1R – 1645

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 (Former Celero Energy II, LP), Rock Queen Unit Tract Battery #7, Located in Unit Letter I, Section 22, Township 13 South, Range 31 East, Chaves Country, New Mexico (NMOCD 1RP#1645)

Mr. Von Gonten:

This report details the results of the Groundwater Aquifer Slug Test Evaluation for the Rock Queen Unit Tract Battery #7, located in Chaves County, New Mexico.

Additional Monitor Well Installation

Between April 4 and April 10, 2014, Tetra Tech was onsite to oversee the installation of three additional monitor wells (MW-5, MW-6, and MW-7) for delineation purposes. Each of the three monitor wells were installed with 2-inch PVC casing. The lithology of the newly installed wells was relatively consistent with limestone and sandstone encountered to approximately 20 feet below ground surface (bgs). From 20 feet to 130 feet bgs is a fine to medium grain calcareous tan to brown sand. From 130 feet bgs to terminus is a white to red clay. 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 123 to 130 feet bgs. The monitor wells were extended to depths of 164, 168, and 168 feet bgs, respectively for MW-5, MW-6, and MW-7. Monitor wells MW-5, MW-6, and MW-7 had 40 feet of 0.02" screen installed at the base of the well. From the top of the screens to the surface of the boring, the wells were completed with blank schedule 40 PVC casing. A sand pack, bentonite seal, and cement were installed in the annulus of the wells. See Figure 3 detailing monitor well locations and Appendix B monitor well completion diagrams.

Tetra Tech
1910 North Big Spring, Midland,TX 79705
Tel 432.682.4559 Fax 432.682.3946 www.tetratech.com

2014 Groundwater Gauging and Sampling Results

Tetra Tech was onsite March 26, 2014 to gauge all monitor wells. No PSH was measured in any of the monitor wells. Utilizing water level elevation calculations, a groundwater gradient map was generated for the sampling event with a hydraulic gradient to the west. 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 80.0 mg/L in monitor well MW-5 to 41,500 mg/L in monitor well MW-1. Monitor wells MW-4 and MW-5 were the only wells with chlorides below the NMWQCC standard of 250 mg/L. The general chemistry and BTEX analyses are shown in Tables 2 and 3, respectively. Chloride concentration map for the sampling event is included as Figure 5. See Appendix C for Laboratory Analytical Reports.

Aquifer Evaluation/Determination

Between March 25 and March 27, 2014, Tetra Tech was onsite to perform slug tests on monitor wells MW-3, MW-5, and MW-6. 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-3 had a K value of 1.026E-5 m/day and a T value of 4.752E-5 m^2/day. Monitor well MW-5 had a K value of 8.28E-5 m/day and a T value of 4.995E-4 m^2/day. Monitor well MW-6 had a K value of 6.798E-5 m/day and a T value of 3.243E-4 m^2/day. From *Groundwater Hydrology*, by David Keith Todd, the K values for the three 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

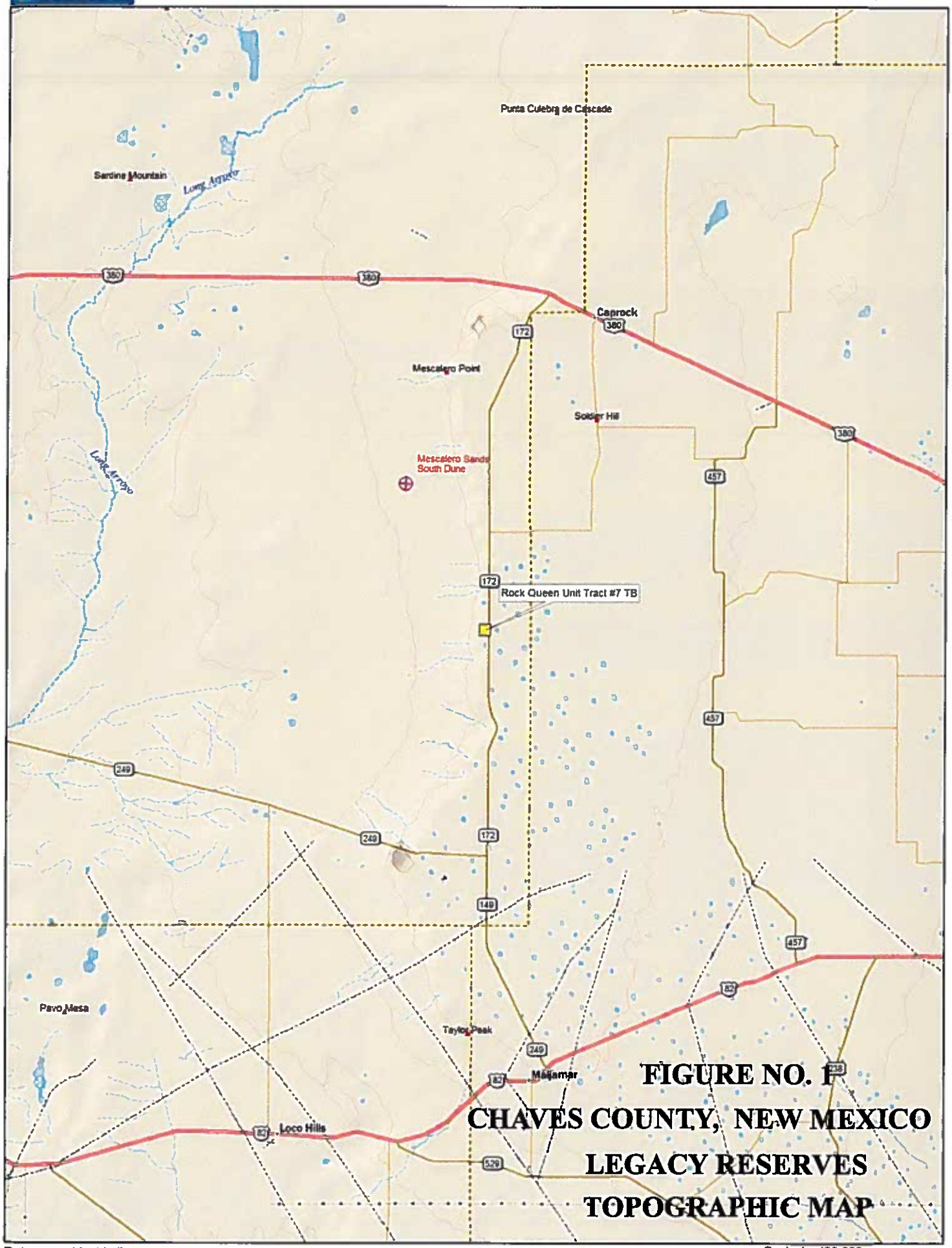


FIGURE NO. 1
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

TN

MN (7.9°E)

Scale 1 : 400,000

1" = 6.31 mi

Data Zoom 9-2

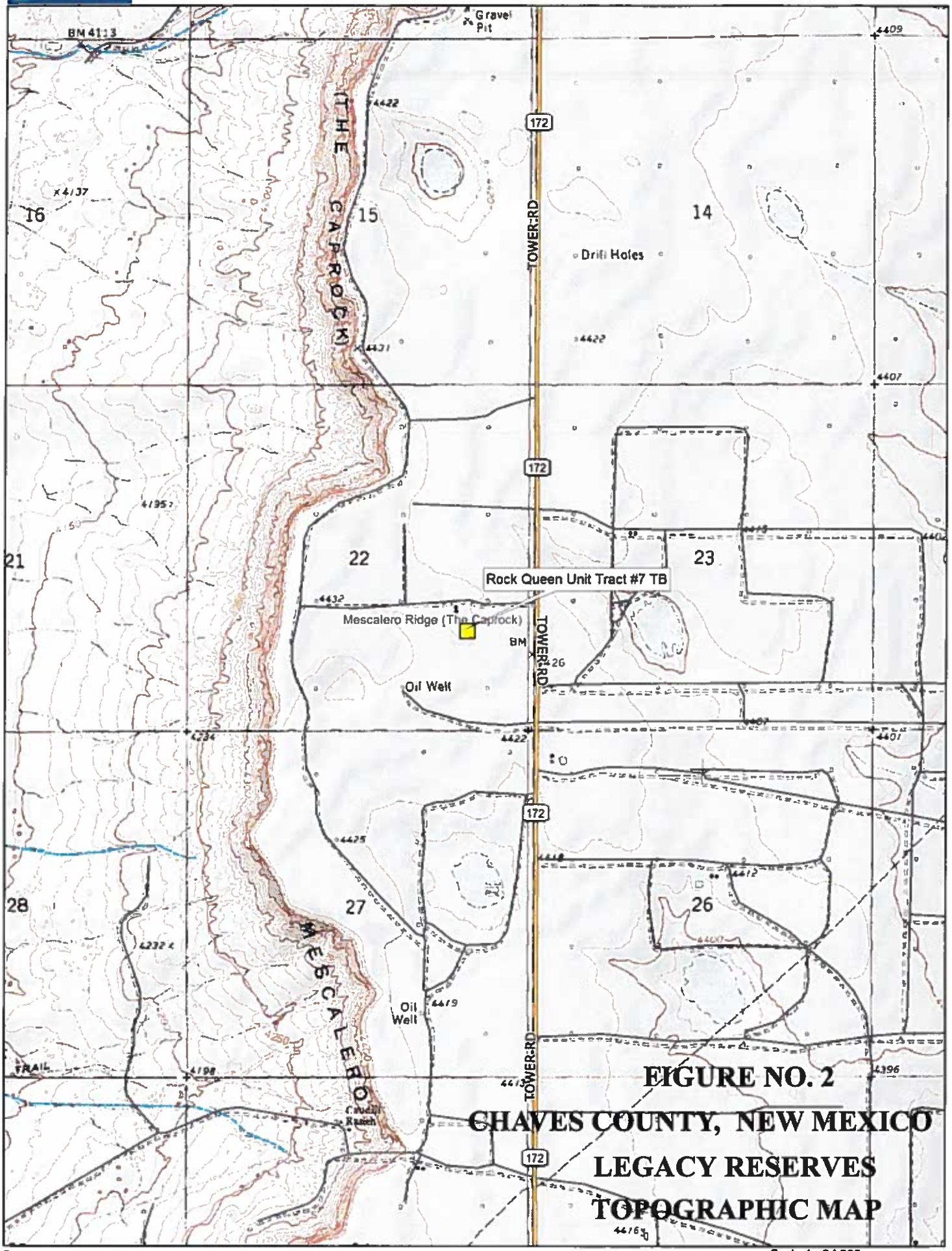


FIGURE NO. 2
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

TN

MN (7.7°E)

