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), Drickey Queen Unit Saltwater Plant #3, Located in Unit Letter H, Section 16, Township 14 South, Range 31 East, Chaves Country, New Mexico (NMOCD 1RP#1648)

Mr. Von Gonten:

This report details the results of the Groundwater Aquifer Slug Test Evaluation for the Drickey Queen Unit Saltwater Plant #3, located in Chaves County, New Mexico.

Additional Monitor Well Installation

On November 6, 2010, and between January 27 and 28, 2014, Tetra Tech was onsite to oversee the installation of four monitor wells (MW-1 through MW-4) for delineation purposes. Each of the four monitor wells were installed with 2-inch PVC casing. The lithology of the installed wells was relatively consistent with tan to brown fine to medium grain sand to a depth of approximately 42 feet below ground surface (bgs). From approximately 42 to 46-56 feet bgs the soils are a brown fine to medium grain sand with well-rounded alluvium. From approximately 46-56 to 66-70 feet bgs, the soils are a red-brown medium to fine grain sand with minor gravel/alluvium and clay. From approximately 67 feet bgs to the terminus of the borings, the soils are a red clay. See Figures 1 and 2 for site locations and Appendix A soil boring logs.

During the investigation, groundwater was encountered at depths of approximately 57 to 63 feet bgs. The monitor wells were extended to depths of 100 feet bgs (MW-1), 80 feet bgs (MW-2 and MW-3), and 74 feet bgs (MW-4). Monitor well MW-1 had 50 feet of 0.02" screen installed at the base, while monitor wells MW-2, MW-3, and MW-4 had 30 feet of 0.02" screen installed at

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

Historic Groundwater Gauging and Sampling Results

Tetra Tech began gauging and sampling monitor well MW-1 in January 2010 and have continued on a quarterly basis. The well was sampled for BTEX, Sulfates, TDS, and periodically for general chemistry. Total BTEX has always remained below the detection limits. Chlorides have ranged from 41,300 milligrams per Liter (mg/L) on April 14, 2011 to 72,900 mg/L on October 29, 2014. No PSH was ever been measured in the monitor well. Gauging data is summarized as Table 1.

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 map generated for the sampling event shows the water forms a depression at the former pit area with no true gradient. Groundwater gradient map for the sampling event is included as Figure 4. Gauging data is summarized as Table 1.

On February 28, 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 mg/L benzene. Chlorides for the sampling period ranged from 23,700 mg/L in monitor well MW-2 to 55,400 mg/L in monitor well MW-1. None of the monitor wells had chlorides below the NMWQCC standard of 250 mg/L. The general chemistry and BTEX analyses are shown in Tables 2 and 3, respectively. A Chloride concentration map for the sampling event is included as Figure 5. See Appendix C for Laboratory Analytical Reports.

Aquifer Evaluation/Determination

On March 27, 2014, Tetra Tech was onsite to perform slug tests on Monitor Wells MW-2 and MW-3. 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-2 had a K value of 4.676E-5 m/day and a T value of 2.554E-4 m^2/day. Monitor well MW-3 had a K value of 2.811E-5 m/day and a T value of 2.116E-4 m^2/day. From *Groundwater Hydrology*, by David Keith Todd, the K values for the two wells indicate characteristics of a tight clay/shale with extremely low Transmissivity. Based on this data, it appears the underlying groundwater is not a viable aquifer and will not render much water. As such, remediation of the underlying groundwater would be neither technologically nor economically feasible. See Appendix D for slug test results.

CONCLUSIONS AND RECOMMENDATIONS

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

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

Respectfully submitted,
Tetra Tech, Inc.

Jeffrey Kindley, P.G.
Senior Environmental Geologist

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

cc: Gregg Skelton – Legacy Reserves

FIGURES

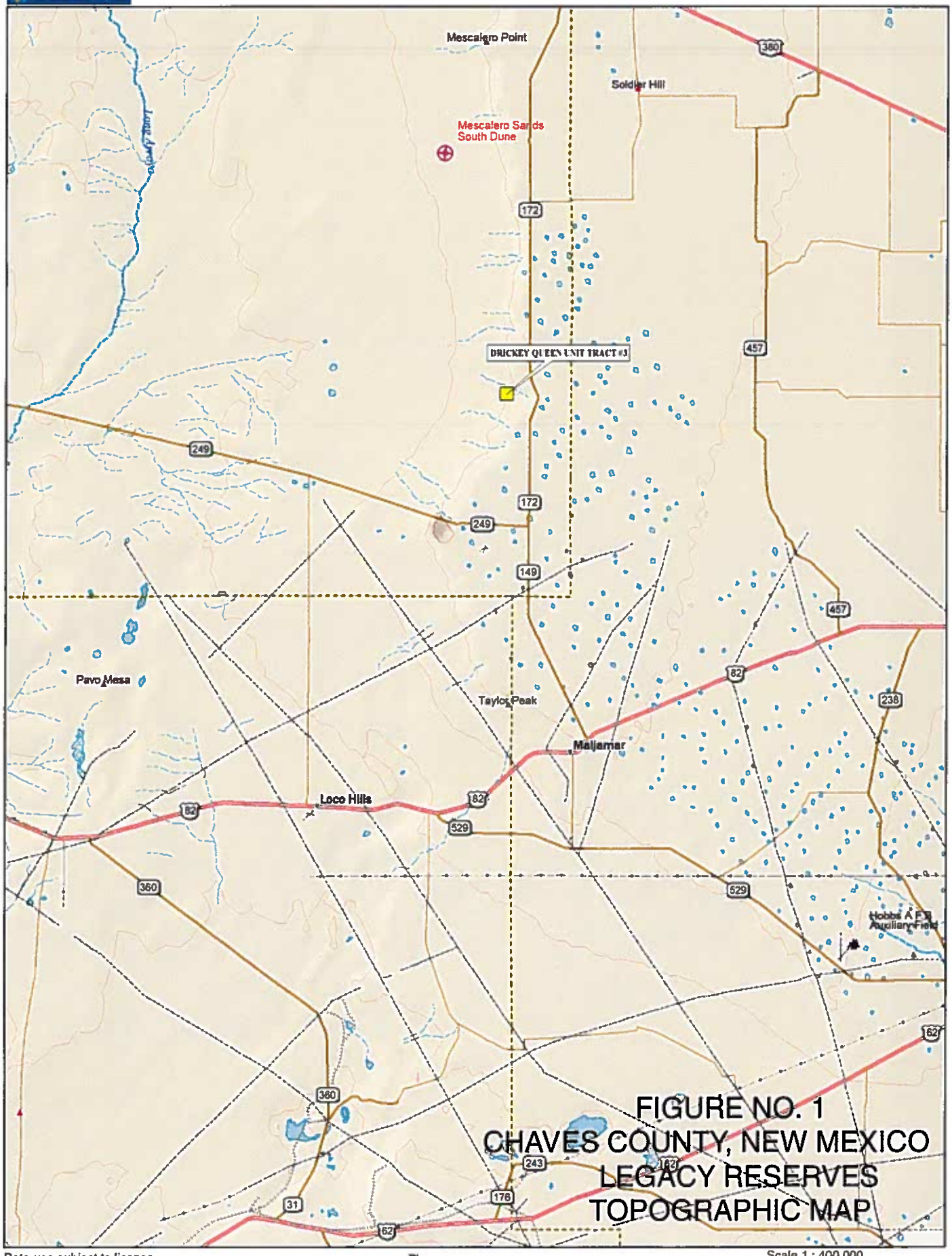

FIGURE NO. 1
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

TN
MN (7.4°E)

