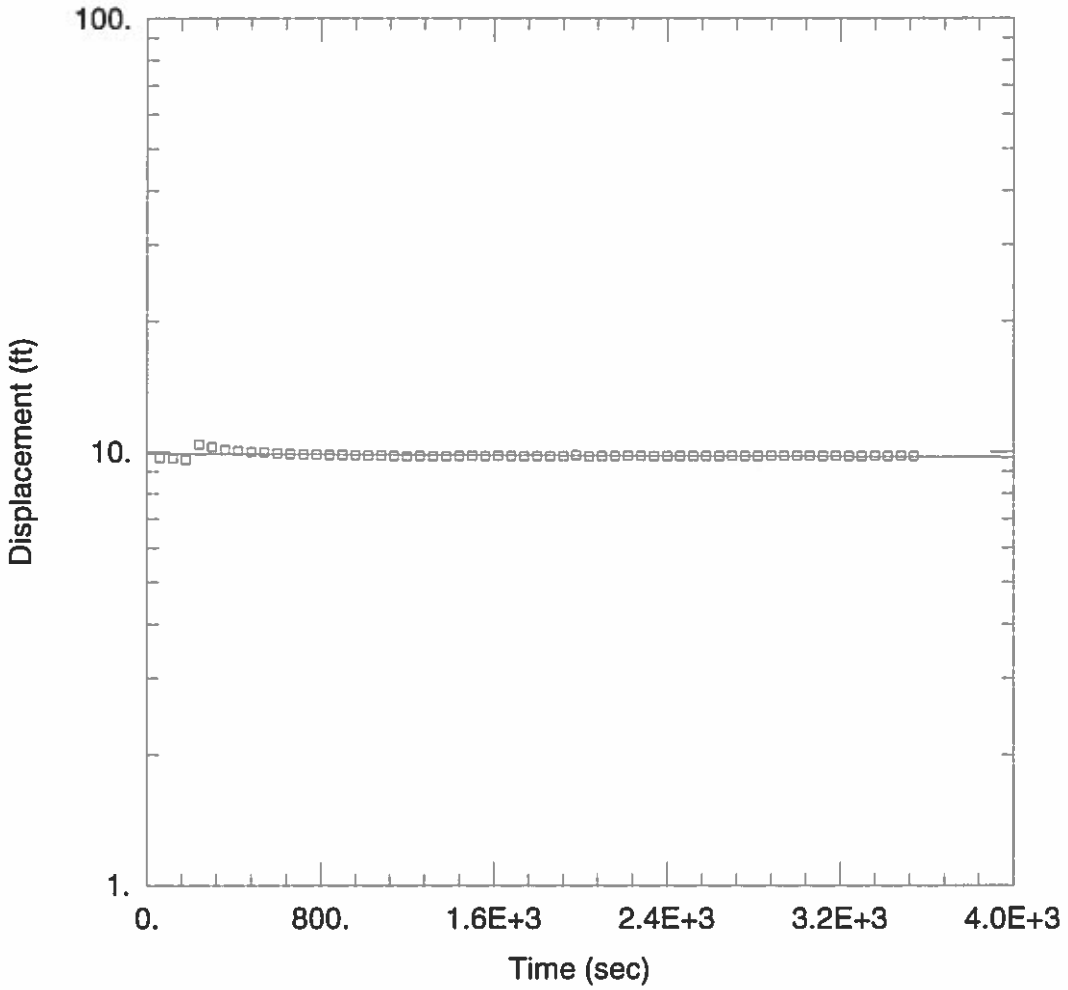
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	4.84E-5	m/day
y0	9.891	ft

K = 5.602E-8 cm/sec
T = K*b = 0.0001714 m²/day (1.984E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract13MW-1slugin.aqt
Date: 04/28/14 Time: 15:02:11

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-1slugin
Test Date: 03/28/14