Scale 1 : 24,000

1" = 2,000.0 ft

Data Zoom 12-7

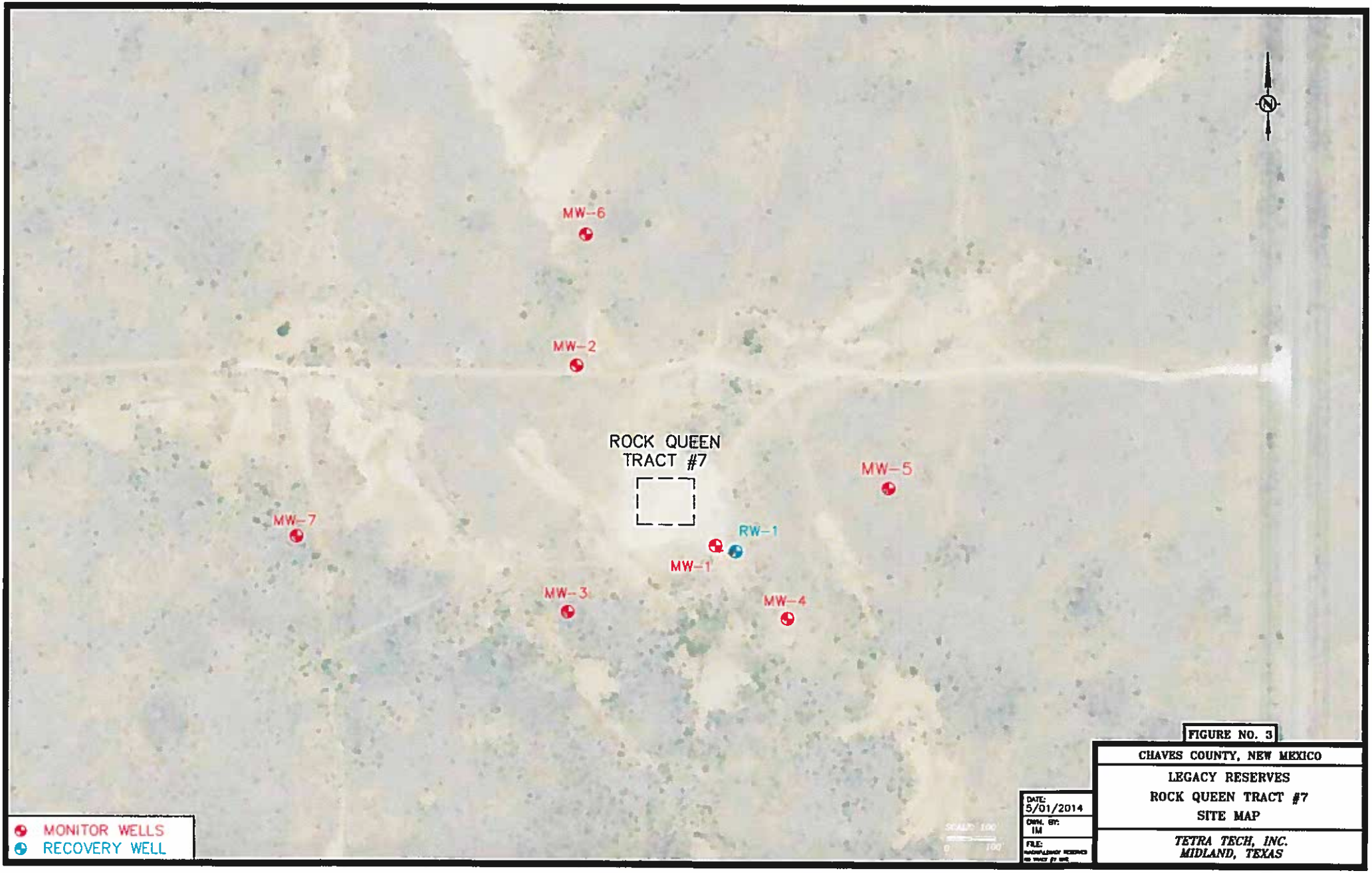


FIGURE NO. 3

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES

ROCK QUEEN TRACT #7

SITE MAP

TETRA TECH, INC.
MIDLAND, TEXAS

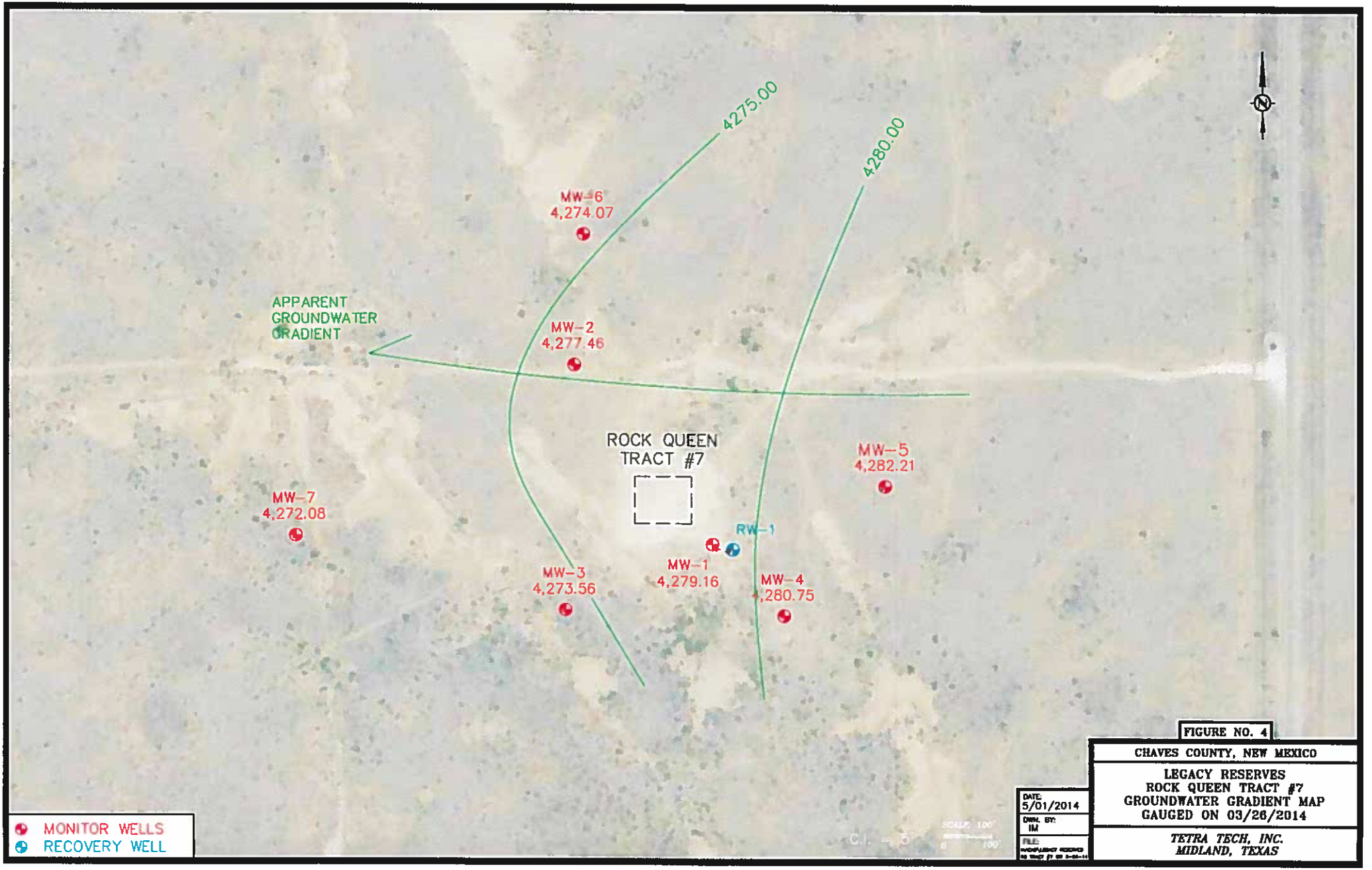


FIGURE NO. 4

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN TRACT #7
GROUNDWATER GRADIENT MAP
GAUGED ON 03/26/2014

TETRA TECH, INC.
MIDLAND, TEXAS

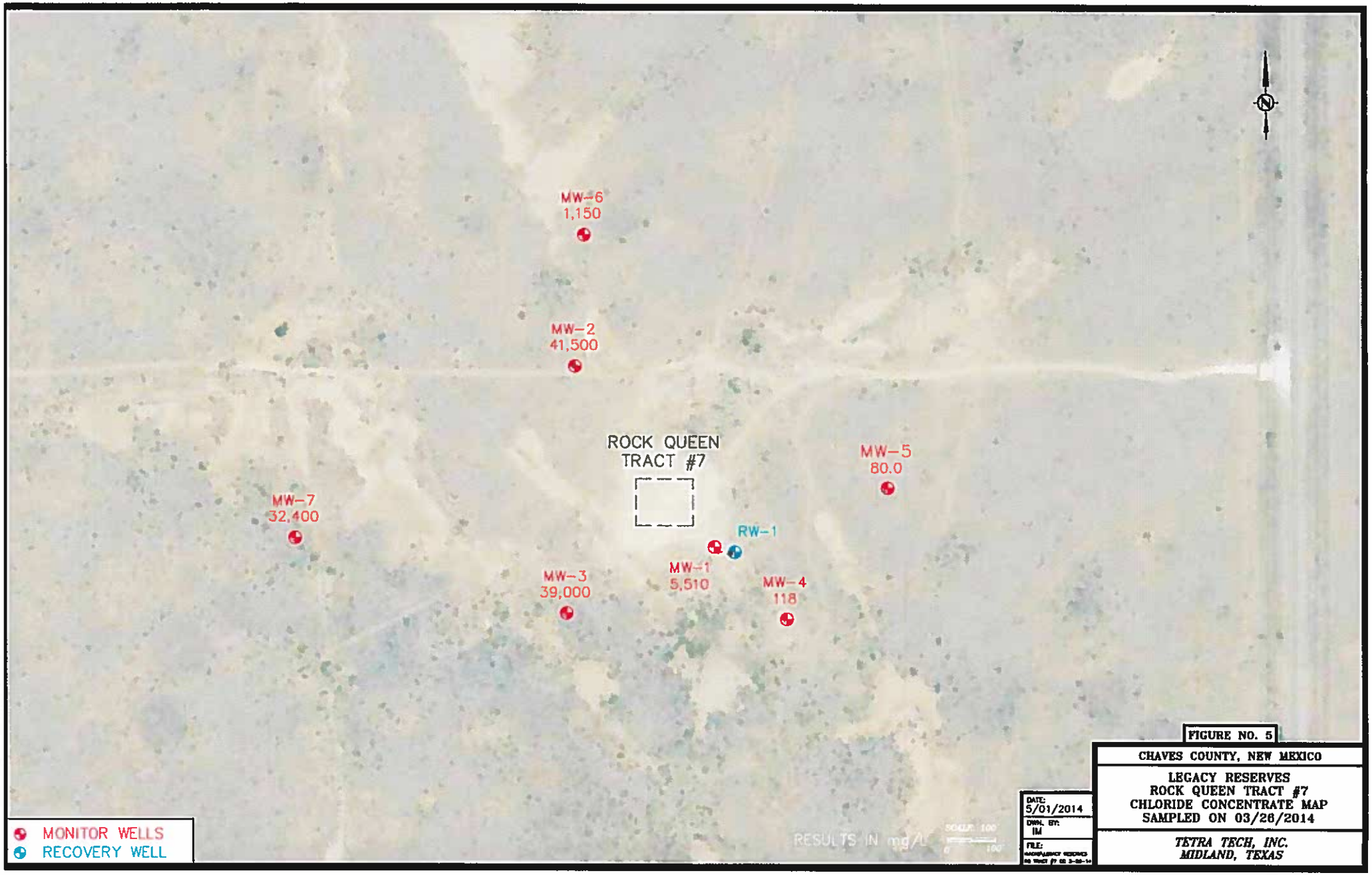


FIGURE NO. 5

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
ROCK QUEEN TRACT #7
CHLORIDE CONCENTRATE MAP
SAMPLED ON 03/26/2014

DATE: 5/01/2014
DWN. BY: IM
FILE:

TETRA TECH, INC.
MIDLAND, TEXAS

TABLES

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract #7
Chaves County, New Mexico

Monitor Well	Date Gauged	Date Well Installation	TOC Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
MW-1	11/24/09	11/17/09	4,428.76	170.00	149.66	4,279.10
	02/25/10				149.43	4,279.33
	07/12/10				149.46	4,279.30
	10/11/10				149.44	4,279.32
	01/17/11				149.43	4,279.33
	04/11/11				149.51	4,279.25
	07/29/11				150.47	4,278.29
	10/27/11				149.40	4,279.36
	01/03/12				149.53	4,279.23
	04/09/12				149.39	4,279.37
	07/24/12				149.41	4,279.35
	10/24/12				149.60	4,279.16
	01/30/13				149.70	4,279.06
	04/22/13				149.54	4,279.22
	07/25/13				149.56	4,279.20
	10/30/13				149.65	4,279.11
	03/26/14				149.60	4,279.16
MW-2	01/17/11	11/18/10	4,432.58	178.60	155.17	4,277.41
	04/11/11				155.20	4,277.38
	07/29/11				155.97	4,276.61
	10/27/11				155.11	4,277.47
	01/03/12				155.16	4,277.42
	04/09/12				155.09	4,277.49
	07/24/12				155.08	4,277.50
	10/24/12				155.21	4,277.37
	01/30/13				154.23	4,278.35
	04/22/13				154.31	4,278.27
	07/25/13				155.09	4,277.49
	10/30/13				151.78	4,280.80
	03/26/14				155.12	4,277.46

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract #7
Chaves County, New Mexico

Monitor Well	Date Gauged	Date Well Installation	TOC Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
MW-3	01/17/11	11/17/10	4,428.37	183.50	154.89	4,273.48
	04/11/11				154.97	4,273.40
	07/29/11				155.76	4,272.61
	10/27/11				154.86	4,273.51
	01/03/12				154.92	4,273.45
	04/09/12				154.83	4,273.54
	07/24/12				154.81	4,273.56
	10/24/12				154.93	4,273.44
	01/30/13				154.98	4,273.39
	04/22/13				154.84	4,273.53
	07/25/13				154.89	4,273.48
	10/30/13				155.02	4,273.35
	03/26/14				154.81	4,273.56
MW-4	01/17/11	11/16/10	4,427.28	179.60	146.22	4,281.06
	04/11/11				146.30	4,280.98
	07/29/11				147.26	4,280.02
	10/27/11				146.40	4,280.88
	01/03/12				146.33	4,280.95
	04/09/12				146.32	4,280.96
	07/24/12				146.35	4,280.93
	10/24/12				146.37	4,280.91
	01/30/13				146.43	4,280.85
	04/22/13				146.31	4,280.97
	07/25/13				146.30	4,280.98
	10/30/13				146.20	4,281.08
	03/26/14				146.53	4,280.75
MW-5	03/26/14	02/26/14	4,429.02		146.81	4,282.21
MW-6	03/26/14	02/26/14	4,432.50		154.95	4,274.07
MW-7	03/26/14	02/26/04	4,429.38		156.94	4,272.08

Table 1
Legacy Reserves
Groundwater Gauging Data
Rock Queen Unit Tract #7
Chaves County, New Mexico

Monitor Well	Date Gauged	Date Well Installation	TOC Elevation (ft)	Depth of Well (bgs in ft)	Depth to Groundwater (ft)	Groundwater Elevation (ft)
RW-1	01/17/11	12/07/10	4,428.04	159.45	148.10	4,279.94
	04/11/11				148.29	4,279.75
	07/29/11				149.07	4,278.97
	10/27/11				148.14	4,279.90
	01/03/12				148.28	4,279.76
	04/09/12				148.14	4,279.90
	07/24/12				148.12	4,279.92
	10/24/12				148.32	4,279.72
	01/30/13				--	--
	04/22/13				148.32	4,279.72
	07/25/13				148.24	4,279.80
	03/26/14				148.44	4,279.60

Table 2
Legacy Reserves
Groundwater Analytical Results
Rock Queen Unit Tract #7
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	11/24/09	1,730	430	585	15.3	<1.00	<1.00	114	114	150	4,690	9,100	6,100	7.55
	02/25/10	8,010	2,250	2,860	80.0	<1.00	<1.00	93	93	463	24,000	38,300	29,300	7.11
	07/12/10	-	-	-	-	-	-	-	-	316	3,060	3,060	-	-
	10/11/10	-	-	-	-	-	-	-	-	960	20,000	48,400	-	-
	01/19/11	-	-	-	-	-	-	-	-	<2500	18,200	38,600	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,020	20,500	32,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	1,170	20,500	33,700	-	-
	10/28/11	-	-	-	-	-	-	-	-	1,270	13,100	23,200	-	-
	01/06/12	-	-	-	-	-	-	-	-	1,260	18,000	23,200	-	-
	04/12/12	-	-	-	-	-	-	-	-	1,020	9,840	25,600	-	-
	07/25/12	-	-	-	-	-	-	-	-	-	25,700	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	826	22,000	51,500	-	-
	01/30/13	-	-	-	-	-	-	-	-	690	17,100	32,400	-	-
	04/24/13	5,440	1,310	4,700	37.3	<1.00	<1.00	551	551	924	19,400	43,700	19,000	6.70
	07/25/13	1,700	458	4,980	49.8	<20.0	<20.0	179	179	<2500	12,600	22,900	6,130	6.91
	10/30/13	531	184	2,920	38.9	<20.0	<20.0	356	356	609	5,520	11,900	2,080	7.43
	03/01/14	587	187	2,850	40.0	<20.0	<20.0	240	240	922	5,510	10,900	2,240	7.37
MW-2	01/19/11	-	-	-	-	-	-	-	-	1,250	45,100	78,200	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,280	19,100	33,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	1,570	11,700	25,900	-	-
	10/28/11	-	-	-	-	-	-	-	-	1,010	10,500	19,500	-	-
	01/06/12	-	-	-	-	-	-	-	-	1,840	26,000	35,800	-	-
	04/12/12	-	-	-	-	-	-	-	-	1,800	21,800	36,900	-	-
	07/25/12	-	-	-	-	-	-	-	-	-	27,300	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	1,490	22,100	37,200	-	-
	01/30/13	-	-	-	-	-	-	-	-	1,140	13,800	24,800	-	-
	04/24/13	6,310	2,510	22,800	102	<1.00	<1.00	160	160	1,610	49,600	88,600	26,100	6.20
	07/25/13	1,030	516	8,400	129	<20.0	<20.0	173	173	<2500	18,500	33,000	4,700	6.86
	10/30/13	782	410	7,000	405	<20.0	<20.0	160	160	1,250	16,500	84,200	3,640	6.67
	03/01/14	4,700	1,970	16,000	120	<20.0	<20.0	124	124	1,250	41,500	80,400	19,800	6.38

Table 2
Legacy Reserves
Groundwater Analytical Results
Rock Queen Unit Tract #7
Chaves County, New Mexico

Monitor Well	Date Sampled	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Potassium (mg/L)	Hydroxide Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Alkalinity (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
MW-3	01/19/11	-	-	-	-	-	-	-	-	1,750	47,500	81,800	-	-
	04/14/11	-	-	-	-	-	-	-	-	1,170	25,100	41,000	-	-
	07/29/11	-	-	-	-	-	-	-	-	1,420	25,100	52,400	-	-
	10/28/11	-	-	-	-	-	-	-	-	1,480	33,400	57,000	-	-
	01/06/12	-	-	-	-	-	-	-	-	1,680	45,300	68,400	-	-
	04/12/12	-	-	-	-	-	-	-	-	1,560	38,300	63,900	-	-
	07/25/12	-	-	-	-	-	-	-	-	-	30,000	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	1,830	57,200	85,700	-	-
	01/30/13	-	-	-	-	-	-	-	-	1,300	27,600	44,800	-	-
	04/24/13	3,520	1,740	21,400	196	<1.00	<1.00	152	152	1,500	38,300	57,100	16,000	6.51
	07/25/13	4,490.0	2,140.0	25,100.0	265.00	<20.0	<20.0	156	156	<12500	48,100	49,200	20,000	6.58
	10/30/13	1,850	821	10,600	181	<20.0	<20.0	320	320	1,030	33,500	33,700	8,000	7.05
	03/01/14	4,450	1,900	19,400	221	<20.0	<20.0	123	123	1,510	39,000	79,600	18,900	6.32
MW-4	01/19/11	-	-	-	-	-	-	-	-	279	<125	792	-	-
	04/14/11	-	-	-	-	-	-	-	-	81	510	3,330	-	-
	07/29/11	-	-	-	-	-	-	-	-	114	127	648	-	-
	10/28/11	-	-	-	-	-	-	-	-	113	144	770	-	-
	01/06/12	-	-	-	-	-	-	-	-	114	98.4	646	-	-
	04/12/12	-	-	-	-	-	-	-	-	106	87.5	579	-	-
	07/25/12	-	-	-	-	-	-	-	-	-	138	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	110	122	695	-	-
	01/30/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/24/13	86.4	18.8	61.3	2.33	<1.00	<1.00	142	142	109	89.8	640	293	7.90
	07/25/13	132	27.4	122	6.5	<20.0	<20.0	139	139	97.9	324	990	443	7.66
	10/30/13	86.1	15.4	82.2	<10.0	<20.0	<20.0	166	166	115	89.4	900	278	7.85
	03/01/14	84.5	13.9	75.8	4.67	<20.0	<20.0	213	213	104	118	702	268	7.84

Table 2

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Tract #7

Chaves County, New Mexico

Monitor Well	Date Sampled	Dissolved Calcium (mg/L)	Dissolved Magnesium (mg/L)	Dissolved Sodium (mg/L)	Dissolved Potassium (mg/L)	Hydroxide Alkalinity (mg/L)	Carbonate Alkalinity (mg/L)	Bicarbonate Alkalinity (mg/L)	Total Alkalinity (mg/L)	Sulfate (mg/L)	Chloride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
RW-1	01/19/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/14/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	07/29/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/28/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01/06/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/12/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	07/25/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/25/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	01/30/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	04/24/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	07/25/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/30/13	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	03/01/14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
MW-5	03/01/14	73.6	10.3	75.3	5.08	<20.0	<20.0	151	151	119	80.0	547	226	7.88
MW-6	03/01/14	424	114	172	5.66	<20.0	<20.0	261	261	103	1,150	2,770	1,530	7.37
MW-7	03/01/14	2,710	1,220	14,500	213	<20.0	<20.0	110	110	1,220	32,400	52,600	11,800	6.65

NS - Not sampled

(-) Not analyzed

Table 3
Legacy Reserves
Groundwater Analytical Results
Rock Queen Unit Tract #7
Chaves County, New Mexico