Scale 1 : 400,000
1" = 6.31 mi
Data Zoom 9-0

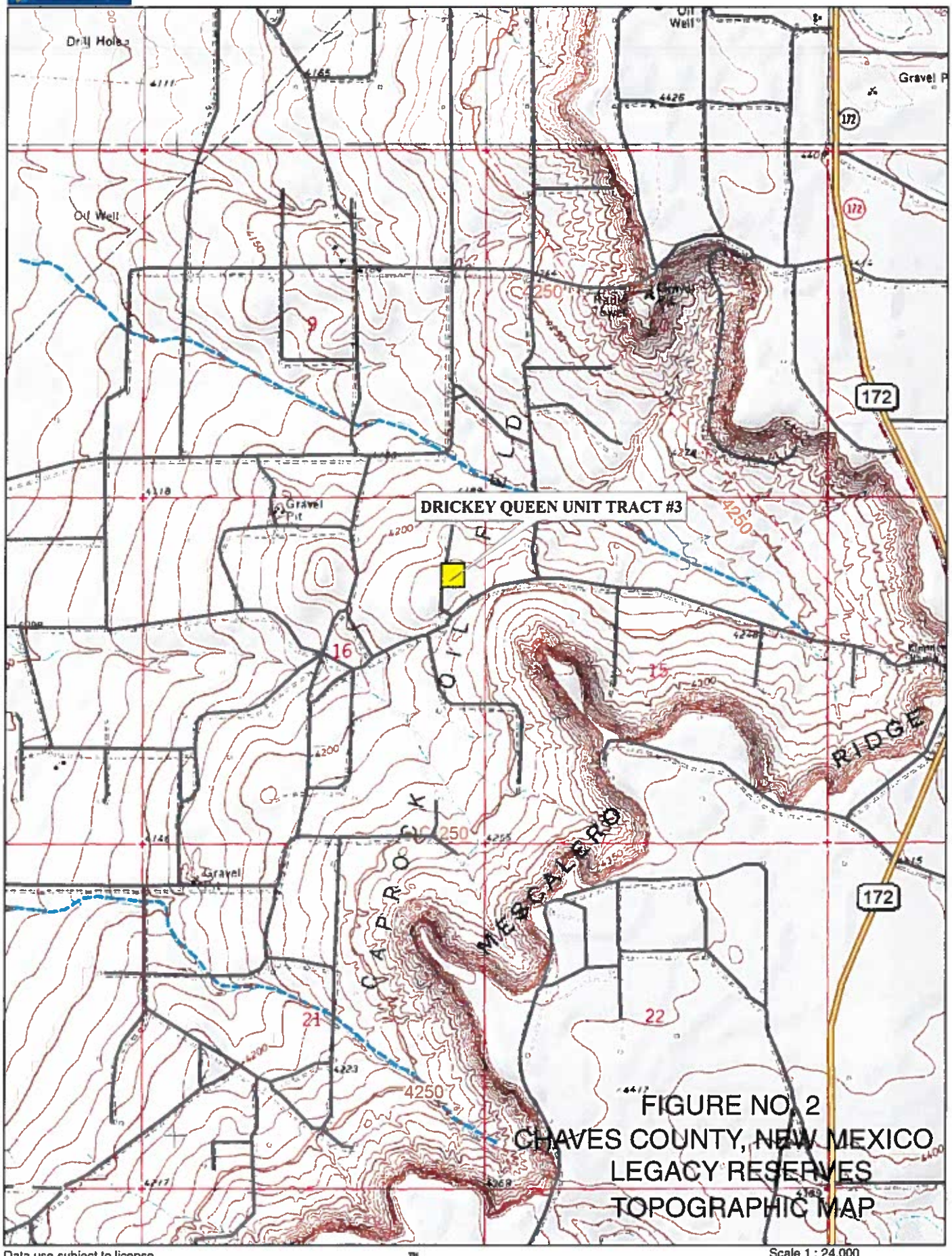

FIGURE NO. 2
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

Scale 1 : 24,000

1" = 2,000.0 ft

Data Zoom 12-2

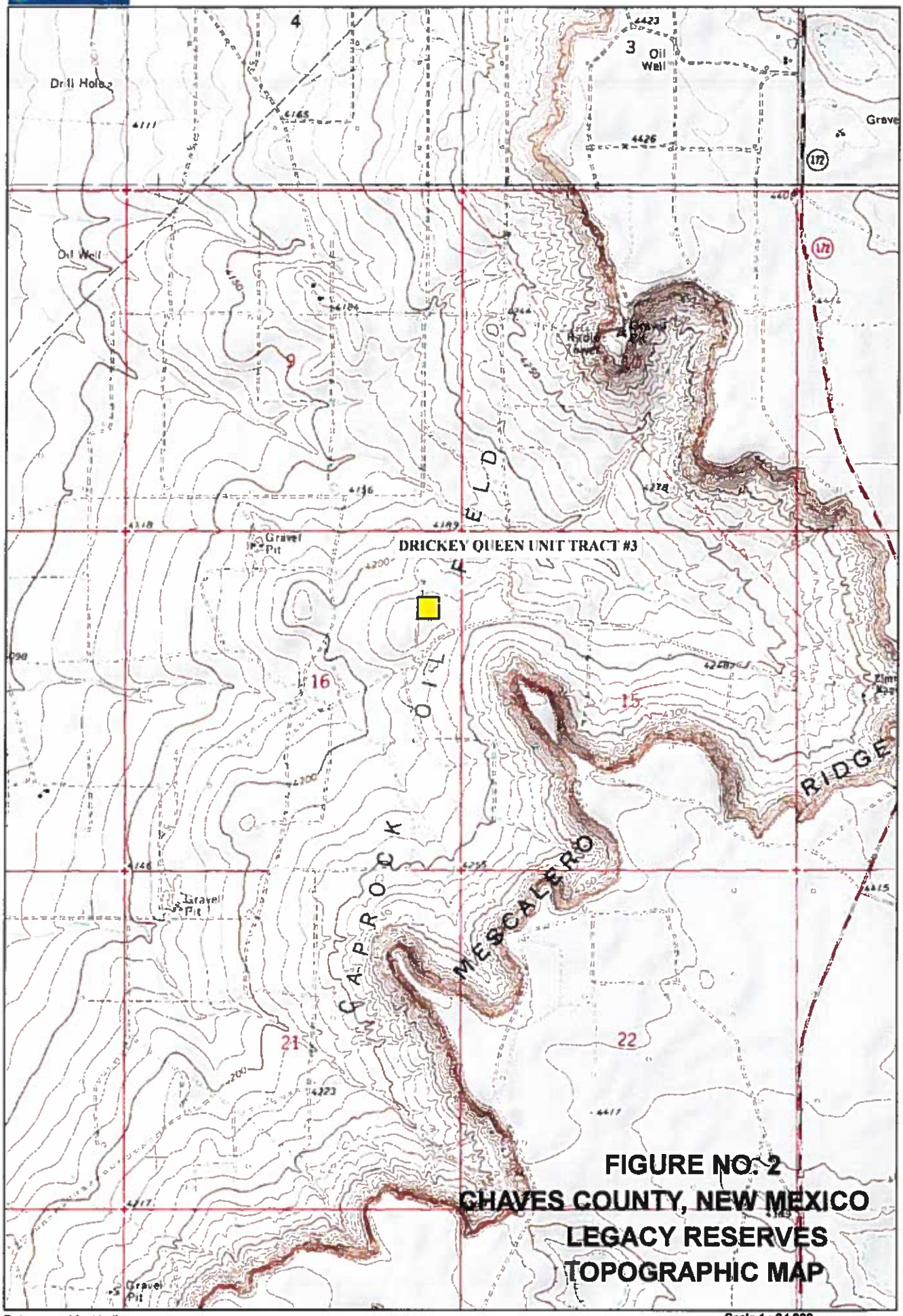

FIGURE NO. 2
CHAVES COUNTY, NEW MEXICO
LEGACY RESERVES
TOPOGRAPHIC MAP

Scale 1 : 24,000

1" = 2,000.0 ft

Data Zoom 12-3