AQUIFER DATA

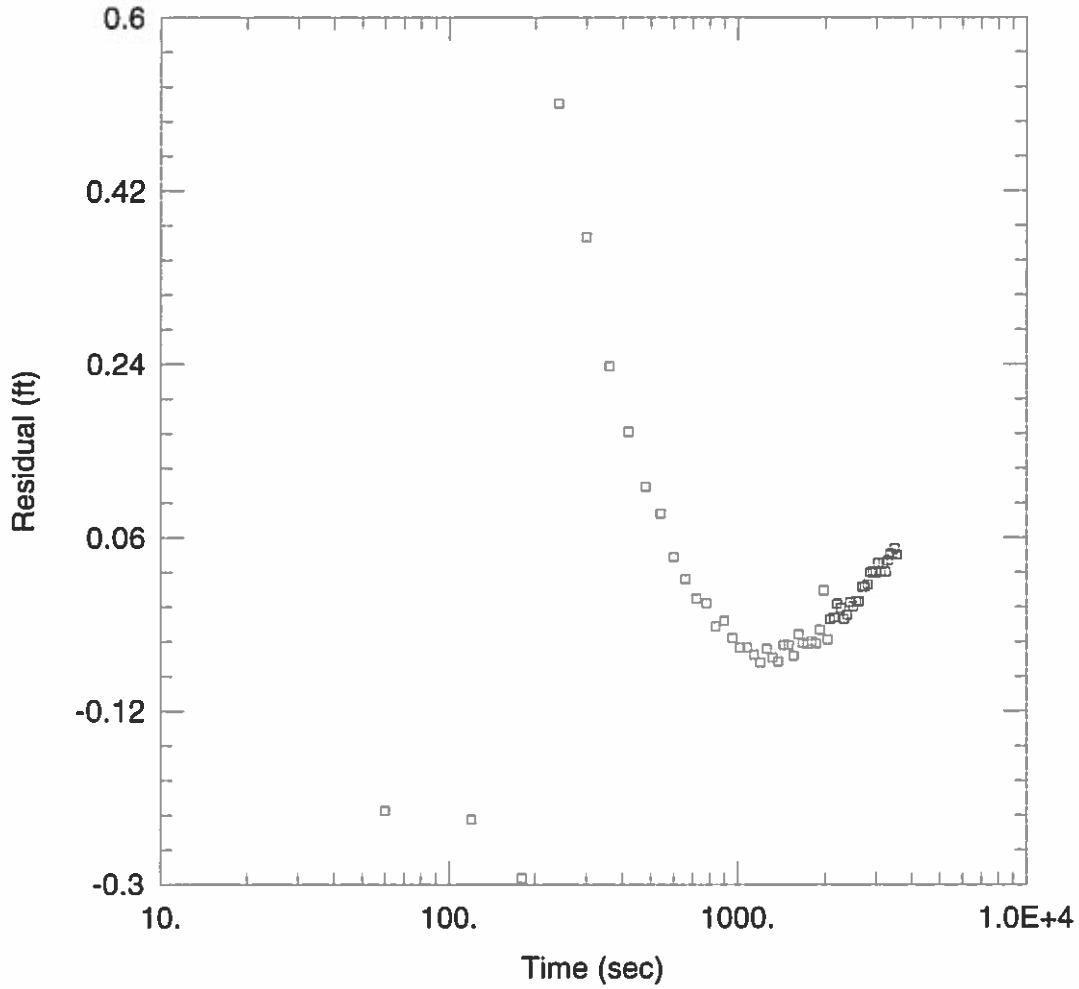
Saturated Thickness: 11.62 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.716 ft Static Water Column Height: 9.674 ft
Total Well Penetration Depth: 11.62 ft Screen Length: 11.62 ft
Casing Radius: 0.083 ft Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice
K = 4.84E-5 m/day y0 = 9.891 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract13MW-1slugin.aqt
Date: 04/28/14 Time: 15:02:18

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-1slugin
Test Date: 03/28/14