Monitor Well	Date Sampled	Benzene (mg/L)	Toluene (mg/L)	Ethyl-Benzene (mg/L)	Xylene (mg/L)	Total BTEX (mg/L)
MW-1	11/24/09	<0.001	<0.001	<0.001	<0.001	<0.001
	02/25/10	<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
	01/19/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/29/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/06/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/25/12	<0.001	<0.001	<0.001	<0.001	0.0041
	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
	07/25/13	<0.001	<0.001	<0.001	<0.001	<0.001
	10/30/13	<0.001	<0.001	<0.001	<0.003	<0.003
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-2	01/19/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	0.0068	<0.001	<0.001	<0.001	0.0068
	07/29/11	0.0065	<0.001	<0.001	<0.001	0.0068
	10/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/06/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/25/12	0.0050	0.0011	<0.001	0.0088	0.0149
	10/25/12	0.00320	<0.001	<0.001	<0.001	0.00320
	01/30/13	<0.001	<0.001	<0.001	<0.001	<0.001
	04/24/13	0.00480	<0.001	<0.001	<0.001	0.00480
	07/25/13	<0.001	<0.001	<0.001	<0.001	<0.001
	10/30/13	<0.001	<0.001	<0.001	<0.003	<0.003
	03/01/14	0.0112	0.00210	<0.00100	<0.00300	0.0133
MW-3	01/19/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/29/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/06/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/25/12	<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
	07/25/13	<0.001	<0.001	<0.001	<0.001	<0.001
	10/30/13	<0.001	<0.001	<0.001	<0.003	<0.003
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300

Table 3

Legacy Reserves

Groundwater Analytical Results

Rock Queen Unit Tract #7

Chaves County, New Mexico

Monitor Well	Date Sampled	Benzene (mg/L)	Toluene (mg/L)	Ethyl-Benzene (mg/L)	Xylene (mg/L)	Total BTEX (mg/L)
MW-4	01/19/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/29/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/28/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/06/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/12/12	<0.001	<0.001	<0.001	<0.001	<0.001
	07/25/12	<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	NS	NS	NS	NS	NS
	04/24/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/25/13	<0.001	<0.001	<0.001	<0.001	<0.001
	10/30/13	<0.001	<0.001	<0.001	<0.003	<0.003
	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
RW-1	01/19/11	NS	NS	NS	NS	NS
	04/14/11	NS	NS	NS	NS	NS
	07/29/11	NS	NS	NS	NS	NS
	10/28/11	NS	NS	NS	NS	NS
	01/06/12	NS	NS	NS	NS	NS
	04/12/12	NS	NS	NS	NS	NS
	07/25/12	NS	NS	NS	NS	NS
	10/25/12	NS	NS	NS	NS	NS
	01/30/13	NS	NS	NS	NS	NS
	04/24/13	NS	NS	NS	NS	NS
	07/25/13	NS	NS	NS	NS	NS
	10/30/13	NS	NS	NS	NS	NS
	03/01/14	NS	NS	NS	NS	NS
MW-5	03/01/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-6	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

NS - Not sampled

APPENDIX A
SOIL BORING LOGS

SAMPLE LOG

Boring/Well MW-5
GPS
Project Number 114-6401628
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #7 Tank Battery
Site Location Chaves, New Mexico
Letter I, Section 22, Township 13 South, Range 31 East
Total Depth 164'
Date Installed 02/17/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Sandstone and caliche (20%)
10-11'	--	Sandstone and caliche (20%)
15-16'	--	Sandstone chert (10%), caliche (30%)
20-21'	--	Light tan fine grain sand
25-26'	--	Light tan fine grain sand
30-31'	--	Light tan fine grain sand
35-36'	--	Light tan fine grain sand and sandstone (10%)
40-41'	--	Light tan fine grain sand and sandstone (10%)
45-46'	--	Light tan fine grain sand
50-51'	--	Light tan fine grain sand
55-56'	--	Light tan fine grain sand
60-61'	--	Tan fine grain sand
65-66'	--	Light brown fine grain sand
70-71'	--	Light brown fine grain sand
75-76'	--	Light brown fine grain sand
80-81'	--	Light brown fine grain sand
85-86'	--	Light brown fine grain sand
90-91'	--	Light brown fine grain sand
95-96'	--	Light brown fine grain sand
100-101'	--	Light brown fine grain sand
105-106'	--	Brown fine grain sand and sandstone (15%)
110-111'	--	Brown fine grain sand and sandstone (15%)
115-116'	--	Brown fine grain sand and sandstone (15%)
120-121'	--	Brown fine grain sand and sandstone (15%)

SAMPLE LOG

Boring/Well MW-5
GPS
Project Number 114-6401628
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #7 Tank Battery
Site Location Chaves, New Mexico
Letter I, Section 22, Township 13 South, Range 31 East
Total Depth 164'
Date Installed 02/17/14

Depth (Ft)	OVM	Sample Description
125-126'	--	Brown fine sand
130-131'	--	Brown fine sand and sandstone (20%)
135-136'	--	Brown fine sand and sandstone (20%)
140-141'	--	Brown fine sand and sandstone (20%)
145-146'	--	Brown fine sand and sandstone (20%)
150-151'	--	Gravel, blue clay (10%), red clay (10%)
155-156'	--	Gravel, blue clay (10%), red clay (10%)
160-161'	--	Gravel, blue clay (10%), red clay (10%)
165-166'	--	Blue to red/brown clay

Total Depth: 164'

SAMPLE LOG

Boring/Well MW-6
GPS
Project Number 114-6401628
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #7 Tank Battery
Site Location Chaves, New Mexico
Letter I, Section 22, Township 13 South, Range 31 East
Total Depth 168'
Date Installed 02/17/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Sandstone and caliche (20%)
10-11'	--	Sandstone and caliche (20%)
15-16'	--	Sandstone and caliche (20%)
20-21'	--	Light tan fine sand and sandstone (20%)
25-26'	--	Light tan fine sand and sandstone (20%)
30-31'	--	Light tan fine sand and sandstone (20%)
35-36'	--	Light tan fine sand and sandstone (10%)
40-41'	--	Light tan fine sand and sandstone (10%)
45-46'	--	Light tan fine sand
50-51'	--	Light tan fine sand
55-56'	--	Light tan fine sand
60-61'	--	Light tan fine sand
65-66'	--	Light brown fine sand
70-71'	--	Light brown fine sand
75-76'	--	Light brown fine sand
80-81'	--	Light brown fine sand
85-86'	--	Light brown fine sand
90-91'	--	Light brown fine sand
95-96'	--	Brown fine sand and sandstone (20%)
100-101'	--	Brown fine sand and sandstone (20%)
105-106'	--	Brown fine sand and sandstone (20%)
110-111'	--	Brown fine sand and sandstone (20%)
115-116'	--	Brown fine sand and sandstone (20%)
120-121'	--	Brown fine sand and sandstone (20%)

SAMPLE LOG

Boring/Well MW-6
GPS
Project Number 114-6401628
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #7 Tank Battery
Site Location Chaves, New Mexico
Letter I, Section 22, Township 13 South, Range 31 East
Total Depth 168'
Date Installed 02/17/14

Depth (Ft)	OVM	Sample Description
125-126'	--	Brown fine sand and sandstone (30%)
130-131'	--	Brown fine sand and sandstone (30%)
135-136'	--	Brown fine sand and sandstone (30%)
140-141'	--	Brown fine sand and sandstone (30%)
145-146'	--	Brown fine sand and sandstone (30%)
150-151'	--	Brown fine sand and sandstone (30%)
155-156'	--	Brown fine sand and brown/red clay
160-161'	--	Red clay and shale (30%)
165-168'	--	Red clay and shale (20%)

Total Depth: 168'

SAMPLE LOG

Boring/Well MW-7
GPS
Project Number 114-6401628
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #7 Tank Battery
Site Location Chaves, New Mexico
Letter I, Section 22, Township 13 South, Range 31 East
Total Depth 168'
Date Installed 02/18/14

Depth (Ft)	OVM	Sample Description
5-6'	--	Caliche, sandstone (40%) and fine light tan sand (20%)
10-11'	--	Caliche, sandstone (40%) and fine light tan sand (20%)
15-16'	--	Caliche and light tan fine sand (40%)
20-21'	--	Tan fine sand
25-26'	--	Tan fine sand
30-31'	--	Tan fine sand
35-36'	--	Tan fine sand
40-41'	--	Tan fine sand
45-46'	--	Tan fine sand
50-51'	--	Tan fine sand
55-56'	--	Tan fine sand
60-61'	--	Light brown fine sand
65-66'	--	Light brown fine sand
70-71'	--	Light brown fine sand
75-76'	--	Brown fine sand
80-81'	--	Brown fine sand
85-86'	--	Brown fine sand
90-91'	--	Brown fine sand
95-96'	--	Brown fine sand and sandstone (10%)
100-101'	--	Brown fine sand and sandstone (10%)
105-106'	--	Brown fine sand and sandstone (10%)
110-111'	--	Brown fine sand and sandstone (10%)
115-116'	--	Brown fine sand and sandstone (10%)
120-121'	--	Brown fine sand and sandstone (10%)

SAMPLE LOG

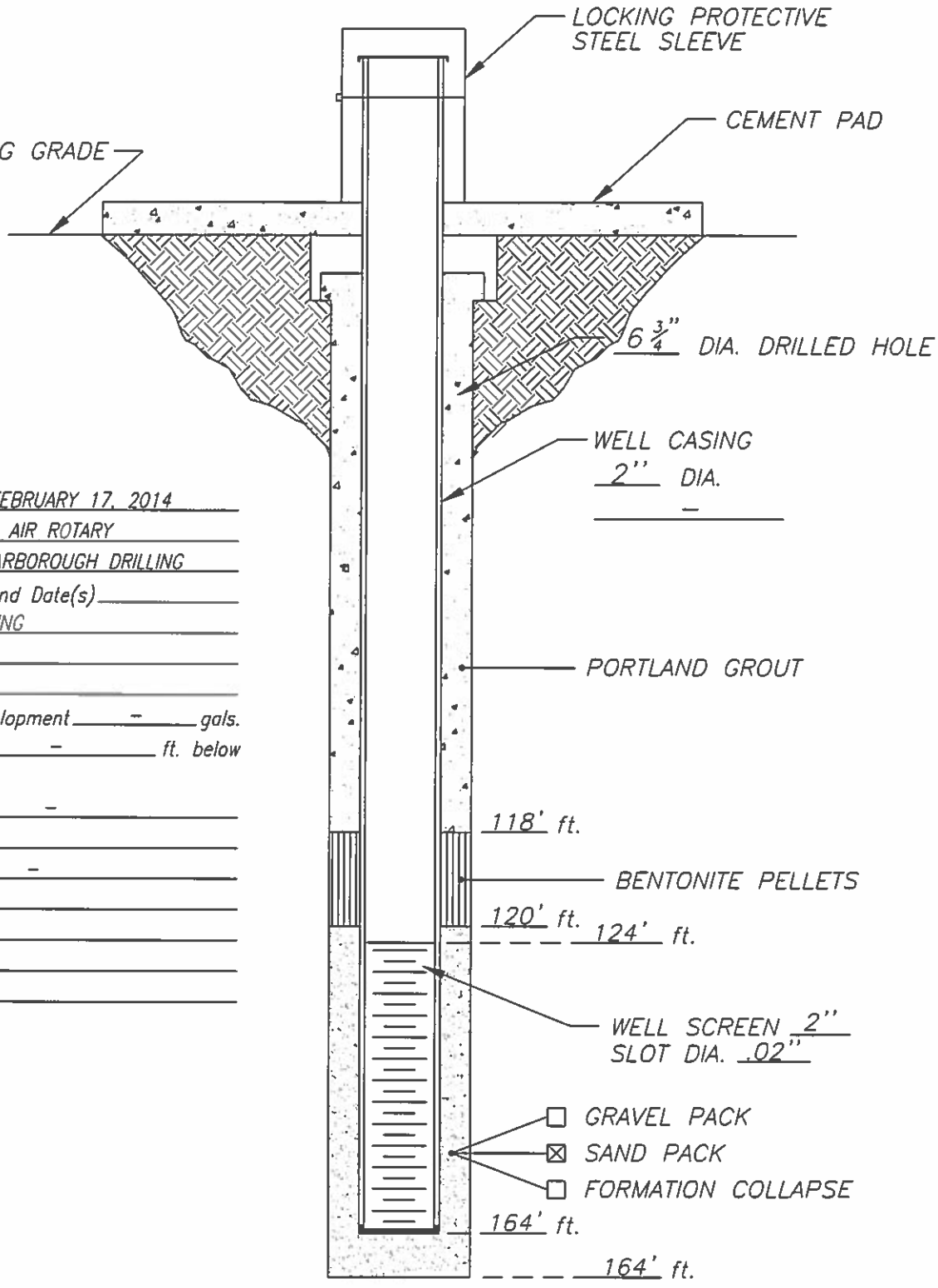
Boring/Well MW-7
GPS
Project Number 114-6401628
Client Celero Energy II, LP
Site Name Rock Queen Unit Tract #7 Tank Battery
Site Location Chaves, New Mexico
Letter I, Section 22, Township 13 South, Range 31 East
Total Depth 168'
Date Installed 02/18/14

Depth (Ft)	OVM	Sample Description
125-126'	--	Brown fine sand
130-131'	--	Brown fine sand
135-136'	--	Brown fine sand
140-141'	--	Brown fine sand
145-146'	--	Brown fine sand
150-151'	--	Brown fine sand
155-156'	--	Brown fine sand
160-161'	--	Brown fine sand
165-166'	--	Gravel and red clay (70%)
168'	--	Red clay (90%) and blue clay (10%)

Total Depth: 168'

APPENDIX B
MONITOR WELL COMPLETION DIAGRAMS

WELL CONSTRUCTION LOG



Installation Date(s) FEBRUARY 17, 2014

Drilling Method AIR ROTARY

Drilling Contractor SCARBOROUGH DRILLING

Development Technique(s) and Date(s) BAILING

Water Removed During Development – gals.

Static Depth to Water – ft. below Ground Level

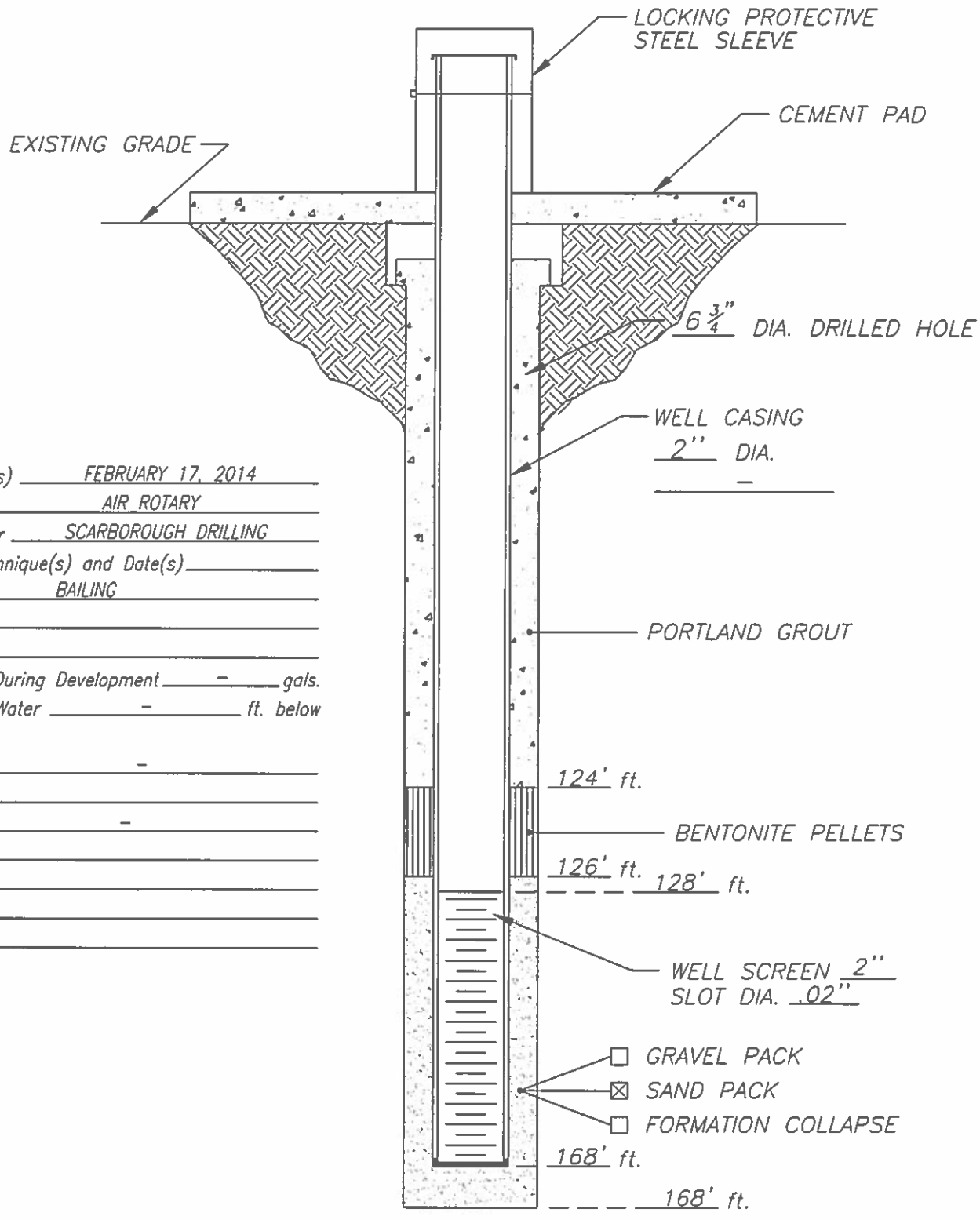
Well Purpose –

Remarks –

DATE: 03/03/2014	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: ROCK QUEEN TRACT #7	MW-5
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401628