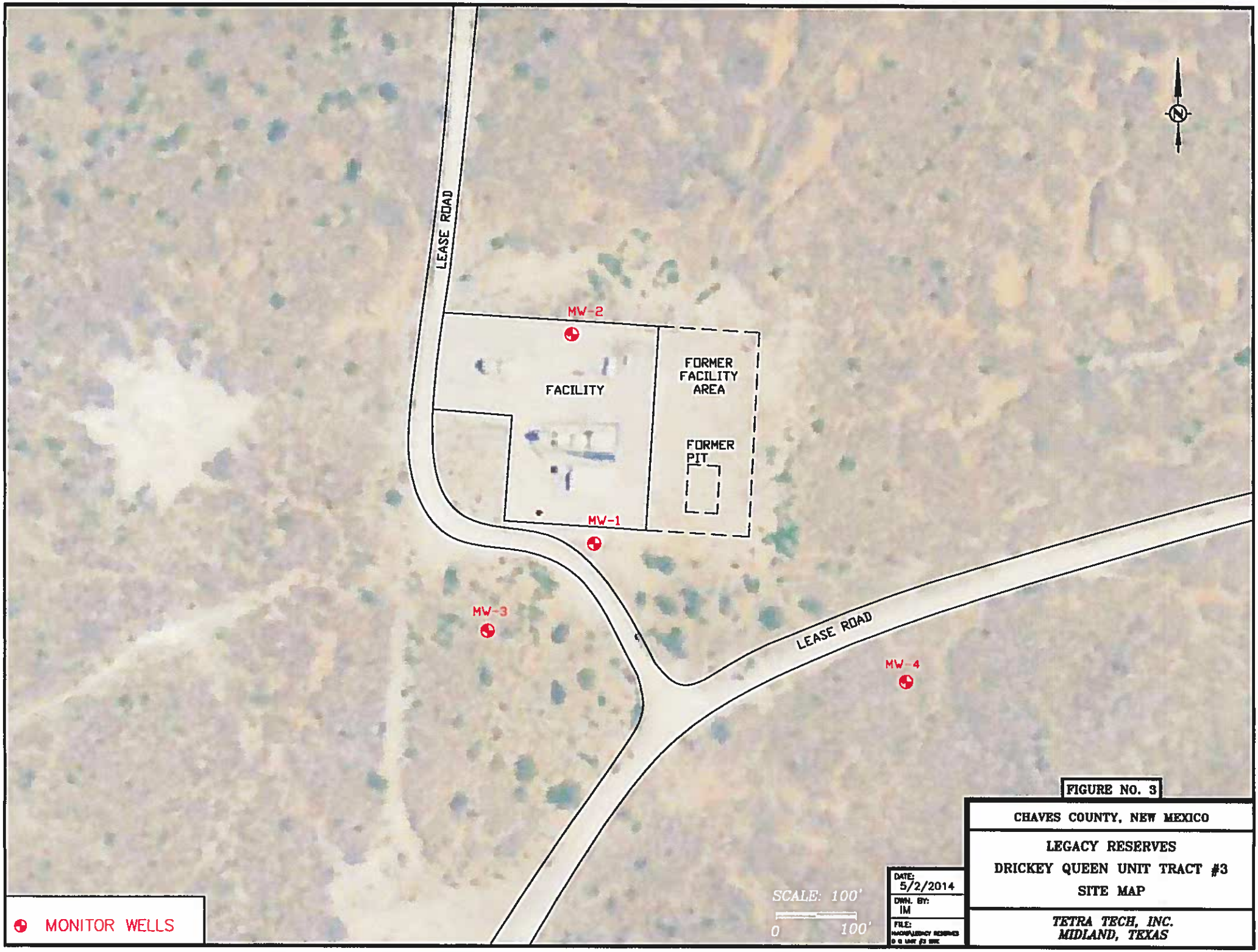

FIGURE NO. 3

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES

DRICKEY QUEEN UNIT TRACT #3

SITE MAP

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MIDLAND, TEXAS

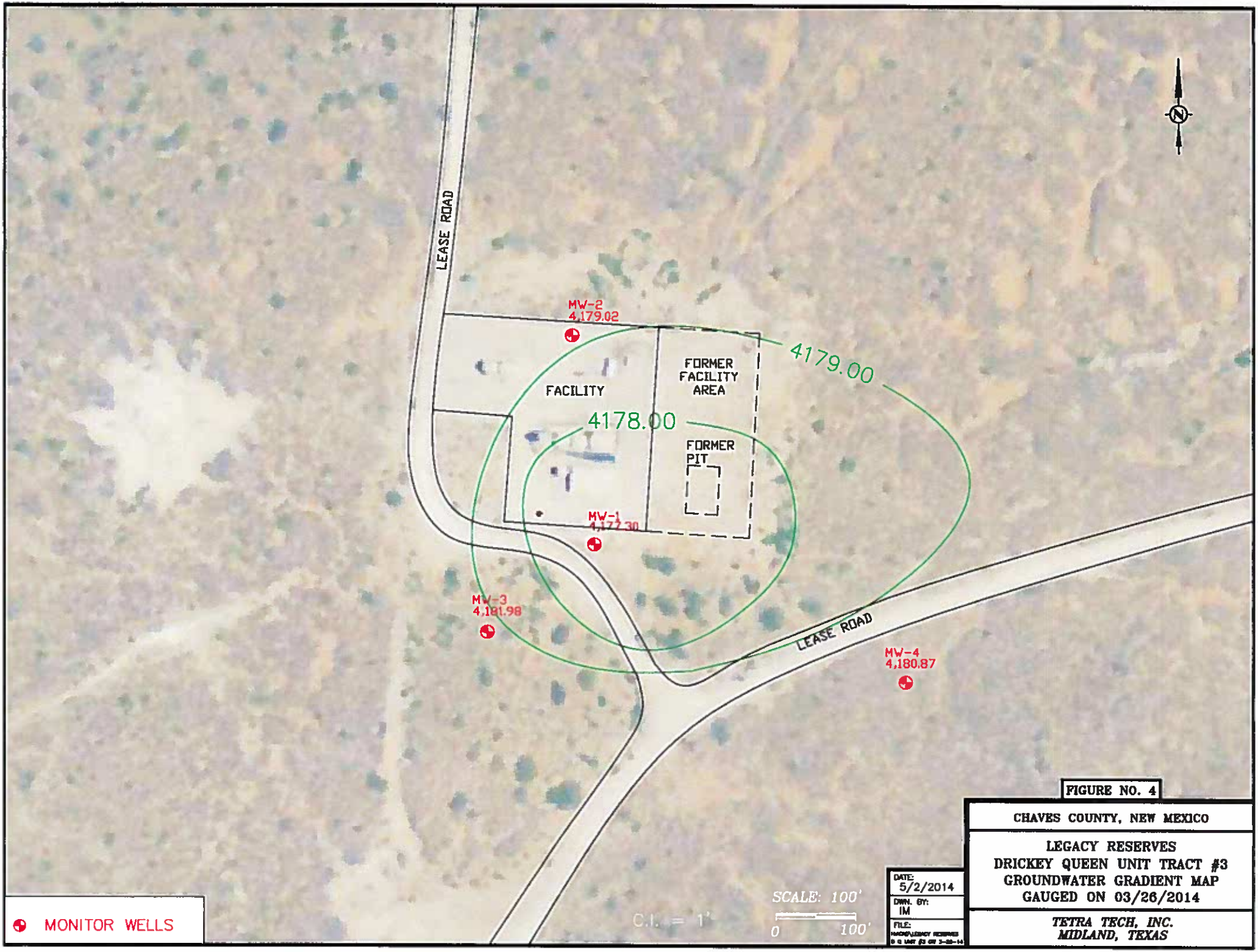


FIGURE NO. 4

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
DRICKEY QUEEN UNIT TRACT #3
GROUNDWATER GRADIENT MAP
GAUGED ON 03/26/2014