AQUIFER DATA

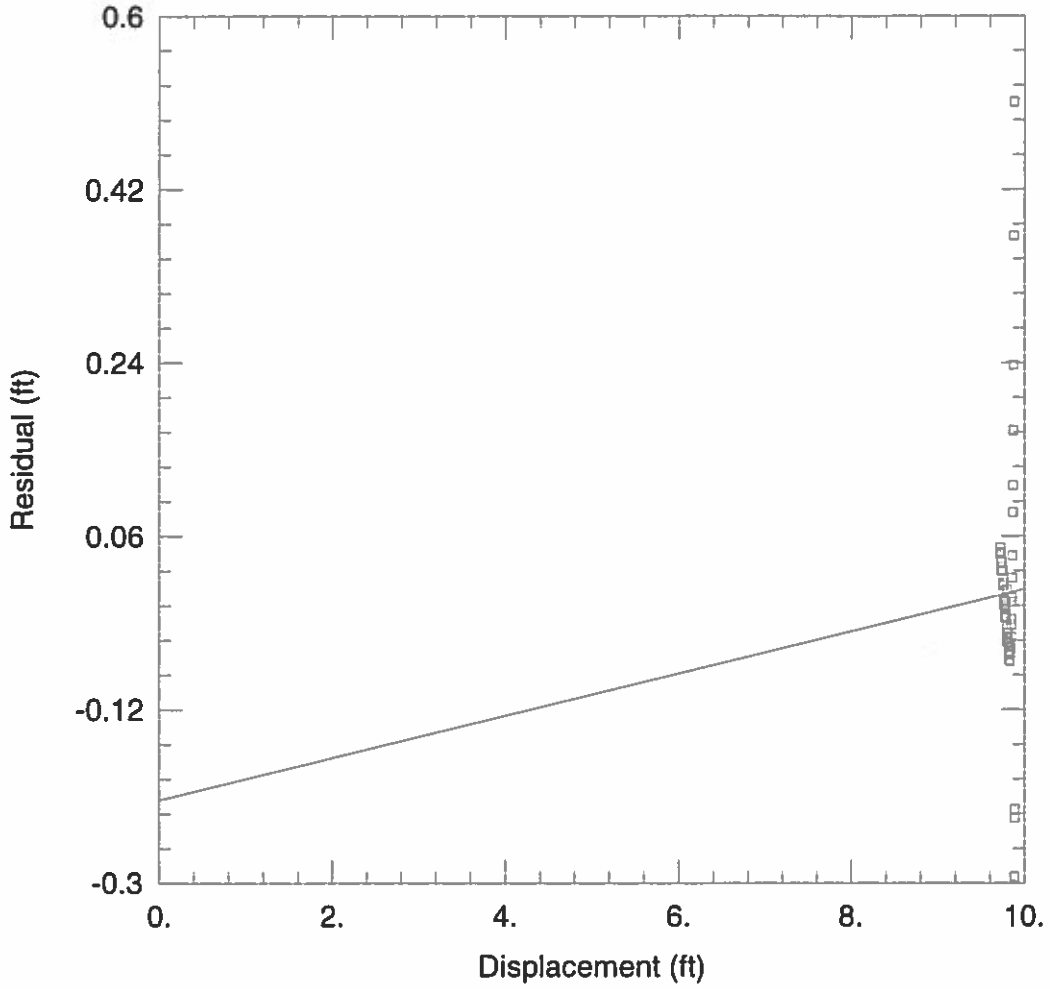
Saturated Thickness: 11.62 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.716 ft
Total Well Penetration Depth: 11.62 ft
Casing Radius: 0.083 ft
Static Water Column Height: 9.674 ft
Screen Length: 11.62 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:\...\RQTract13MW-1slugin.aqt
Date: 04/28/14 Time: 15:02:27

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-1slugin
Test Date: 03/28/14