WELL CONSTRUCTION LOG



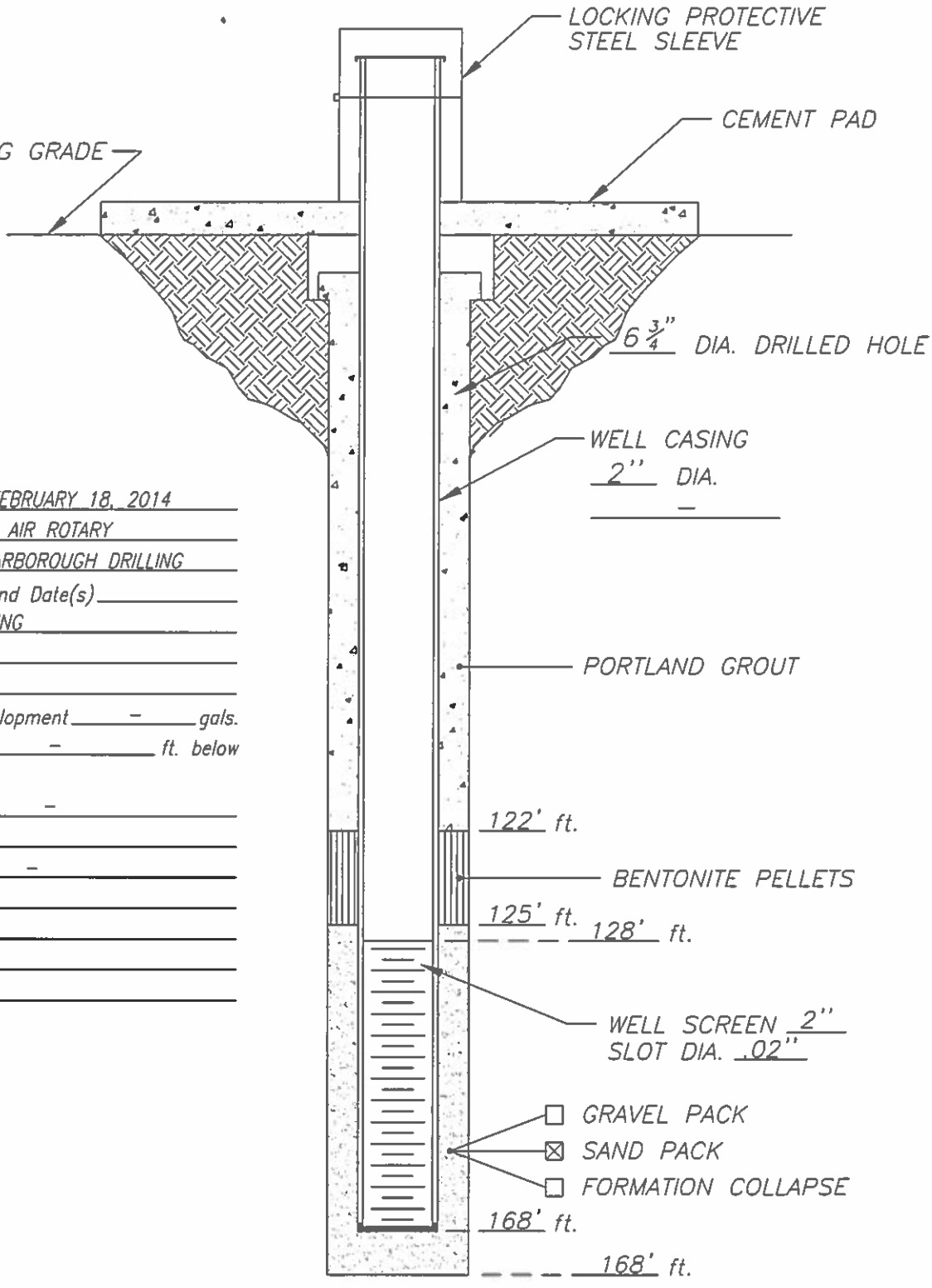
Installation Date(s) FEBRUARY 17, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) BAILING

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

Remarks –

DATE: 03/03/2014	CLIENT: CELERO ENERGY II, LLC PROJECT: ROCK QUEEN TRACT #7 LOCATION: CHAVES COUNTY, NEW MEXICO	WELL NO. MW-6
TETRA TECH, INC. MIDLAND, TEXAS	114-6401628	

WELL CONSTRUCTION LOG



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

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

Remarks –

DATE: 03/03/2014	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: ROCK QUEEN TRACT #7	MW-7
	LOCATION: CHAVES COUNTY, NEW MEXICO	
	114-6401628	

APPENDIX C
LABORATORY ANALYTICAL RESULTS

TRACEANALYSIS, INC.

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

Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

Analytical and Quality Control Report

(Corrected Report)

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

Report Date: April 2, 2014

Work Order: 14030407

Project Location: Chavez Co., NM
Project Name: Celero/Rock Queen #7
Project Number: 114-6401628

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
356491	MW-1	water	2014-03-01	16:30	2014-03-03
356492	MW-2	water	2014-03-01	16:45	2014-03-03
356493	MW-3	water	2014-03-01	17:20	2014-03-03
356494	MW-4	water	2014-03-01	16:20	2014-03-03
356495	MW-5	water	2014-03-01	16:05	2014-03-03
356496	MW-6	water	2014-03-01	16:55	2014-03-03
356497	MW-7	water	2014-03-01	17:10	2014-03-03

Report Corrections (Work Order 14030407)

- 3/31/14: Reissued as a J-flag report.

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.

TraceAnalysis, Inc.

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

Report Contents

Case Narrative

Samples for project Celero/Rock Queen #7 were received by TraceAnalysis, Inc. on 2014-03-03 and assigned to work order 14030407. Samples for work order 14030407 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	92894	2014-03-04 at 07:50	109850	2014-03-04 at 16:51
Alkalinity	SM 2320B	92946	2014-03-06 at 08:02	109916	2014-03-06 at 14:03
BTEX	S 8021B	92971	2014-03-07 at 11:57	109964	2014-03-07 at 21:17
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	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Ca, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Chloride (IC)	E 300.0	93340	2014-03-20 at 11:28	110388	2014-03-20 at 11:28
Chloride (IC)	E 300.0	93341	2014-03-19 at 18:37	110389	2014-03-19 at 18:37
Hardness	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Hardness	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
K, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
K, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Mg, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
Mg, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Na, Dissolved	S 6010C	93041	2014-03-11 at 10:14	110044	2014-03-11 at 11:50
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	110109	2014-03-04 at 14:39
pH	SM 4500-H+	92947	2014-03-04 at 08:23	110110	2014-03-04 at 14:42
SO4 (IC)	E 300.0	93340	2014-03-20 at 11:28	110388	2014-03-20 at 11:28
SO4 (IC)	E 300.0	93341	2014-03-19 at 18:37	110389	2014-03-19 at 18:37
SO4 (IC)	E 300.0	93668	2014-04-01 at 15:05	110780	2014-04-01 at 15:05
TDS	SM 2540C	92935	2014-03-05 at 11:06	110082	2014-03-12 at 14:25
TDS	SM 2540C	92966	2014-03-06 at 07:28	110085	2014-03-07 at 17:43

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 14030407 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: 356491 - MW-1

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109850	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92894	Sample Preparation:	2014-03-04	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	240	mg/L as CaCo3	1	20.0
Total Alkalinity		3	240	mg/L as CaCo3	1	20.0

Sample: 356491 - MW-1

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	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)			0.0981	mg/L	1	0.100	98	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0719	mg/L	1	0.100	72	70 - 130

Sample: 356491 - MW-1

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**587**	mg/L	1	1.00
Dissolved Potassium		2	**40.0**	mg/L	1	1.00
Dissolved Magnesium		2	**187**	mg/L	1	1.00
Dissolved Sodium		2	**2850**	mg/L	10	1.00

Sample: 356491 - MW-1

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110389	Date Analyzed:	2014-03-19	Analyzed By:	JR
Prep Batch:	93341	Sample Preparation:	2014-03-19	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**5510**	mg/L	500	2.50

Sample: 356491 - MW-1

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**2240**	mg eq CaCO3/L	1	0.00

Sample: 356491 - MW-1

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110109	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: 356491 - MW-1

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110389	Date Analyzed:	2014-03-19	Analyzed By:	JR
Prep Batch:	93341	Sample Preparation:	2014-03-19	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Sulfate		1	<1250	mg/L	500	2.50

Sample: 356491 - MW-1

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

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Total Dissolved Solids		3	**10900**	mg/L	10	2.50

Sample: 356492 - MW-2

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109850	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92894	Sample Preparation:	2014-03-04	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	**124**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**124**	mg/L as CaCo3	1	20.0

Sample: 356492 - MW-2

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	Result	RL	Units	Dilution	RL
Benzene		3	**0.0112**		mg/L	1	0.00100
Toluene		3	**0.00210**		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)			0.0893	mg/L	1	0.100	89	70 - 130
4-Bromofluorobenzene (4-BFB)	[1] Q--	Q--	0.0679	mg/L	1	0.100	68	70 - 130

Sample: 356492 - MW-2

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

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Dissolved Calcium		2	**4700**		mg/L	10	1.00
Dissolved Potassium		2	**120**		mg/L	1	1.00
Dissolved Magnesium		2	**1970**		mg/L	10	1.00
Dissolved Sodium		2	**16000**		mg/L	100	1.00

Sample: 356492 - MW-2

Laboratory: El Paso
Analysis: Chloride (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110389 | Date Analyzed: 2014-03-19 | Analyzed By: JR
Prep Batch: 93341 | Sample Preparation: 2014-03-19 | Prepared By: JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Chloride		1	**41500**		mg/L	5000	2.50

Sample: 356492 - MW-2

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**19800**	mg eq CaCO3/L	10	0.00

Sample: 356492 - MW-2

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110110	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	**6.38**	s.u.	1	0.00

Sample: 356492 - MW-2

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110780	Date Analyzed:	2014-04-01	Analyzed By:	JR
Prep Batch:	93668	Sample Preparation:	2014-04-01	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate	H	1	**1250**	mg/L	50	2.50

Sample: 356492 - MW-2

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**80400**	mg/L	50	2.50

Sample: 356493 - MW-3

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109850	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92894	Sample Preparation:	2014-03-04	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	**123**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**123**	mg/L as CaCo3	1	20.0

Sample: 356493 - 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		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)				0.0939	mg/L	1	0.100	94	70 - 130
4-Bromofluorobenzene (4-BFB)	2 Qar	Qar		0.0689	mg/L	1	0.100	69	70 - 130

Sample: 356493 - MW-3

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**4450**	mg/L	10	1.00
Dissolved Potassium		2	**221**	mg/L	1	1.00
Dissolved Magnesium		2	**1900**	mg/L	10	1.00

continued ...

sample 356493 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2	**19400**	mg/L	100	1.00

Sample: 356493 - MW-3

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110389	Date Analyzed:	2014-03-19	Analyzed By:	JR
Prep Batch:	93341	Sample Preparation:	2014-03-19	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**39000**	mg/L	5000	2.50

Sample: 356493 - MW-3

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**18900**	mg eq CaCO3/L	10	0.00

Sample: 356493 - MW-3

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110110	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	**6.32**	s.u.	1	0.00

Sample: 356493 - MW-3

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110389	Date Analyzed:	2014-03-19	Analyzed By:	JR
Prep Batch:	93341	Sample Preparation:	2014-03-19	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**1510**	mg/L	50	2.50

Sample: 356493 - MW-3

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**79600**	mg/L	50	2.50

Sample: 356494 - MW-4

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109850	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92894	Sample Preparation:	2014-03-04	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	**213**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**213**	mg/L as CaCo3	1	20.0

Sample: 356494 - MW-4

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

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0979	mg/L	1	0.100	98	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0701	mg/L	1	0.100	70	70 - 130

Sample: 356494 - MW-4

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

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Dissolved Calcium		3	**84.5**		mg/L	1	1.00
Dissolved Potassium		3	**4.67**		mg/L	1	1.00
Dissolved Magnesium		3	**13.9**		mg/L	1	1.00
Dissolved Sodium		3	**75.8**		mg/L	1	1.00

Sample: 356494 - MW-4

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	Result	RL	Units	Dilution	RL
Chloride		1	**118**		mg/L	5	2.50

Sample: 356494 - MW-4

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**268**	mg eq CaCO3/L	1	0.00

Sample: 356494 - MW-4

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110110	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92947	Sample Preparation:	2014-03-04	Prepared By:	AR

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

Sample: 356494 - MW-4

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**104**	mg/L	5	2.50

Sample: 356494 - MW-4

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Total Dissolved Solids		3	**702**	mg/L	1	2.50

Sample: 356495 - MW-5

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109850	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92894	Sample Preparation:	2014-03-04	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	**151**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**151**	mg/L as CaCo3	1	20.0

Sample: 356495 - MW-5

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

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

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0975	mg/L	1	0.100	98	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0701	mg/L	1	0.100	70	70 - 130

Sample: 356495 - MW-5

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**73.6**	mg/L	1	1.00
Dissolved Potassium		2	**5.08**	mg/L	1	1.00
Dissolved Magnesium		2	**10.3**	mg/L	1	1.00

continued ...

sample 356495 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium		2	**75.3**	mg/L	1	1.00

Sample: 356495 - MW-5

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**80.0**	mg/L	5	2.50

Sample: 356495 - MW-5

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**226**	mg eq CaCO3/L	1	0.00

Sample: 356495 - MW-5

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110110	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	**7.88**	s.u.	1	0.00

Sample: 356495 - MW-5

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**119**	mg/L	5	2.50

Sample: 356495 - MW-5

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	**547**	mg/L	1	2.50

Sample: 356496 - MW-6

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109916	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92946	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Carbonate Alkalinity	U	3	<20.0	mg/L as CaCo3	1	20.0
Bicarbonate Alkalinity		3	**261**	mg/L as CaCo3	1	20.0
Total Alkalinity		3	**261**	mg/L as CaCo3	1	20.0

Sample: 356496 - MW-6

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)			0.0949	mg/L	1	0.100	95	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0704	mg/L	1	0.100	70	70 - 130

Sample: 356496 - MW-6

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Calcium		2	**424**	mg/L	1	1.00
Dissolved Potassium		2	**5.66**	mg/L	1	1.00
Dissolved Magnesium		2	**114**	mg/L	1	1.00
Dissolved Sodium		2	**172**	mg/L	1	1.00

Sample: 356496 - MW-6

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**1150**	mg/L	50	2.50

Sample: 356496 - MW-6

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

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hardness (by ICP)			**1530**	mg eq CaCO3/L	1	0.00

Sample: 356496 - MW-6

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110110	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: 356496 - MW-6

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**103**	mg/L	5	2.50

Sample: 356496 - MW-6

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	**2770**	mg/L	5	2.50

Sample: 356497 - MW-7

Laboratory:	Midland				
Analysis:	Alkalinity	Analytical Method:	SM 2320B	Prep Method:	N/A
QC Batch:	109916	Date Analyzed:	2014-03-06	Analyzed By:	AR
Prep Batch:	92946	Sample Preparation:	2014-03-06	Prepared By:	AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Hydroxide Alkalinity	U	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	**110**	mg/L as CaCo3	1	20.0
Total Alkalinity		a	**110**	mg/L as CaCo3	1	20.0

Sample: 356497 - 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)			0.0939	mg/L	1	0.100	94	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0703	mg/L	1	0.100	70	70 - 130

Sample: 356497 - 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	**2710**	mg/L	10	1.00
Dissolved Potassium		a	**213**	mg/L	1	1.00
Dissolved Magnesium		a	**1220**	mg/L	10	1.00

continued ...

sample 356497 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Dissolved Sodium	Q1 Q2	2	**14500**	mg/L	100	1.00

Sample: 356497 - MW-7

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1	**32400**	mg/L	1000	2.50

Sample: 356497 - 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)			**11800**	mg eq CaCO3/L	10	0.00

Sample: 356497 - MW-7

Laboratory:	Midland				
Analysis:	pH	Analytical Method:	SM 4500-H+	Prep Method:	N/A
QC Batch:	110110	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	**6.65**	s.u.	1	0.00

Sample: 356497 - MW-7

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110388	Date Analyzed:	2014-03-20	Analyzed By:	JR
Prep Batch:	93340	Sample Preparation:	2014-03-20	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Sulfate		1	**1220**	mg/L	50	2.50

Sample: 356497 - MW-7

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	**52600**	mg/L	50	2.50

Method Blanks

Method Blank (1) QC Batch: 109850

QC Batch: 109850 | Date Analyzed: 2014-03-04 | Analyzed By: AR
Prep Batch: 92894 | QC Preparation: 2014-03-04 | 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: 109916

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

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

Method Blank (1) QC Batch: 109964

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

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

continued ...

method blank continued ...