TETRA TECH, INC.
MIDLAND, TEXAS

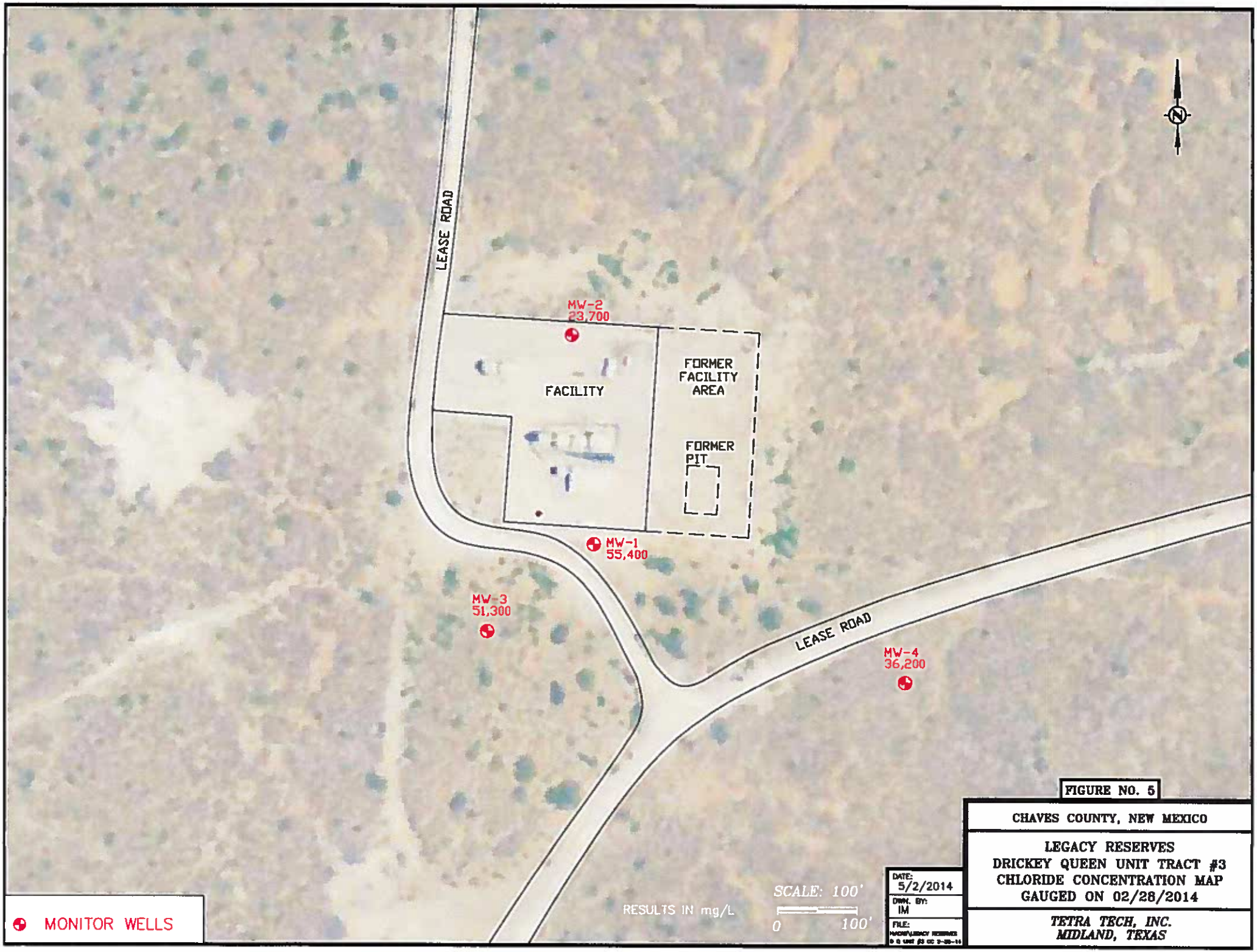


FIGURE NO. 5

CHAVES COUNTY, NEW MEXICO

LEGACY RESERVES
DRICKEY QUEEN UNIT TRACT #3
CHLORIDE CONCENTRATION MAP
GAUGED ON 02/28/2014

TETRA TECH, INC.
MIDLAND, TEXAS

TABLES

Table 1
Legacy Reserves
Groundwater Gauging Data
Drickey Queen Unit Saltwater Plant 3
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)
TMW-1	12/28/07	10/30/07		59.45		0.00
	02/05/08			59.51		0.00
MW-1	01/17/11	11/16/10	4,239.89	102.68	61.89	4,178.00
	04/11/11				61.89	4,178.00
	07/26/11				62.78	4,177.11
	10/24/11				62.10	4,177.79
	01/05/12				62.04	4,177.85
	04/09/12				62.11	4,177.78
	07/24/12				62.20	4,177.69
	10/25/12				62.35	4,177.54
	01/31/13				62.46	4,177.43
	04/22/13				62.42	4,177.47
	02/28/14				63.10	4,176.79
	03/26/14				62.59	4,177.30
MW-2	02/28/14	02/28/14	4,240.40		61.32	4,179.08
	03/26/14				61.38	4,179.02
MW-3	02/28/14	02/28/14	4,239.88		62.74	4,177.14
	03/26/14				57.90	4,181.98
MW-4	02/28/14	02/28/14	4,243.58		62.99	4,180.59
	03/26/14				62.71	4,180.87

Table 2

Legacy Reserves

Groundwater Analytical Results

Drickey Queen SWP #3

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)	Fluoride (mg/L)	TDS (mg/L)	Hardness (mg/L)	pH
MW-1	01/18/11	-	-	-	-	-	-	-	-	487	43,300	-	81,500	-	-
	04/14/11	-	-	-	-	-	-	-	-	472	41,300	-	76,300	-	-
	07/27/11	-	-	-	-	-	-	-	-	566	58,800	-	80,000	-	-
	10/24/11	-	-	-	-	-	-	-	-	521	51,900	-	96,800	-	-
	01/06/12	-	-	-	-	-	-	-	-	611	65,100	-	89,800	-	-
	04/10/12	-	-	-	-	-	-	-	-	<1250	67,100	-	84,100	-	-
	07/25/12	-	-	-	-	-	-	-	-	-	56,200	-	-	-	-
	10/25/12	-	-	-	-	-	-	-	-	580	58,100	-	106,000	-	-
	01/31/13	-	-	-	-	-	-	-	-	593	56,400	-	81,600	-	-
	04/22/13	7,040	3,570	28,300	158	<20.0	<20.0	132	132	768	69,000	-	98,000	32,300	6.38
	07/24/13	4,770	2,590	29,600	287	<20.0	<20.0	136	136	<12500	64,900	-	117,000	23,400	6.53
	10/29/13	6,210	3,000	26,300	147	<20.0	<20.0	126	126	647	72,900	-	113,000	27,900	6.56
	02/28/14	6,290	2,850	26,800	226	<20.0	<20.0	126	126	1,340	55,400	-	118,000	27,400	6.34
MW-2	02/28/14	10,600	2,420	7,190	54.0	<20.0	<20.0	90.0	90.0	1,210	23,700	-	54,200	36,400	6.57
MW-3	02/28/14	6,070	2,150	24,200	240	<20.0	<20.0	101	101	1,760	51,300	-	112,000	24,000	6.30
MW-4	02/28/14	2,770	1,300	17,200	249	<20.0	<20.0	118	118	1,130	36,200	-	66,700	10,500	6.55

(-) Not Analyzed

Table 3
Legacy Reserves
Groundwater Analytical Results
Drickey Queen Salt Water Plant #3
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	01/18/11	<0.001	<0.001	<0.001	<0.001	<0.001
	04/14/11	<0.001	<0.001	<0.001	<0.001	<0.001
	07/27/11	<0.001	<0.001	<0.001	<0.001	<0.001
	10/24/11	<0.001	<0.001	<0.001	<0.001	<0.001
	01/06/12	<0.001	<0.001	<0.001	<0.001	<0.001
	04/10/12	<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
	01/31/13	<0.001	<0.001	<0.001	<0.001	<0.001
	04/22/13	<0.001	<0.001	<0.001	<0.001	<0.001
	07/24/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100