AQUIFER DATA

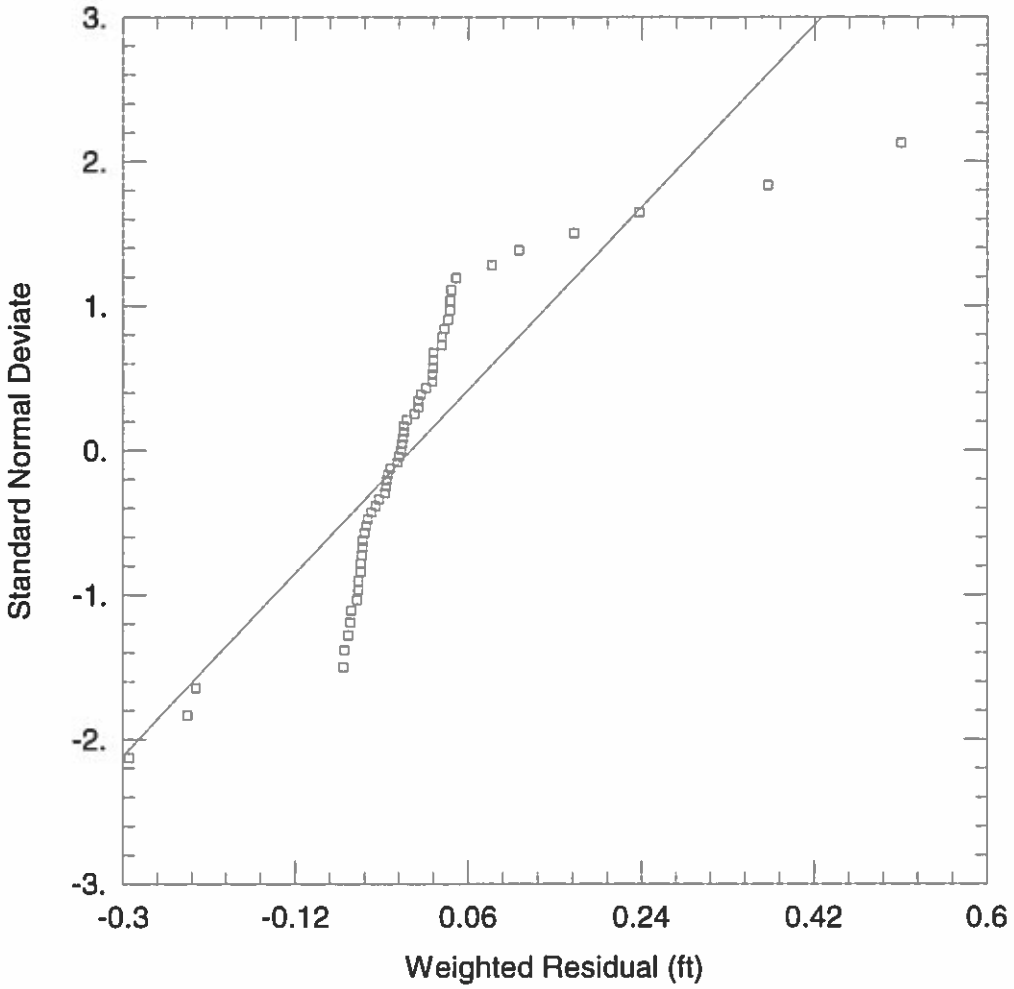
Saturated Thickness: 11.62 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.716 ft
Total Well Penetration Depth: 11.62 ft
Casing Radius: 0.083 ft
Static Water Column Height: 9.674 ft
Screen Length: 11.62 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:\...\RQTract13MW-1slugin.aqt
Date: 04/28/14 Time: 15:02:35

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-1slugin
Test Date: 03/28/14

AQUIFER DATA

Saturated Thickness: 11.62 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.716 ft
Total Well Penetration Depth: 11.62 ft
Casing Radius: 0.083 ft
Static Water Column Height: 9.674 ft
Screen Length: 11.62 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 13 MW 8\RQTract13MW-8slu
Title: Falling-head slug test
Date: 04/28/14
Time: 14:56:16

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Date: 03/28/14
Test Well: MW-8slugin

AQUIFER DATA

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

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.008 ft
Static Water Column Height: 18.6 ft
Casing Radius: 0.083 ft
Well Radius: 0.281 ft
Well Skin Radius: 1. ft
Screen Length: 18.6 ft
Total Well Penetration Depth: 18.6 ft