Parameter	Flag	Cert	MDL Result	Units	RL
Xylene		a	<0.000189	mg/L	0.003

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

Method Blank (1) QC Batch: 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		a	<0.000238	mg/L	0.001
Toluene		a	<0.000181	mg/L	0.001
Ethylbenzene		a	<0.000247	mg/L	0.001
Xylene		a	<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		a	<0.000238	mg/L	0.001
Toluene		a	<0.000181	mg/L	0.001
Ethylbenzene		a	<0.000247	mg/L	0.001
Xylene		a	<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: 110044

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

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

Method Blank (1) QC Batch: 110082

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

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

Method Blank (1) QC Batch: 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: 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

Method Blank (1) QC Batch: 110388

QC Batch: 110388 | Date Analyzed: 2014-03-20 | Analyzed By: JR
Prep Batch: 93340 | QC Preparation: 2014-03-20 | Prepared By: JR

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

Method Blank (1) QC Batch: 110388

QC Batch: 110388 | Date Analyzed: 2014-03-20 | Analyzed By: JR
Prep Batch: 93340 | QC Preparation: 2014-03-20 | Prepared By: JR

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

Method Blank (1) QC Batch: 110389

QC Batch: 110389 | Date Analyzed: 2014-03-19 | Analyzed By: JR
Prep Batch: 93341 | QC Preparation: 2014-03-19 | Prepared By: JR

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

Method Blank (1) QC Batch: 110389

QC Batch:	110389	Date Analyzed:	2014-03-19	Analyzed By:	JR
Prep Batch:	93341	QC Preparation:	2014-03-19	Prepared By:	JR

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

Method Blank (1) QC Batch: 110780

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

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

Duplicates (1) Duplicated Sample: 356495

QC Batch:	109850	Date Analyzed:	2014-03-04	Analyzed By:	AR
Prep Batch:	92894	QC Preparation:	2014-03-04	Prepared By:	AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity	3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Carbonate Alkalinity	3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Bicarbonate Alkalinity	3	140	151	mg/L as CaCo3	1	8	20
Total Alkalinity	3	140	151	mg/L as CaCo3	1	8	20

Duplicates (1) Duplicated Sample: 356470

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

continued ...

duplicate continued ...

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	79.0	94.0	mg/L as CaCo3	1	17	20
Total Alkalinity	J	79.0	94.0	mg/L as CaCo3	1	17	20

Duplicates (1) Duplicated Sample: 356493

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

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

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	J	60400	66700	mg/L	50	10	10

Duplicates (1) Duplicated Sample: 356458

QC Batch: 110109 | Date Analyzed: 2014-03-04 | Analyzed By: AR
Prep Batch: 92947 | QC Preparation: 2014-03-04 | Prepared By: AR

Param		Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH	J	6.17	6.15	s.u.	1	0	10

Duplicates (1) Duplicated Sample: 356495

QC Batch:	110110	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	7.68	7.88	s.u.	1	3	10

Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

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

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

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

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

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

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

Laboratory Control Spike (LCS-1)

QC Batch: 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		a	0.110	mg/L	1	0.100	<0.000238	110	70 - 130	4	20
Toluene		a	0.111	mg/L	1	0.100	<0.000181	111	70 - 130	4	20
Ethylbenzene		a	0.106	mg/L	1	0.100	<0.000247	106	70 - 130	3	20
Xylene		a	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: 110044 | Date Analyzed: 2014-03-11 | Analyzed By: LM
Prep Batch: 93041 | QC Preparation: 2014-03-11 | Prepared By: PM

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

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

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

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

Laboratory Control Spike (LCS-1)

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

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

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

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

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

Laboratory Control Spike (LCS-1)

QC Batch: 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: 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.

Laboratory Control Spike (LCS-1)

QC Batch: 110388 | Date Analyzed: 2014-03-20 | Analyzed By: JR
Prep Batch: 93340 | QC Preparation: 2014-03-20 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	23.9	mg/L	1	25.0	<0.678	96	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	23.9	mg/L	1	25.0	<0.678	96	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: 110388 | Date Analyzed: 2014-03-20 | Analyzed By: JR
Prep Batch: 93340 | QC Preparation: 2014-03-20 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	24.1	mg/L	1	25.0	<0.0260	96	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	24.0	mg/L	1	25.0	<0.0260	96	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: 110389 | Date Analyzed: 2014-03-19 | Analyzed By: JR
Prep Batch: 93341 | QC Preparation: 2014-03-19 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	24.9	mg/L	1	25.0	<0.678	100	90 - 110

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	25.0	mg/L	1	25.0	<0.678	100	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: 110389 | Date Analyzed: 2014-03-19 | Analyzed By: JR
Prep Batch: 93341 | QC Preparation: 2014-03-19 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	25.0	mg/L	1	25.0	<0.0260	100	90 - 110

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	25.1	mg/L	1	25.0	<0.0260	100	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: 110780 | Date Analyzed: 2014-04-01 | Analyzed By: JR
Prep Batch: 93668 | QC Preparation: 2014-04-01 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	24.9	mg/L	1	25.0	<0.0260	100	90 - 110

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	24.9	mg/L	1	25.0	<0.0260	100	90 - 110	0	20

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

Matrix Spike (MS-1) Spiked Sample: 356485

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

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

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

continued ...

matrix spikes continued ...

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

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

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

Matrix Spike (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.

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 (xMS-1) Spiked Sample: 357343

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

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

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

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

continued ...

matrix spikes continued ...

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

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

Matrix Spike (MS-1) Spiked Sample: 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.

Matrix Spike (MS-1) Spiked Sample: 358506

QC Batch: 110388 | Date Analyzed: 2014-03-20 | Analyzed By: JR
Prep Batch: 93340 | QC Preparation: 2014-03-20 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	1950	mg/L	55.6	1390	478	106	80 - 120

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

continued ...

matrix spikes continued ...

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	1890	mg/L	55.6	1390	478	102	80 - 120	3	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: 358506

QC Batch: 110388 | Date Analyzed: 2014-03-20 | Analyzed By: JR
Prep Batch: 93340 | QC Preparation: 2014-03-20 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1700	mg/L	55.6	1390	294	101	80 - 120

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	1650	mg/L	55.6	1390	294	98	80 - 120	3	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: 358407

QC Batch: 110389 | Date Analyzed: 2014-03-19 | Analyzed By: JR
Prep Batch: 93341 | QC Preparation: 2014-03-19 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	2110	mg/L	55.7	1390	459	119	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	2080	mg/L	55.7	1390	459	116	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: 358407

QC Batch: 110389 | Date Analyzed: 2014-03-19 | Analyzed By: JR
Prep Batch: 93341 | QC Preparation: 2014-03-19 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1930	mg/L	55.7	1390	322	116	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	1890	mg/L	55.7	1390	322	113	80 - 120	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: 357547

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

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	1960	mg/L	55.6	1390	506	105	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	1930	mg/L	55.6	1390	506	102	80 - 120	2	20

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

Calibration Standards

Standard (ICV-1)

QC Batch: 109850 | 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
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-04
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	242		-	2014-03-04
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-04
Total Alkalinity		3	mg/L as CaCo3	250	250	100	90 - 110	2014-03-04

Standard (CCV-1)

QC Batch: 109850 | 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
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-04
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	248		-	2014-03-04
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-04
Total Alkalinity		3	mg/L as CaCo3	250	263	105	90 - 110	2014-03-04

Standard (ICV-1)

QC Batch: 109916 | Date Analyzed: 2014-03-06 | Analyzed By: AR

Param	Flag	Cert	Units	ICVs True Conc.	ICVs Found Conc.	ICVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-06
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	234		-	2014-03-06
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-06
Total Alkalinity		3	mg/L as CaCo3	250	253	101	90 - 110	2014-03-06

Standard (CCV-1)

QC Batch: 109916 | Date Analyzed: 2014-03-06 | Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Hydroxide Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-06
Carbonate Alkalinity		3	mg/L as CaCo3	0.00	268		-	2014-03-06
Bicarbonate Alkalinity		3	mg/L as CaCo3	0.00	<20.0		-	2014-03-06
Total Alkalinity		3	mg/L as CaCo3	250	269	108	90 - 110	2014-03-06

Standard (CCV-1)

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

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

Standard (CCV-2)

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

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

Standard (CCV-3)

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

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

Standard (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

continued ...

standard continued ...

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
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

continued ...

standard continued . . .

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
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: 110044 Date Analyzed: 2014-03-11 Analyzed By: LM

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

Standard (CCV-1)

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

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

Standard (ICV-1)

QC Batch: 110109 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	7.01	100	98 - 102	2014-03-04

Standard (CCV-1)

QC Batch: 110109 Date Analyzed: 2014-03-04 Analyzed By: AR

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

Standard (ICV-1)

QC Batch: 110110 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	7.05	101	98 - 102	2014-03-04

Standard (CCV-1)

QC Batch: 110110 Date Analyzed: 2014-03-04 Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
pH		3	s.u.	7.00	7.09	101	98 - 102	2014-03-04

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

Standard (CCV-1)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-1)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-2)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-2)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-3)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-3)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-4)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-4)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-5)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-5)

QC Batch: 110388 Date Analyzed: 2014-03-20 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	2014-03-20

Standard (CCV-1)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-1)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-2)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-2)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-3)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-3)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-4)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-4)

QC Batch: 110389 Date Analyzed: 2014-03-19 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	2014-03-19

Standard (CCV-1)

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

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.0	96	90 - 110	2014-04-01

Standard (CCV-2)

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

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.0	96	90 - 110	2014-04-01

Appendix

Report Definitions

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

Laboratory Certifications

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

Standard Flags

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

Result Comments

1 Surrogate fails due to matrix effect - confirmed by reanalysis.
2 Surrogate fails due to matrix effect - confirmed by reanalysis.

Attachments

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

14030407

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 Energy
SITE MANAGER: Greg Pope
PROJECT NO.: 114-6401628
PROJECT NAME: Rock Queen Tract #7

ANALYSIS REQUEST (Circle or Specify Method No.)

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, SO4	ALK, HARDNESS		
356491	3/1/14	1630	w		X	mw-1	6		X		X		X												X				X			7
492	↓	1645	↓		X	mw-2	↓		↓		↓		↓												↓				↓			6
493		1720			X	mw-3																										6
494		1620			X	mw-4																										9
495		1605				MW-5																										8
496		1636				MW-6																										7
497		17:10				MW-7																										7
																																6

RELINQUISHED BY: (Signature) [signature] Date: 3/3/14 Time: 1502
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: 1621
RELINQUISHED BY: (Signature) Date: Time:
RECEIVED BY: (Signature) Date: Time:

SAMPLED BY: (Print & Initial) CF/TH Date: Time:
SAMPLE SHIPPED BY: (Circle) FEDEX BUS AIRBILL #: HAND DELIVERED (circled) UPS 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: added samples received not listed per GP. AR

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

Midland - BTEX /pH/alk/TDS Lubbock - Anions/hardness ED-Cl/SO4

14030407

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 Energy
SITE MANAGER: Greg Pope
PROJECT NO.: 114-6401628
PROJECT NAME: Rock Queen Tract #7

ANALYSIS REQUEST (Circle or Specify Method No.)

LAB I.D. NUMBER	DATE	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS, Sol., ALK, HARDNESS				
35491	3/1/14	1630	W		X	MW-1	6		X		X		X											X				X				7
492	↓	1645	↓		X	MW-2	↓		↓		↓		↓											↓				↓				6
493		1720			X	MW-3																										6
494	↓	1620	↓		X	MW-4	↓		↓		↓		↓											↓				↓				9
495		1605				MW-5																										8
496		1635				MW-6																										7
497		1710				MW-7																										7
																																6

RELINQUISHED BY: (Signature) Date: 3/3/14 Time: 1500
RECEIVED BY: (Signature) Date: 03.03.14 Time: 1900
RELINQUISHED BY: (Signature) Date: 03.03.14 Time: 2142
RECEIVED BY: (Signature) Date: 3/4/14 Time: 16:21
RELINQUISHED BY: (Signature) Date: 3/4/14 Time: 15:30
RECEIVED BY: (Signature) Date: Time:

SAMPLED BY: (Print & Initial) CF/TH Date: Time:
SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS OTHER:
AIRBILL: 5: 28 95 1243

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

RECEIVED BY: (Signature) TA
DATE: 3/5/14 TIME: 9:00

TETRA TECH CONTACT PERSON: GREG POPE
Results by: STP
RUSH Charges Authorized: Yes No

SAMPLE CONDITION WHEN RECEIVED: -0.8 2.7 12.5

REMARKS: added samples weekend not listed per GP. AR

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

Midland - BTEX/pH/Alk/TDS Roswell - Anions/Hardness EP - Cl/SO4

Cation-Anion Balance Sheet

DATE: 4/2/2014

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate-N ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
356491	587	187	2850	40	240.00	922	5510				10900	
356492	4700	1970	16000	120	124.00	1250	41500				80400	
356493	4450	1900	19400	221	123.00	1510	39000				79600	
356494	84.5	13.9	75.8	4.67	213.00	104	118				702	
356495	73.6	10.3	75.3	5.08	151.00	119	80				547	
356496	424	114	172	5.66	261.00	103	1150				2770	
356497	2710	1220	14500	213	110.00	1220	32400				52600	

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*
356491	29.29	15.39	123.98	1.02	4.80	19.20	155.44	0.00	0.00	0.00	169.68	179.43	2.794358709
356492	234.53	162.11	696.00	3.07	2.48	26.03	1170.72	0.00	0.00	0.00	1095.71	1199.22	4.510336237
356493	222.06	156.35	843.90	5.65	2.46	31.44	1100.19	0.00	0.00	0.00	1227.96	1134.09	3.9741362
356494	4.22	1.14	3.30	0.12	4.26	2.17	3.33	0.00	0.00	0.00	8.78	9.75	5.271760173
356495	3.67	0.85	3.28	0.13	3.02	2.48	2.26	0.00	0.00	0.00	7.93	7.75	1.09274407
356496	21.16	9.38	7.48	0.14	5.22	2.14	32.44	0.00	0.00	0.00	38.17	39.81	2.10399857
356497	135.23	100.39	630.75	5.45	2.20	25.40	914.00	0.00	0.00	0.00	871.82	941.60	3.848134415

	EC/Cation	EC/Anion				
356491	16967.773	17943.314	range	0	to	0
356492	109571.09	119922	range	0	to	0
356493	122795.918	113408.82	range	0	to	0
356494	877.71396	975.406	range	0	to	0
356495	792.57234	775.438	range	0	to	0
356496	3816.54428	3980.596	range	0	to	0
356497	87182.134	94160.44	range	0	to	0

TDS/EC	TDS/Cal		TDS/Anion	
#DIV/0!	0.64		0.61	needs to be 0.55-0.77
#DIV/0!	0.73		0.67	needs to be 0.55-0.77
#DIV/0!	0.65		0.70	needs to be 0.55-0.77
#DIV/0!	0.80		0.72	needs to be 0.55-0.77
#DIV/0!	0.69		0.71	needs to be 0.55-0.77
#DIV/0!	0.73		0.70	needs to be 0.55-0.77
#DIV/0!	0.60		0.56	needs to be 0.55-0.77

APPENDIX D
SLUG TEST DATA

AQTESOLV for Windows

Data Set: H:\WinSitu Data\Celero Caprock Slug Test Data\Exported Data\RQ Tract 7 MW-3 slugin\RQTract7MW
Date: 04/28/14
Time: 14:39:38

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract7
Test Date: 03/25/14
Test Well: MW-3Slugin