	10/29/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
	02/28/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-2	02/28/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-3	02/28/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300
MW-4	02/28/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300

NS - Not sampled

APPENDIX A
SOIL BORING LOGS

SAMPLE LOG

Boring/Well: MW-1
GPS N33.108158° W103.819°
Project Number: 115-6403136
Client: Celero Energy II, LP
Site Name: Drickey Queen Unit SWD Plant #1
Site Location: Chaves County, New Mexico
Letter H, Section 16, Township 14 South, Range 31 East
Total Depth 100
Date Installed: 11/16/10

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
5-7	NA	Tan fine grain sand
10-12	NA	Light tan fine grain sand
15-17	NA	Light tan fine grain sand
20-22	NA	Light tan fine grain sand
25-27	NA	Light brown fine grain sand
30-32	NA	Light brown fine grain sand
35-37	NA	Brown fine grain sand
40-42	NA	Brown fine grain sand
45-47	NA	Reddish brown fine grain sand with well rounded pebbles of quartz.
50-52	NA	Reddish brown fine grain sand
55-57	NA	Red brown fine grain sand
60-62	NA	Red brown fine grain sand
65-67	NA	Reddish brown clay sand (25% clay)
70-72	NA	Reddish brown clayey sand (50% clay)
75-77	NA	Red clay (moist)
80-82	NA	Red clay (moist)
85-87	NA	Light red/brown clayey sand with gravel
90-92	NA	Red Clay (Red bed)
95-97	NA	Red Clay (Red bed)
100	NA	Red Clay (Red bed)
Total Depth:	100'	Groundwater encountered at approximately 75 feet below ground surface

SAMPLE LOG

Boring/Well: MW-2
GPS 33.10692 -103.81982
Project Number: 114-6401633
Client: Celero Energy II, LP
Site Name: Drickey Queen Unit SWD Plant #1
Site Location: Chaves County, New Mexico
Letter H, Section 16, Township 14 South, Range 31 East
Total Depth 80'
Date Installed: 01/27/14

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
5-6	NA	Dark brown medium grained sand
10-11	NA	Tan fine grained sand
15-16	NA	Tan fine grained sand
20-21	NA	Tan medium grained sand
25-26	NA	Brown medium grained sand
30-31	NA	Brown medium grained sand
35-36	NA	Brown medium grained sand
40-41	NA	Brown medium o fine grained sand
45-46	NA	Brown medium to fine grained sand with well rounded alluvium
50-51	NA	Brown medium to fine grained sand with well rounded alluvium
55-56	NA	Red-brown medium to fine grained sand
60-61	NA	Tan fine grained sand
65-66	NA	Brown medium sand with subangular-rounded alluvium
70-71	NA	Dark red clay and sand (60%)
75-76	NA	Dark red clay
80-81	NA	Dark red clay
Total Depth:	80'	Groundwater not encountered

SAMPLE LOG

Boring/Well: MW-3
GPS 33.10602 -103.82005
Project Number: 114-6401633
Client: Celero Energy II, LP
Site Name: Drickey Queen Unit SWD Plant #1
Site Location: Chaves County, New Mexico
Letter H, Section 16, Township 14 South, Range 31 East
Total Depth 80'
Date Installed: 01/27/14