No. of Observations: 56

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	18.59	1740.	18.62
120.	18.61	1800.	18.63
180.	18.7	1860.	18.63
240.	18.63	1920.	18.62
300.	18.61	1980.	18.63
360.	18.65	2040.	18.62
420.	18.62	2100.	18.62
480.	18.62	2160.	18.62
540.	18.62	2220.	18.63
600.	18.63	2280.	18.64
660.	18.62	2340.	18.63
720.	18.61	2400.	18.62
780.	18.62	2460.	18.62
840.	18.62	2520.	18.62
900.	18.62	2580.	18.62
960.	18.63	2640.	18.62
1020.	18.62	2700.	18.62
1080.	18.63	2760.	18.63
1140.	18.61	2820.	18.62
1200.	18.62	2880.	18.62
1260.	18.63	2940.	18.63
1320.	18.62	3000.	18.62
1380.	18.63	3060.	18.63
1440.	18.62	3120.	18.61
1500.	18.63	3180.	18.63
1560.	18.64	3240.	18.63
1620.	18.63	3300.	18.62
1680.	18.62	3360.	18.63

SOLUTION

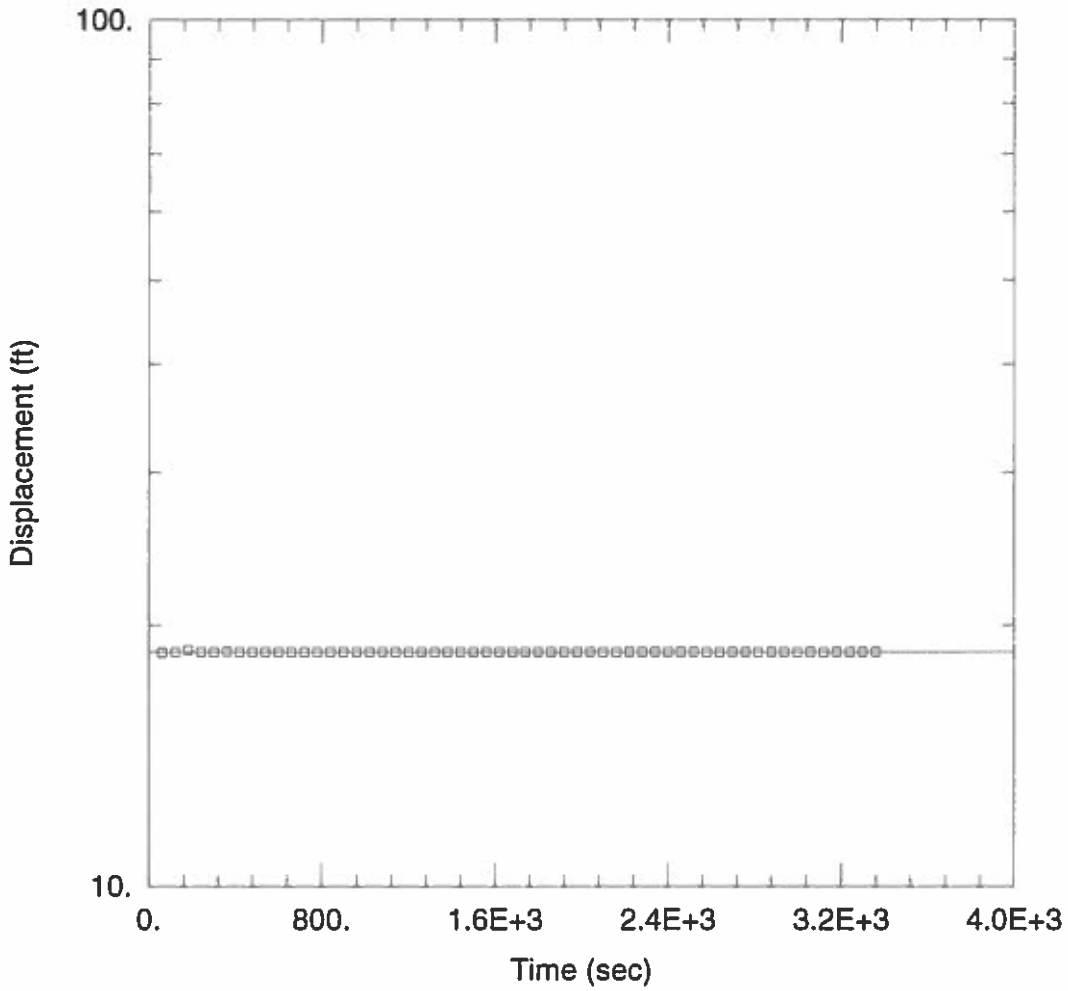
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	3.396E-7	m/day
y0	18.63	ft