AQUIFER DATA

Saturated Thickness: 15.19 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.165 ft
Static Water Column Height: 21.85 ft
Casing Radius: 0.083 ft
Well Radius: 0.281 ft
Well Skin Radius: 1. ft
Screen Length: 15.19 ft
Total Well Penetration Depth: 15.19 ft

No. of Observations: 68

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	21.84	2100.	21.83
120.	22.01	2160.	21.84
180.	21.91	2220.	21.83
240.	21.88	2280.	21.83
300.	21.85	2340.	21.84
360.	21.86	2400.	21.82
420.	21.86	2460.	21.83
480.	21.85	2520.	21.83
540.	21.85	2580.	21.83
600.	21.86	2640.	21.83
660.	21.85	2700.	21.82
720.	21.86	2760.	21.83
780.	21.84	2820.	21.83
840.	21.86	2880.	21.82
900.	21.85	2940.	21.82
960.	21.85	3000.	21.84
1020.	21.84	3060.	21.84
1080.	21.83	3120.	21.83
1140.	21.84	3180.	21.83
1200.	21.84	3240.	21.83
1260.	21.84	3300.	21.85
1320.	21.84	3360.	21.82
1380.	21.84	3420.	21.84
1440.	21.85	3480.	21.82
1500.	21.85	3540.	21.82
1560.	21.83	3600.	21.82
1620.	21.83	3660.	21.84
1680.	21.85	3720.	21.82
1740.	21.83	3780.	21.83
1800.	21.85	3840.	21.82
1860.	21.83	3900.	21.84
1920.	21.85	3960.	21.83

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1980.	21.84	4020.	21.84
2040.	21.82	4080.	21.82

SOLUTION

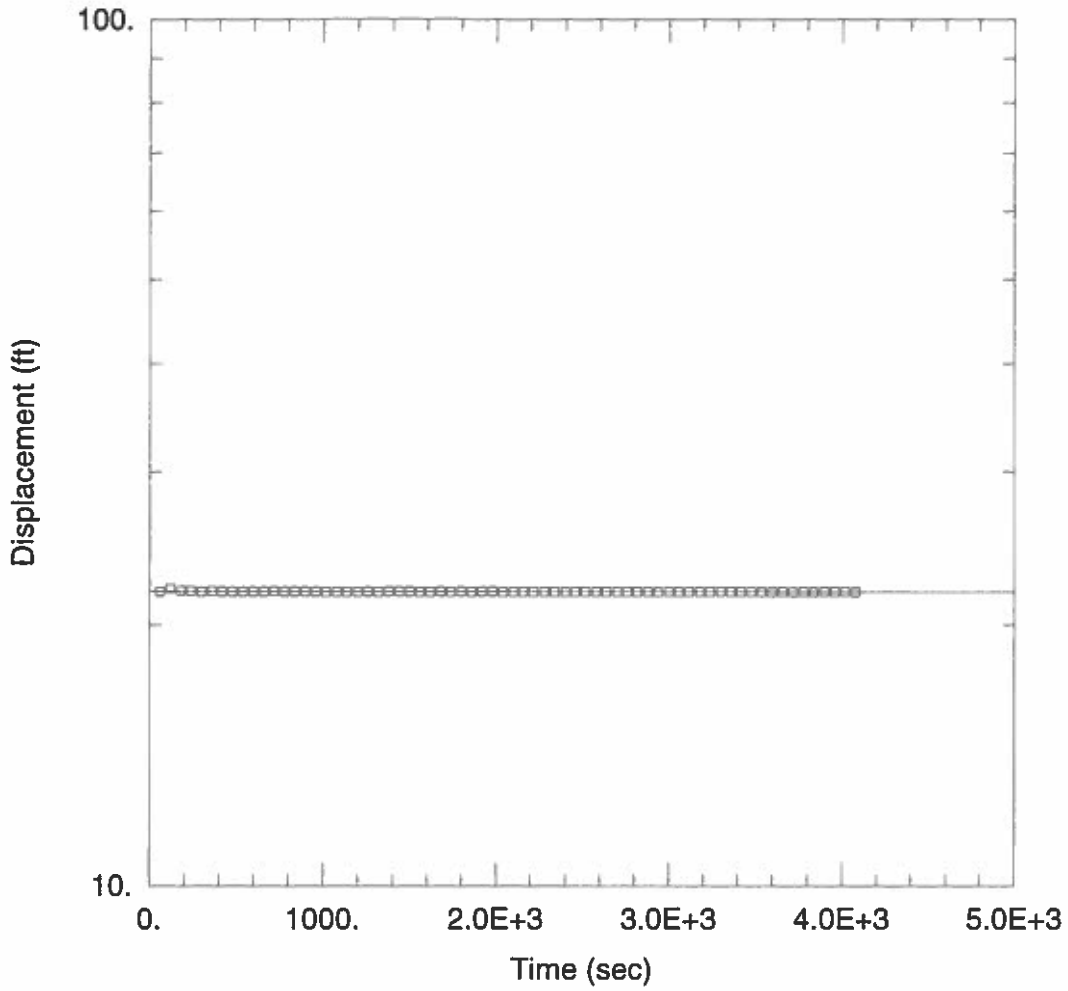
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.057

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	1.026E-5	m/day
y0	21.87	ft

K = 1.188E-8 cm/sec
T = K*b = 4.752E-5 m²/day (5.5E-6 sq. cm/sec)



WELL TEST ANALYSIS

Data Set: H:\...\RQTract7MW-3slugin.aqt
Date: 04/28/14 Time: 14:39:57

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract7
Test Well: MW-3Slugin
Test Date: 03/25/14

AQUIFER DATA

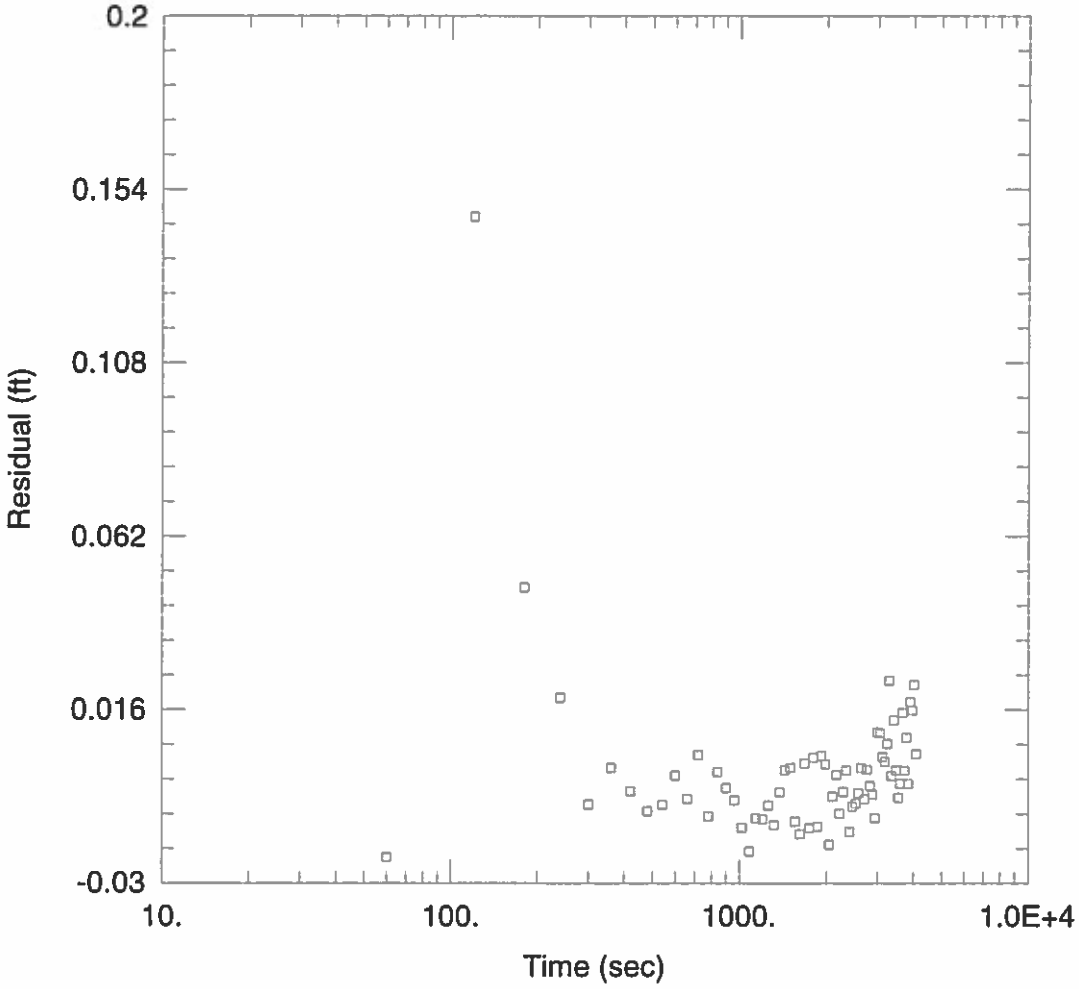
Saturated Thickness: 15.19 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.165 ft
Total Well Penetration Depth: 15.19 ft
Casing Radius: 0.083 ft
Static Water Column Height: 21.85 ft
Screen Length: 15.19 ft
Well Radius: 0.281 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 1.026E-5 m/day
y0 = 21.87 ft



WELL TEST ANALYSIS

Data Set: H:\...\RQTract7MW-3slugin.aqt
Date: 04/28/14 Time: 14:40:08

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract7
Test Well: MW-3Slugin
Test Date: 03/25/14

AQUIFER DATA

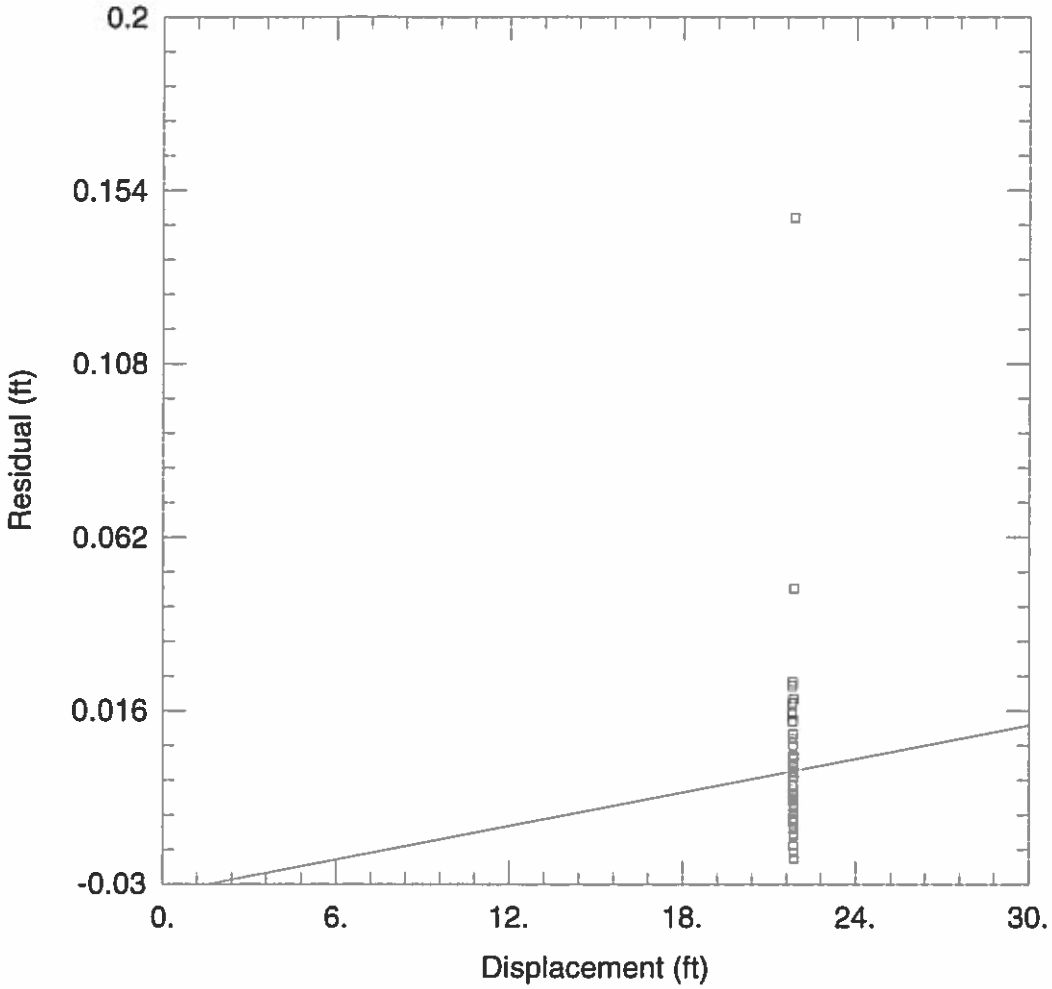
Saturated Thickness: 15.19 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.165 ft
Total Well Penetration Depth: 15.19 ft
Casing Radius: 0.083 ft
Static Water Column Height: 21.85 ft
Screen Length: 15.19 ft
Well Radius: 0.281 ft

SOLUTION

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



WELL TEST ANALYSIS

Data Set: H:\...\RQTract7MW-3slugin.aqt
Date: 04/28/14 Time: 14:40:17

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract7
Test Well: MW-3Slugin
Test Date: 03/25/14

AQUIFER DATA

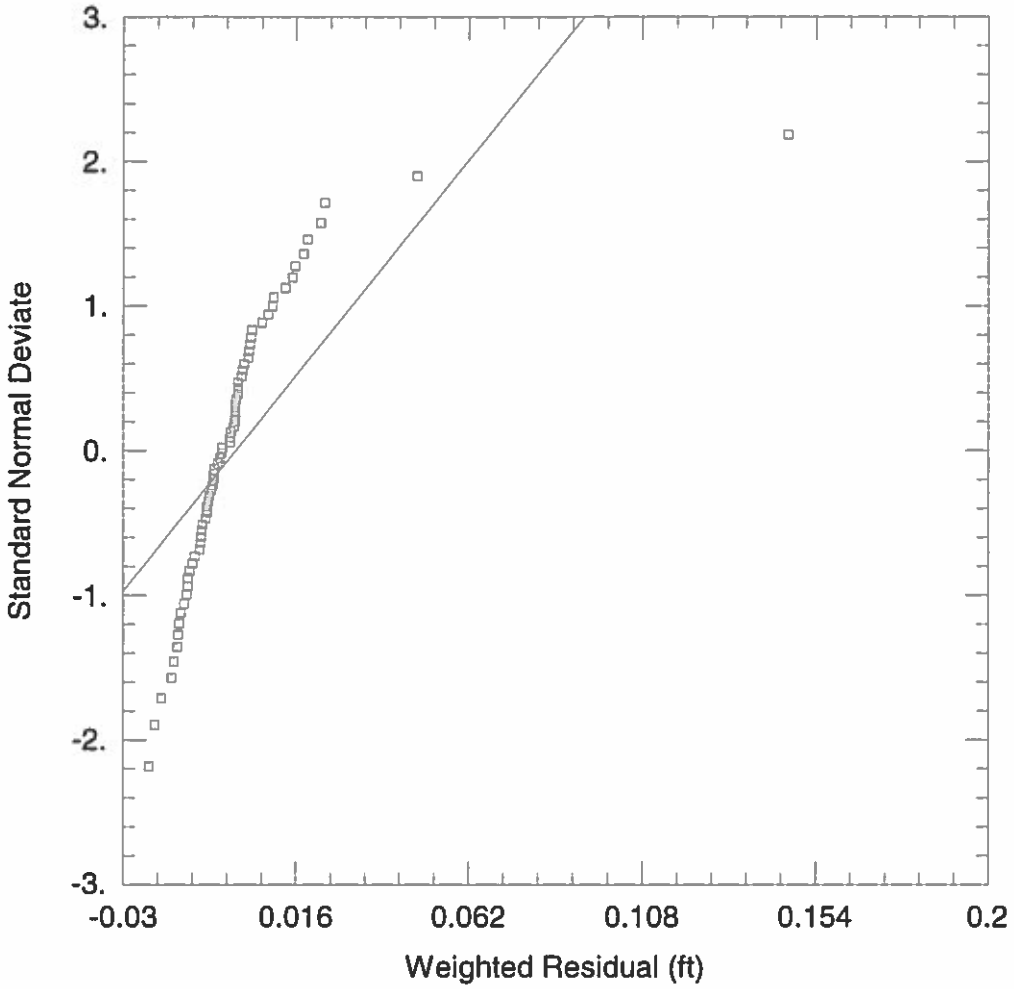
Saturated Thickness: 15.19 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.165 ft
Total Well Penetration Depth: 15.19 ft
Casing Radius: 0.083 ft
Static Water Column Height: 21.85 ft
Screen Length: 15.19 ft
Well Radius: 0.281 ft