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
5-6	NA	Light brown fine grained sand
10-11	NA	Light tan fine grained sand
15-16	NA	Light tan fine grained sand
20-21	NA	Light tan fine grained sand
25-26	NA	Brown medium grained sand and red clay (65%)
30-31	NA	Brown medium to fine grained sand
35-36	NA	Brown medium to fine grained sand
40-41	NA	Brown medium to fine grained sand
45-46	NA	Tan medium to fine grained sand with well rounded alluvium
50-51	NA	Brown medium to fine grained sand
55-56	NA	Brown medium to fine grained sand
60-61	NA	Brown medium to fine grained sand with gravel
65-66	NA	Dark brown fine grained sand and clay (10%) with alluvium
70-71	NA	Red Clay
75-76	NA	Red Clay
80-81	NA	Red clay with medium grained sand
Total Depth:	80'	Groundwater not encountered

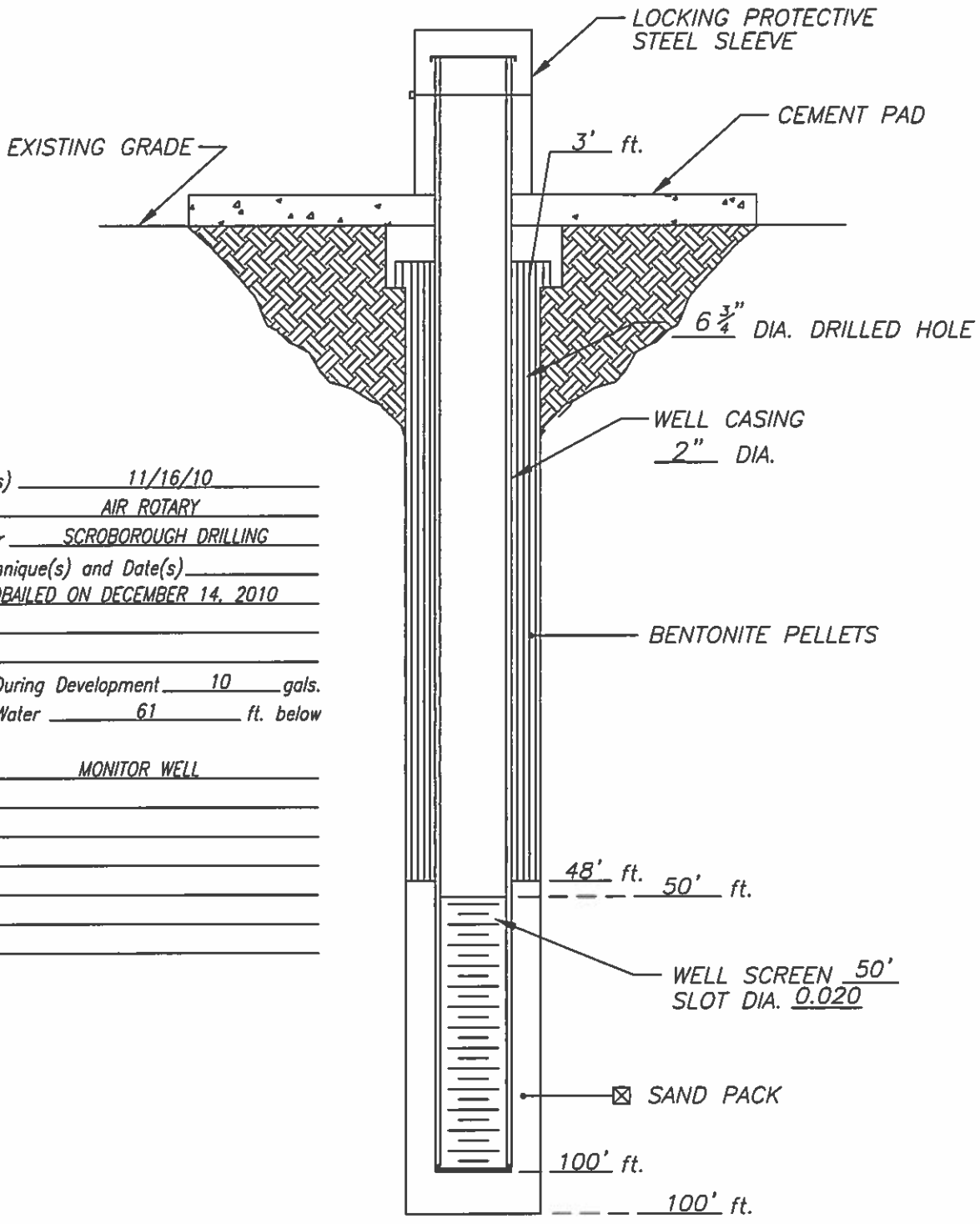
SAMPLE LOG

Boring/Well: MW-4
GPS 33.10582 -103.81849
Project Number: 114-6401633
Client: Celero Energy II, LP
Site Name: Drickey Queen Unit SWD Plant #1
Site Location: Chaves County, New Mexico
Letter H, Section 16, Township 14 South, Range 31 East
Total Depth 74'
Date Installed: 01/28/13

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
5-6	NA	Brown medium to fine grained sand
10-11	NA	Light tan fine grained sand
15-16	NA	Light tan fine grained sand
20-21	NA	Light tan fine grained sand
25-26	NA	Light tan fine grained sand
30-31	NA	Brown fine grained sand
35-36	NA	Brown fine grained sand
40-41	NA	Brown fine grained sand
45-46	NA	Red - brown fine grained sand and clay (20&) with well rounded alluvium
50-51	NA	Brown medium to fine grained sand with well rounded alluvium
55-56	NA	Brown medium to fine grained sand with well rounded alluvium
60-61	NA	Brown fine grained sand
65-66	NA	Dark brown fine grained sand and clay (20%)
70-71	NA	Red clay
75-76	NA	Red Clay
80-81	NA	Red Clay
Total Depth:	74	Groundwater not encountered