K = 3.931E-10 cm/sec
T = K*b = 1.035E-7 m²/day (1.198E-8 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract13MW-8slugin.aqt
Date: 04/28/14 Time: 14:56:24

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-8slugin
Test Date: 03/28/14

AQUIFER DATA

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

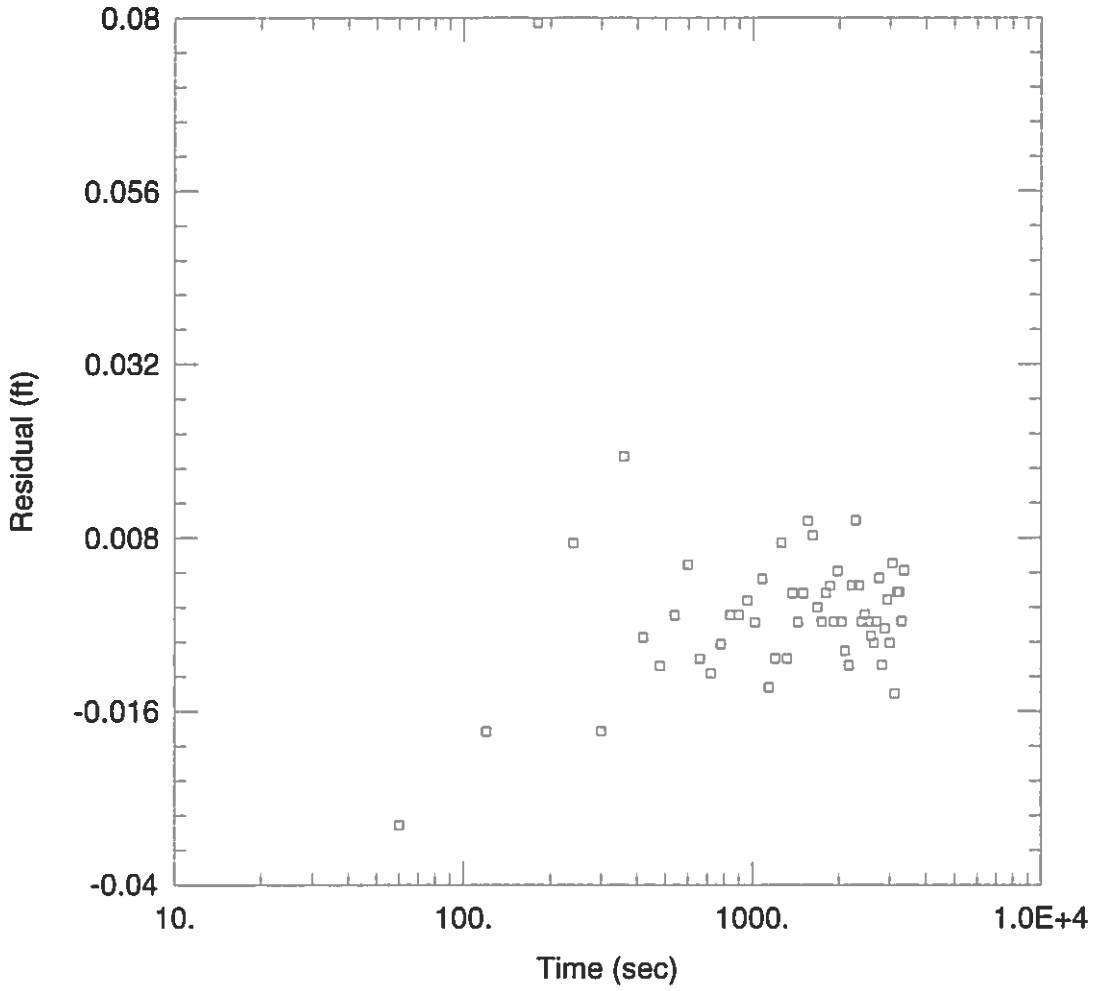
WELL DATA (New Well)