SOLUTION

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



WELL TEST ANALYSIS

Data Set: H:\...\RQTract7MW-3slugin.aqt
Date: 04/28/14 Time: 14:40:24

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero Energy
Location: RQTract7
Test Well: MW-3Slugin
Test Date: 03/25/14

AQUIFER DATA

Saturated Thickness: 15.19 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.165 ft
Total Well Penetration Depth: 15.19 ft
Casing Radius: 0.083 ft
Static Water Column Height: 21.85 ft
Screen Length: 15.19 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 7 MW-5\RQTract7MW-5slugi
Title: Falling-Head Slug Test
Date: 04/28/14
Time: 14:08:57

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Date: 03/26/14
Test Well: MW-5Slugin

AQUIFER DATA

Saturated Thickness: 19.79 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.533 ft
Static Water Column Height: 3.524 ft
Casing Radius: 0.0833 ft
Well Radius: 0.2817 ft
Well Skin Radius: 1. ft
Screen Length: 19.79 ft
Total Well Penetration Depth: 19.79 ft

No. of Observations: 61

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	4.057	1920.	3.662
120.	3.96	1980.	3.654
180.	3.892	2040.	3.65
240.	3.858	2100.	3.646
300.	3.817	2160.	3.666
360.	3.775	2220.	3.643
420.	3.749	2280.	3.654
480.	3.733	2340.	3.657
540.	3.714	2400.	3.656
600.	3.705	2460.	3.647
660.	3.696	2520.	3.656
720.	3.686	2580.	3.668
780.	3.671	2640.	3.645
840.	3.684	2700.	3.657
900.	3.674	2760.	3.645
960.	3.664	2820.	3.647
1020.	3.658	2880.	3.643
1080.	3.671	2940.	3.654
1140.	3.657	3000.	3.648
1200.	3.67	3060.	3.661
1260.	3.658	3120.	3.644
1320.	3.659	3180.	3.653
1380.	3.661	3240.	3.642
1440.	3.655	3300.	3.648
1500.	3.666	3360.	3.642
1560.	3.642	3420.	3.645
1620.	3.652	3480.	3.64
1680.	3.656	3540.	3.643
1740.	3.662	3600.	3.643
1800.	3.658	3660.	3.627

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1860.	3.651		

SOLUTION

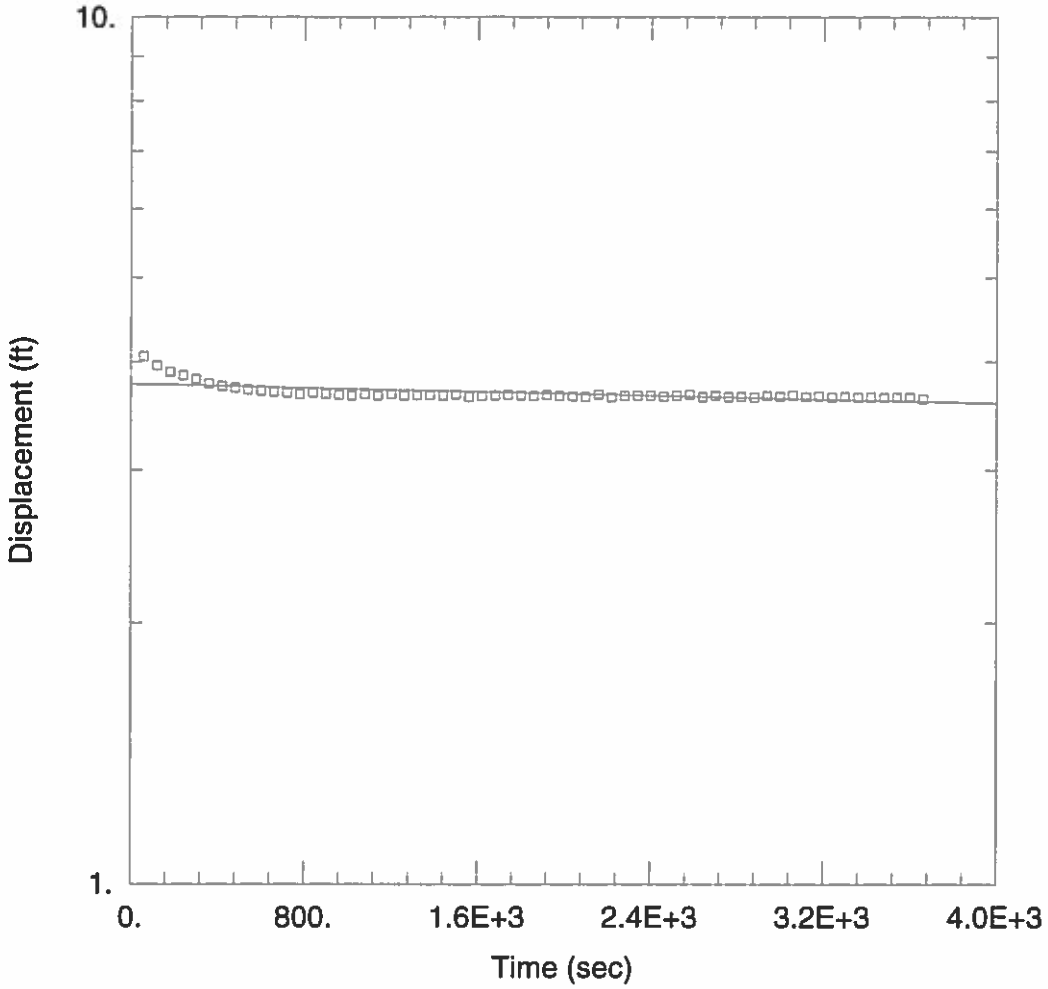
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 3.265

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	8.28E-5	m/day
y0	3.77	ft

K = 9.583E-8 cm/sec
T = K*b = 0.0004995 m²/day (5.781E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-5slugin.aqt
Date: 04/28/14 Time: 14:06:49

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-5Slugin
Test Date: 03/26/14

AQUIFER DATA

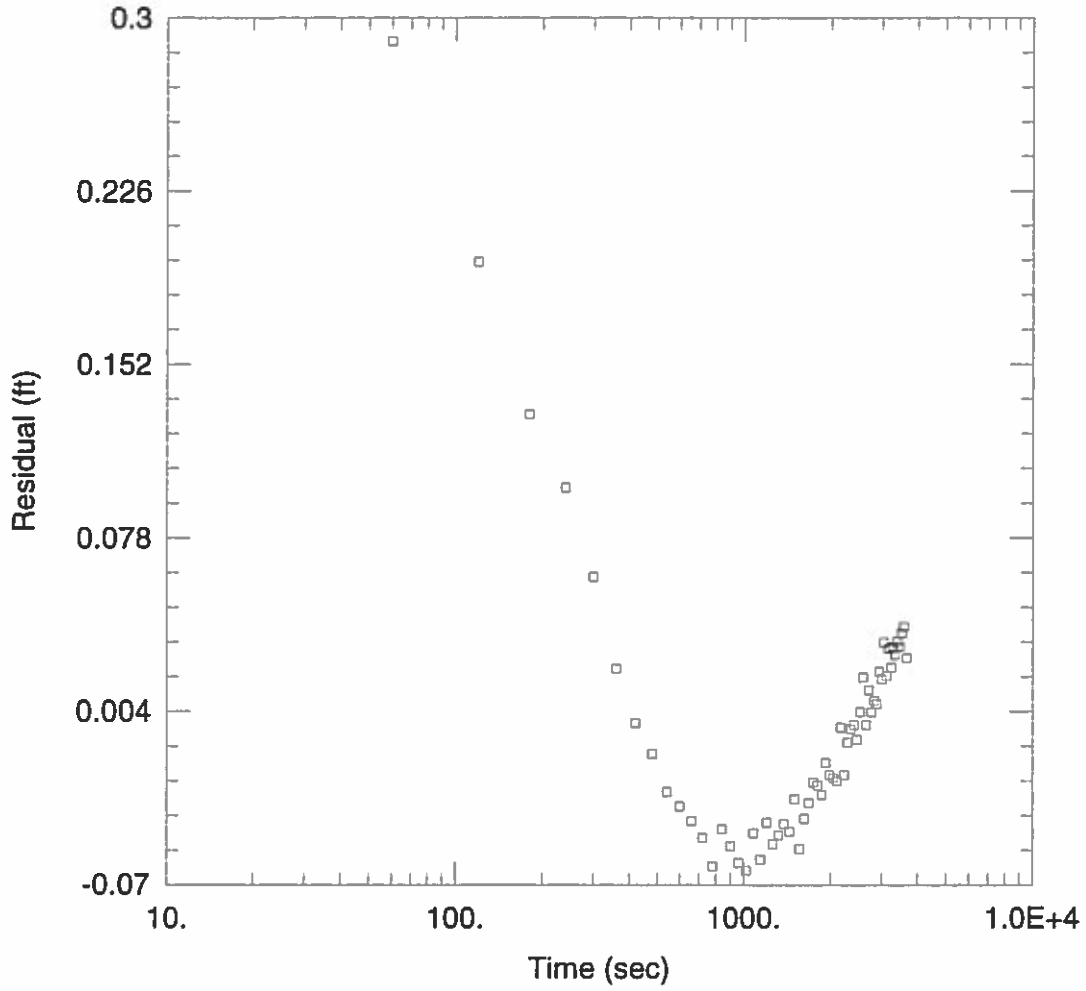
Saturated Thickness: 19.79 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.533 ft
Total Well Penetration Depth: 19.79 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 3.524 ft
Screen Length: 19.79 ft
Well Radius: 0.2817 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 8.28E-5 m/day
y0 = 3.77 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-5slugin.aqt
Date: 04/28/14 Time: 14:06:58

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-5Slugin
Test Date: 03/26/14

AQUIFER DATA

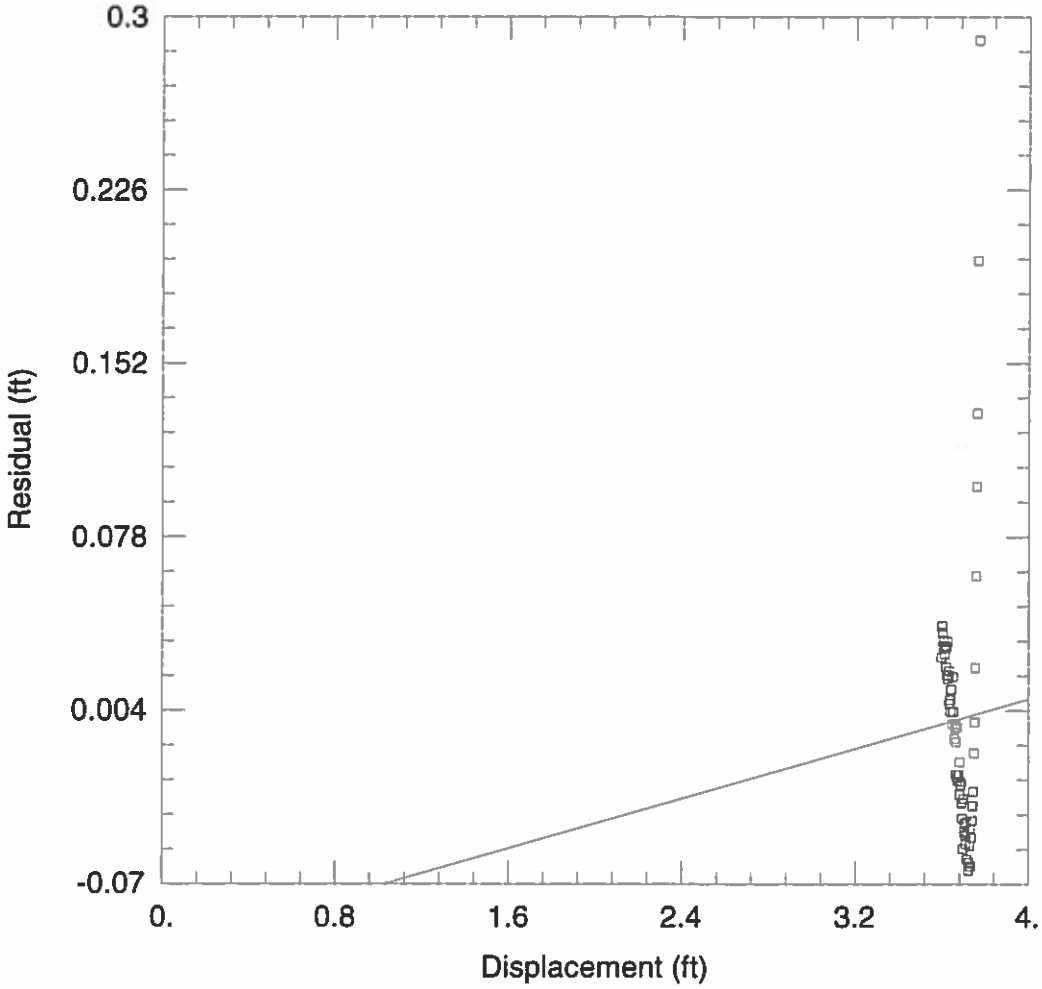
Saturated Thickness: 19.79 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.533 ft
Total Well Penetration Depth: 19.79 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 3.524 ft
Screen Length: 19.79 ft
Well Radius: 0.2817 ft

SOLUTION

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



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-5slugin.aqt
Date: 04/28/14 Time: 14:07:04

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-5Slugin
Test Date: 03/26/14

AQUIFER DATA

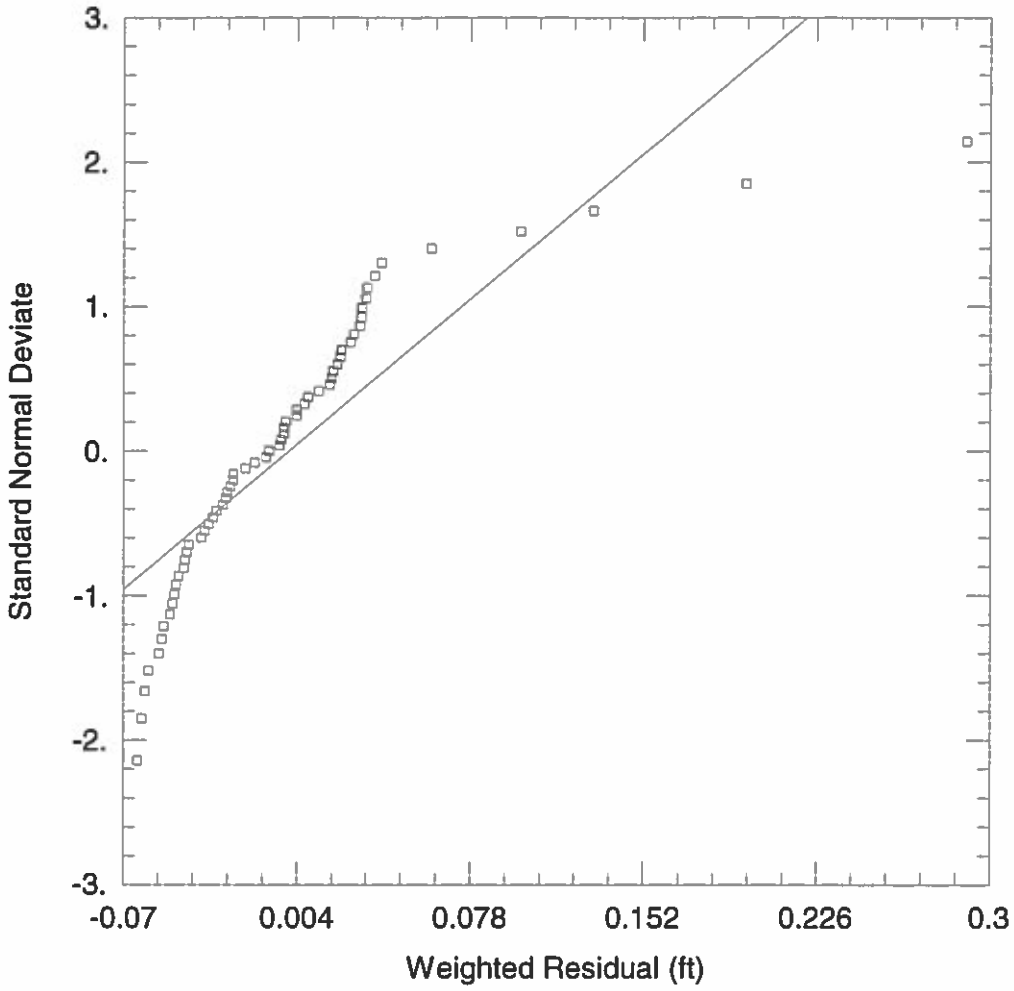
Saturated Thickness: 19.79 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.533 ft
Total Well Penetration Depth: 19.79 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 3.524 ft
Screen Length: 19.79 ft
Well Radius: 0.2817 ft