APPENDIX B
MONITOR WELL COMPLETION DIAGRAMS

WELL CONSTRUCTION LOG



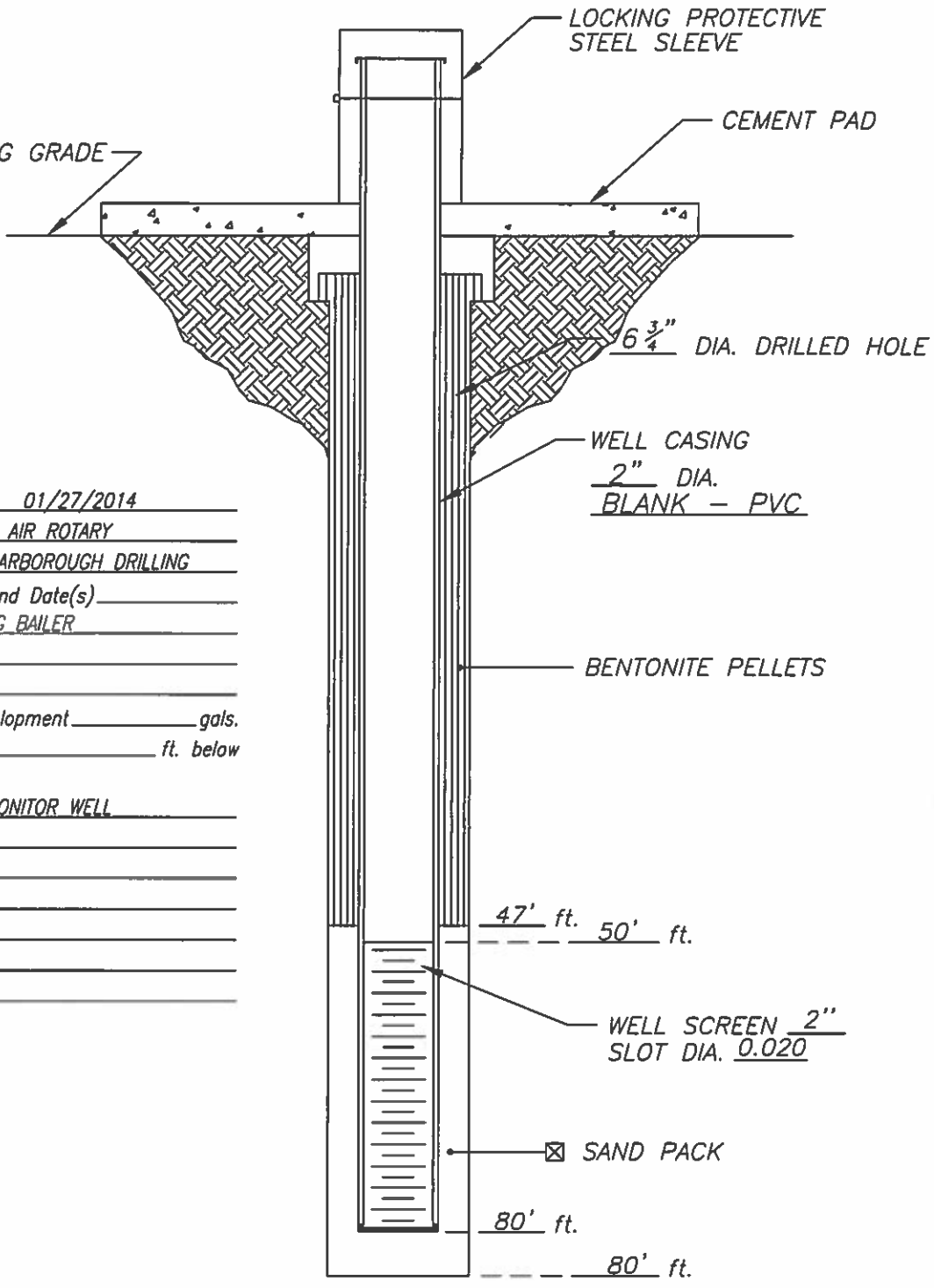
Installation Date(s) 11/16/10
Drilling Method AIR ROTARY
Drilling Contractor SCROBOROUGH DRILLING
Development Technique(s) and Date(s)
HANDBAILED ON DECEMBER 14, 2010

Water Removed During Development 10 gals.
Static Depth to Water 61 ft. below Ground Level
Well Purpose MONITOR WELL

Remarks

DATE: 11/16/10	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: DRICKEY QUEEN #3 TB	MW-1
	LOCATION: CHAVES COUNTY, NEW MEXICO	
	115-6403136A	

WELL CONSTRUCTION LOG



Installation Date(s) 01/27/2014
Drilling Method AIR ROTARY
Drilling Contractor SCHARBOROUGH DRILLING
Development Technique(s) and Date(s)
RIG BAILER

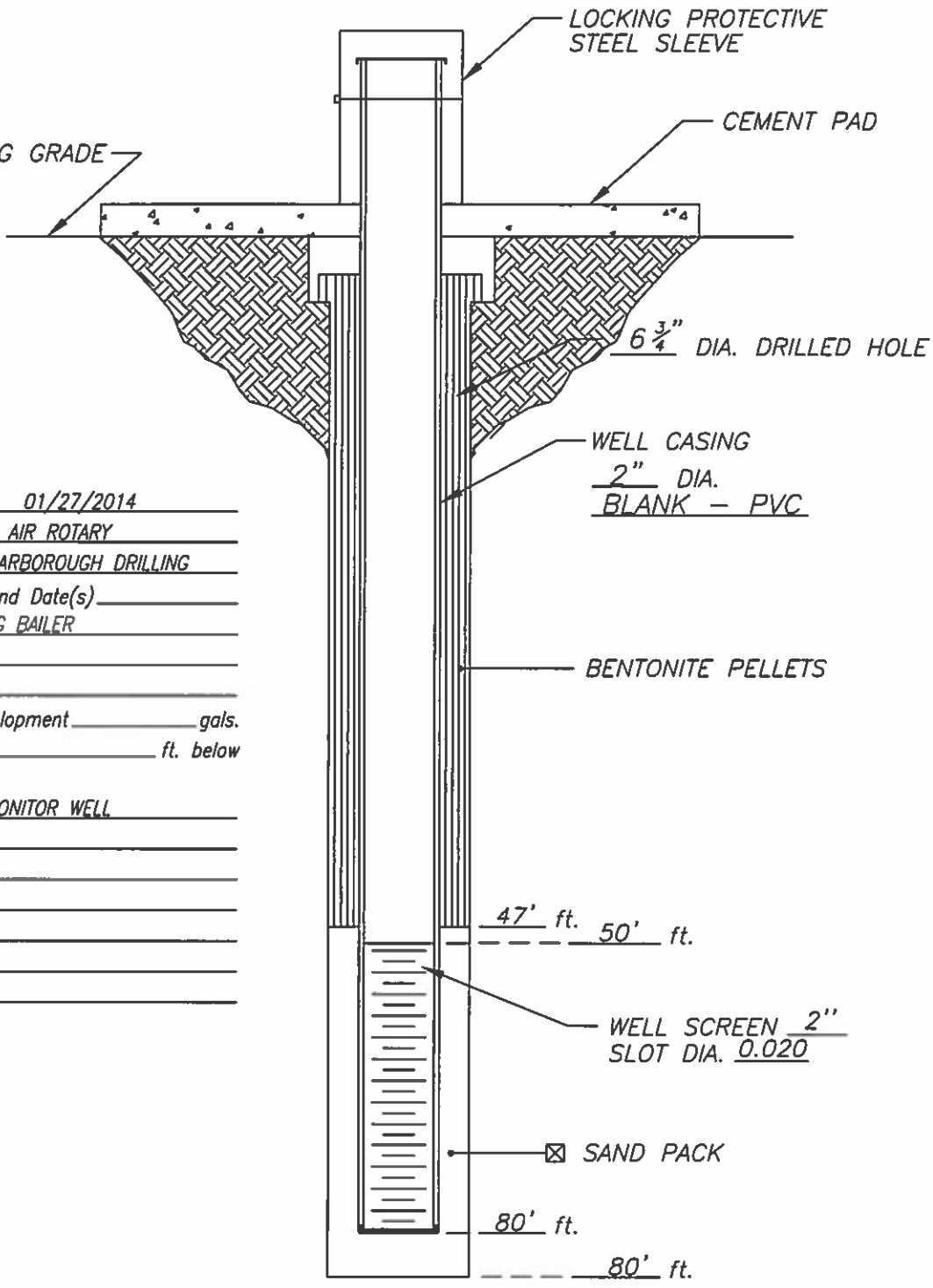
Water Removed During Development _____ gals.
Static Depth to Water _____ ft. below Ground Level
Well Purpose MONITOR WELL