Initial Displacement: 0.008 ft
Total Well Penetration Depth: 18.6 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.6 ft
Screen Length: 18.6 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 3.396E-7 m/day y0 = 18.63 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract13MW-8slugin.aqt
Date: 04/28/14 Time: 14:56:32

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-8slugin
Test Date: 03/28/14

AQUIFER DATA

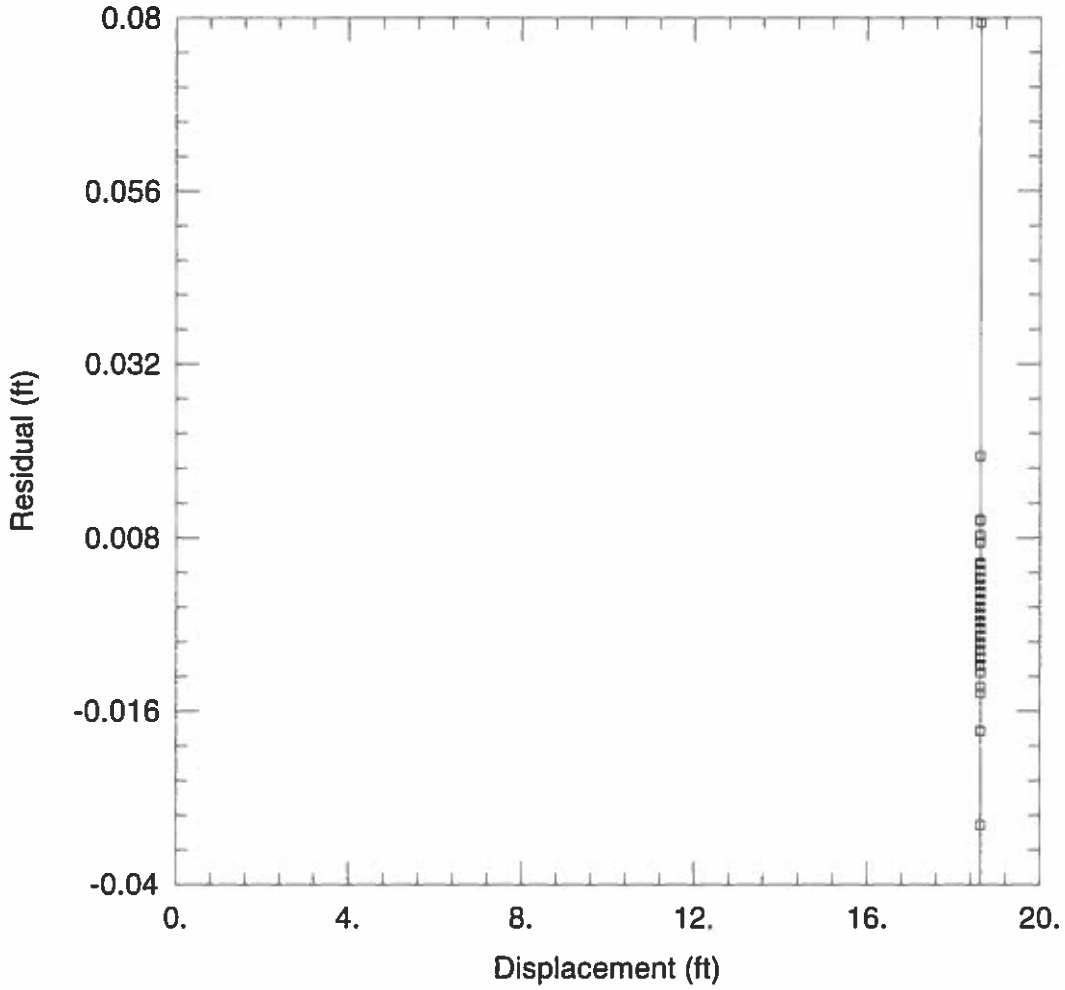
Saturated Thickness: 1. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.008 ft Static Water Column Height: 18.6 ft
Total Well Penetration Depth: 18.6 ft Screen Length: 18.6 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



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract13MW-8slugin.aqt
Date: 04/28/14 Time: 14:56:39