SOLUTION

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



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-5slugin.aqt
Date: 04/28/14 Time: 14:07:11

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-5Slugin
Test Date: 03/26/14

AQUIFER DATA

Saturated Thickness: 19.79 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.533 ft
Total Well Penetration Depth: 19.79 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 3.524 ft
Screen Length: 19.79 ft
Well Radius: 0.2817 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 7 MW-6\RQTract7MW-6slugi
Title: Falling-Head Slug Test
Date: 04/28/14
Time: 14:13:28

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Date: 03/27/14
Test Well: MW-6Slugin

AQUIFER DATA

Saturated Thickness: 15.65 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 1.426 ft
Static Water Column Height: 10.18 ft
Casing Radius: 0.0833 ft
Well Radius: 0.2188 ft
Well Skin Radius: 1. ft
Screen Length: 15.65 ft
Total Well Penetration Depth: 15.65 ft

No. of Observations: 40

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	10.17	1260.	10.26
120.	10.17	1320.	10.25
180.	10.16	1380.	10.25
240.	11.61	1440.	10.25
300.	10.54	1500.	10.25
360.	10.42	1560.	10.25
420.	10.35	1620.	10.25
480.	10.32	1680.	10.24
540.	10.3	1740.	10.25
600.	10.29	1800.	10.25
660.	10.28	1860.	10.26
720.	10.27	1920.	10.25
780.	10.27	1980.	10.25
840.	10.26	2040.	10.26
900.	10.26	2100.	10.25
960.	10.26	2160.	10.26
1020.	10.25	2220.	10.27
1080.	10.25	2280.	10.26
1140.	10.26	2340.	10.26
1200.	10.26	2400.	10.25

SOLUTION

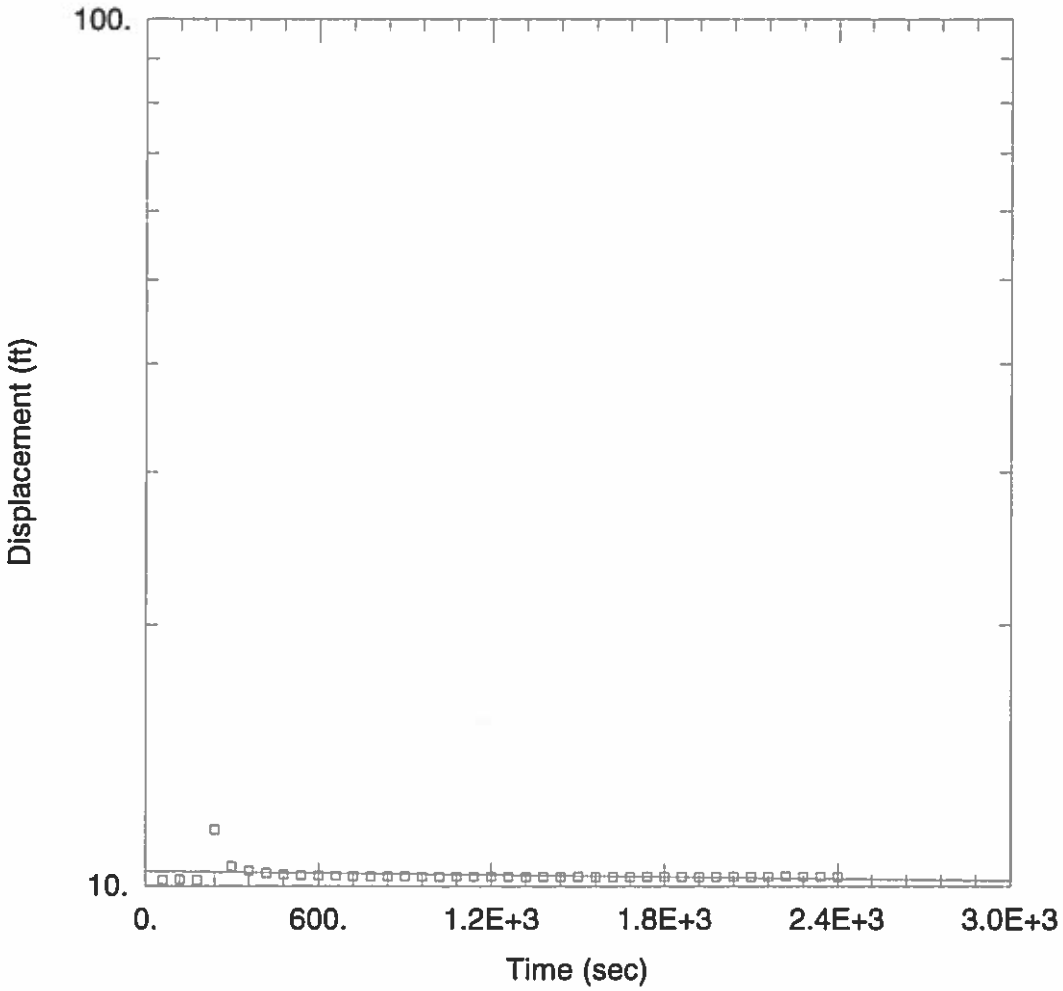
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	6.798E-5	m/day
y0	10.4	ft

K = 7.868E-8 cm/sec
T = K*b = 0.0003243 m²/day (3.753E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-6slugin.aqt
Date: 04/28/14 Time: 14:13:41

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-6Slugin
Test Date: 03/27/14

AQUIFER DATA

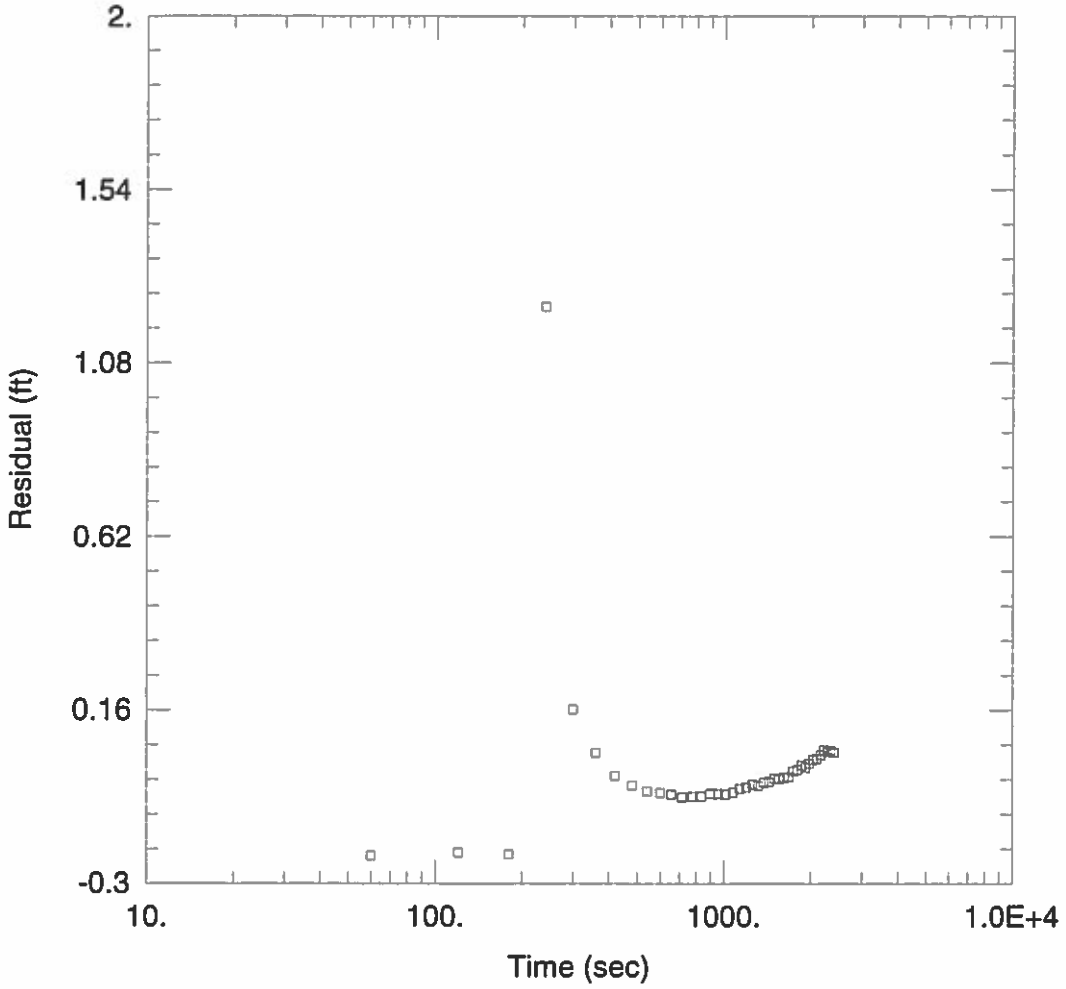
Saturated Thickness: 15.65 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 1.426 ft
Total Well Penetration Depth: 15.65 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.18 ft
Screen Length: 15.65 ft
Well Radius: 0.2188 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 6.798E-5 m/day
y0 = 10.4 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-6slugin.aqt
Date: 04/28/14 Time: 14:13:48

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-6Slugin
Test Date: 03/27/14

AQUIFER DATA

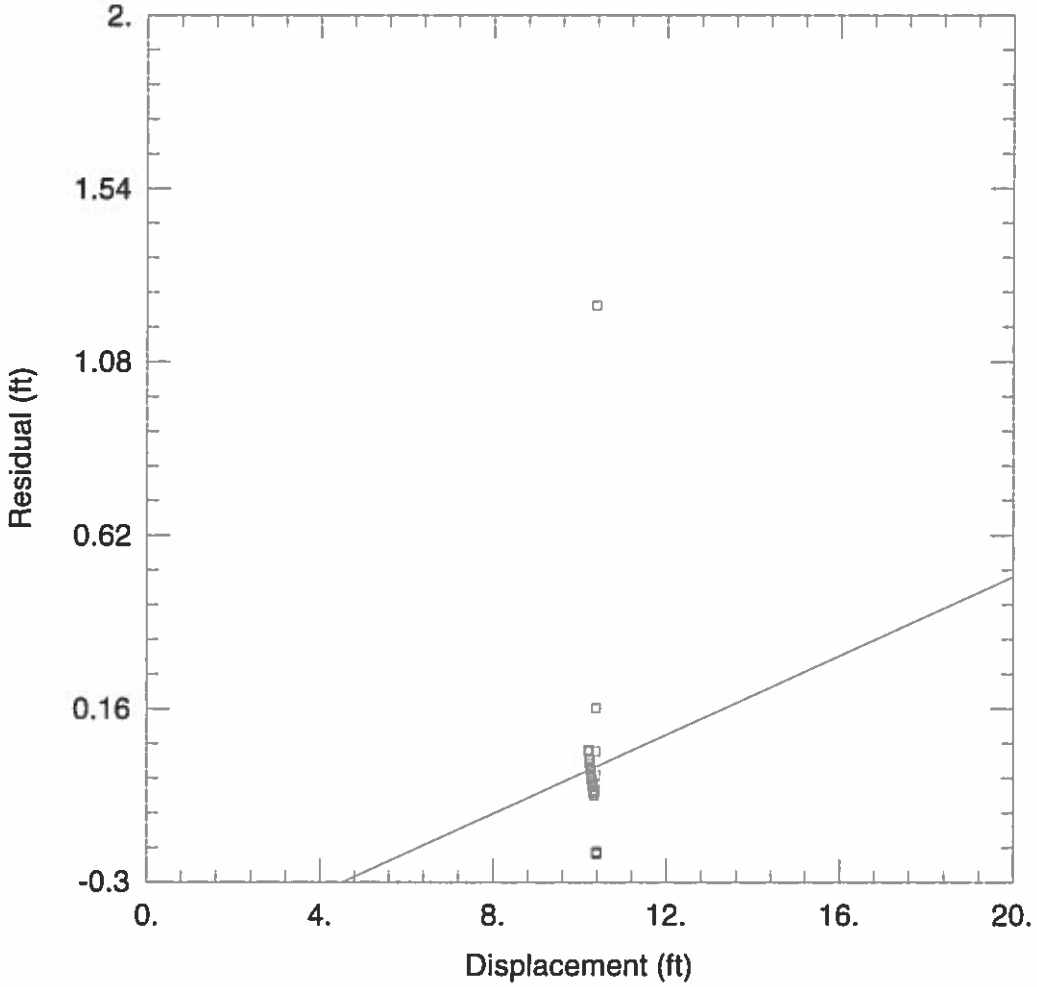
Saturated Thickness: 15.65 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 1.426 ft
Total Well Penetration Depth: 15.65 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.18 ft
Screen Length: 15.65 ft
Well Radius: 0.2188 ft

SOLUTION

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



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-6slugin.aqt
Date: 04/28/14 Time: 14:13:56

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-6Slugin
Test Date: 03/27/14

AQUIFER DATA

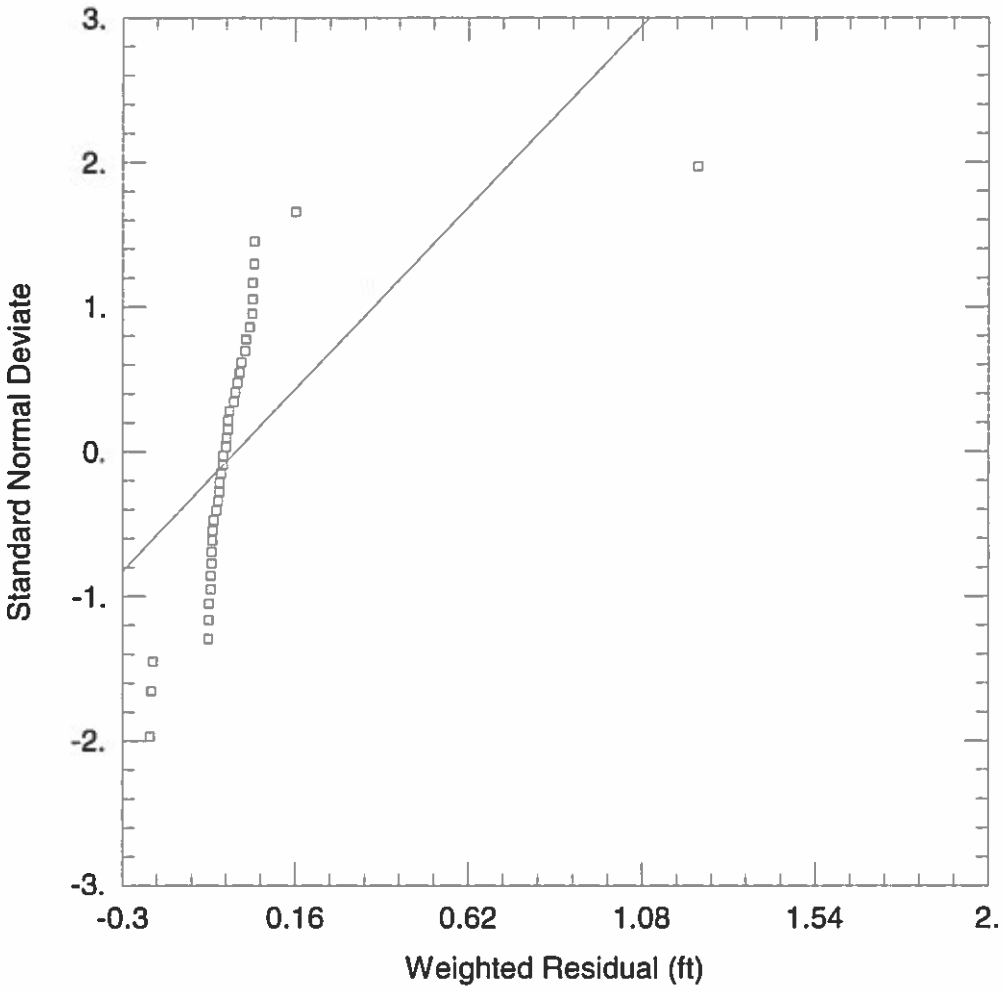
Saturated Thickness: 15.65 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 1.426 ft
Total Well Penetration Depth: 15.65 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.18 ft
Screen Length: 15.65 ft
Well Radius: 0.2188 ft

SOLUTION

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



FALLING-HEAD SLUG TEST

Data Set: H:\...\RQTract7MW-6slugin.aqt
Date: 04/28/14 Time: 14:14:03

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: RQTract7
Test Well: MW-6Slugin
Test Date: 03/27/14

AQUIFER DATA

Saturated Thickness: 15.65 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 1.426 ft
Total Well Penetration Depth: 15.65 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 10.18 ft
Screen Length: 15.65 ft
Well Radius: 0.2188 ft

SOLUTION

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