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-8slugin
Test Date: 03/28/14

AQUIFER DATA

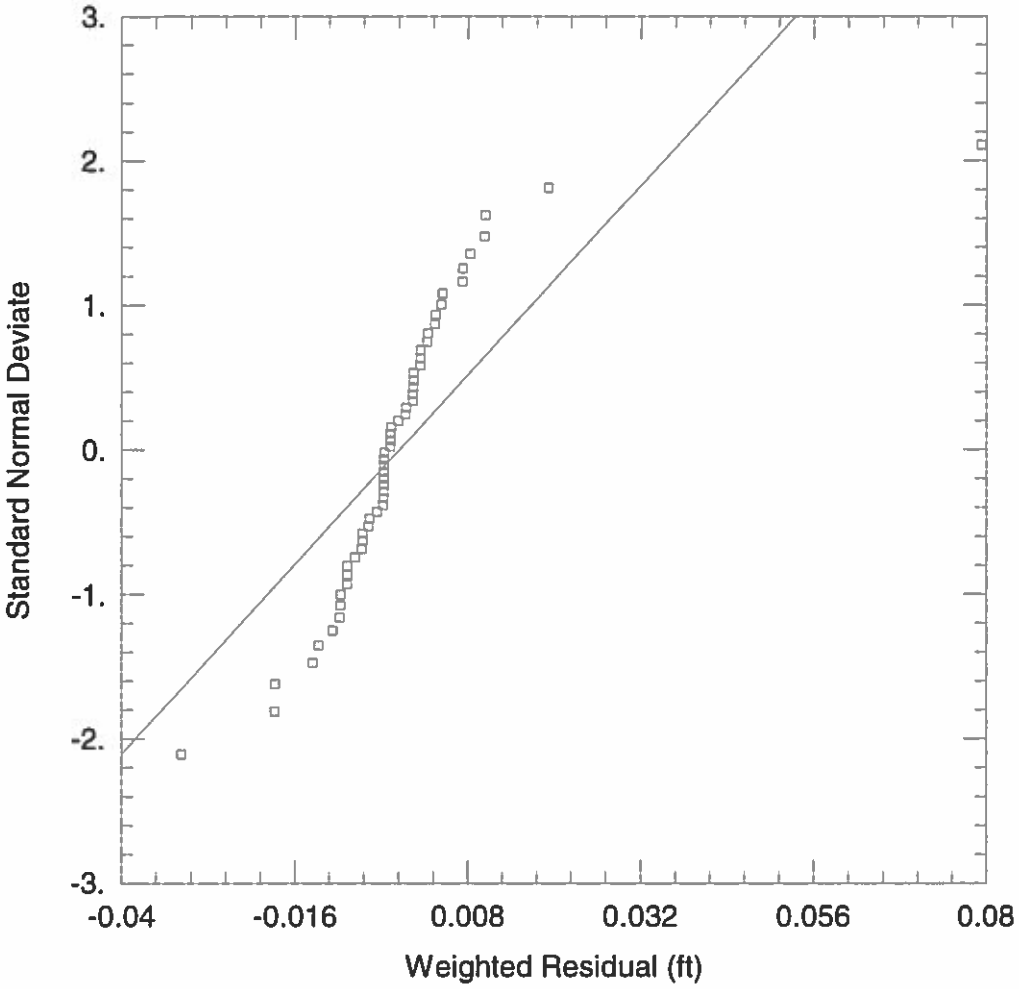
Saturated Thickness: 1. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.008 ft Static Water Column Height: 18.6 ft
Total Well Penetration Depth: 18.6 ft Screen Length: 18.6 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



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract13MW-8slugin.aqt
Date: 04/28/14 Time: 14:56:46

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTracc13
Test Well: MW-8slugin
Test Date: 03/28/14

AQUIFER DATA

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

WELL DATA (New Well)

Initial Displacement: 0.008 ft
Total Well Penetration Depth: 18.6 ft
Casing Radius: 0.083 ft
Static Water Column Height: 18.6 ft
Screen Length: 18.6 ft
Well Radius: 0.281 ft

SOLUTION

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