Remarks

DATE: 02/10/2013	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: DRICKEY QUEEN #3 TB	MW-2
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401633

WELL CONSTRUCTION LOG



Installation Date(s) 01/27/2014
Drilling Method AIR ROTARY
Drilling Contractor SCHARBOROUGH DRILLING
Development Technique(s) and Date(s)
RIG BAILER

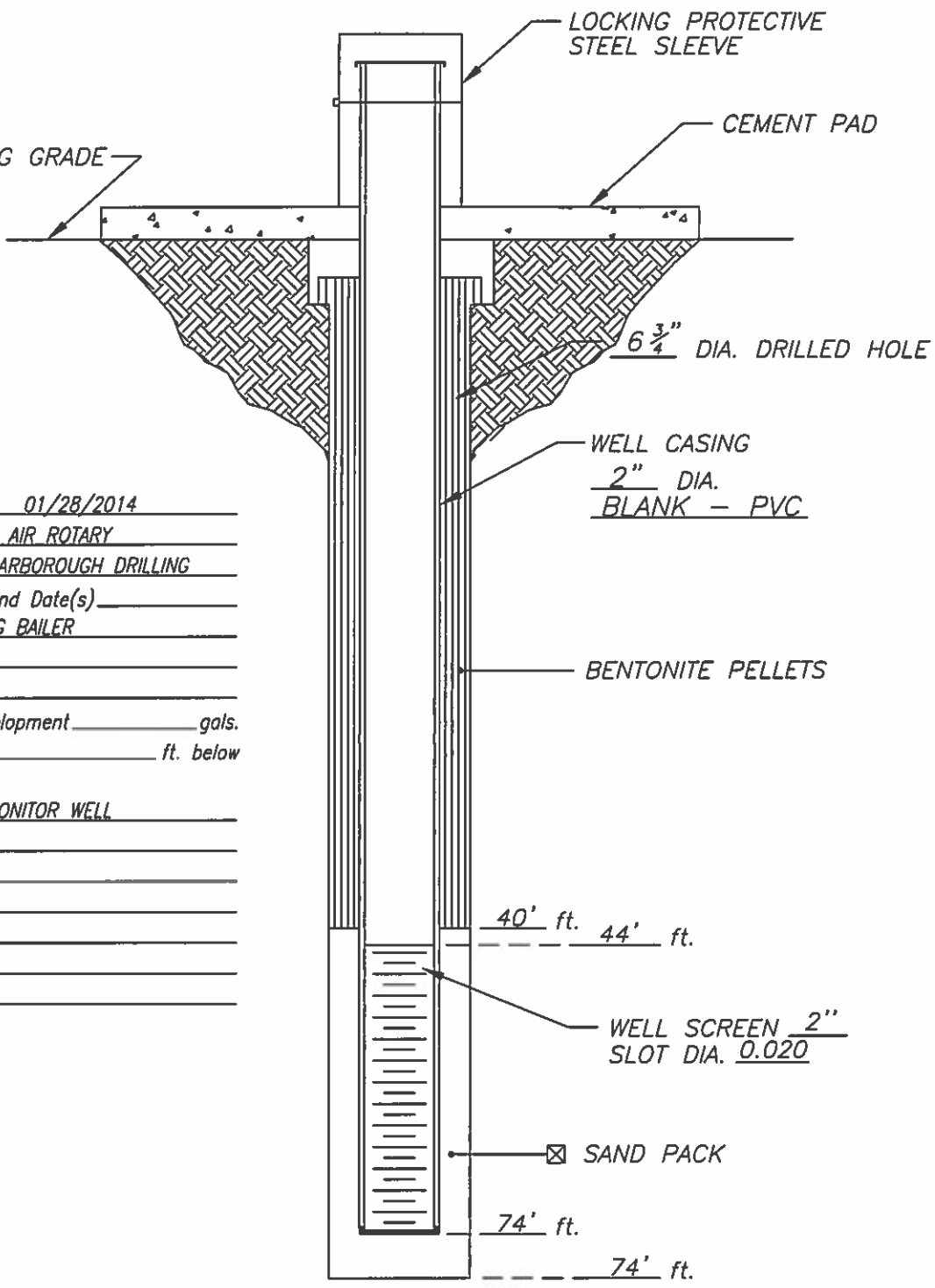
Water Removed During Development _____ gals.
Static Depth to Water _____ ft. below Ground Level
Well Purpose MONITOR WELL

Remarks

DATE: 02/10/2013	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: DRICKEY QUEEN #3 TB	MW-3
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401633

WELL CONSTRUCTION LOG



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

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

Remarks

DATE: 02/10/2013	CLIENT: CELERO ENERGY II, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: DRICKEY QUEEN #3 TB	MW-4
	LOCATION: CHAVES COUNTY, NEW MEXICO	

114-6401633

APPENDIX C
LABORATORY ANALYTICAL RESULTS

TRACEANALYSIS, INC.

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Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

Analytical and Quality Control Report

(Corrected Report)

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Report Date: March 24, 2014

Work Order: 14030408

Project Location: Chavez Co., NM
Project Name: Drickie Queen #3
Project Number: 114-6401633

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
356498	MW-1	water	2014-02-28	14:15	2014-03-03
356499	MW-2	water	2014-02-28	14:30	2014-03-03
356500	MW-3	water	2014-02-28	14:45	2014-03-03
356501	MW-4	water	2014-02-28	15:00	2014-03-03

Report Corrections (Work Order 14030408)

- 3/24/14: Reissued report as a J-flagged 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.

Notes:

For inorganic analyses, the term MQL should actually read PQL.

Michael Abel

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

Report Contents

Case Narrative

Samples for project Drickie Queen #3 were received by TraceAnalysis, Inc. on 2014-03-03 and assigned to work order 14030408. Samples for work order 14030408 were received intact without headspace and at a temperature of -0.8 C.

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

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
Alkalinity	SM 2320B	92946	2014-03-06 at 08:02	109916	2014-03-06 at 14:03
BTEX	S 8021B	92992	2014-03-08 at 10:07	109973	2014-03-09 at 20:19
BTEX	S 8021B	93006	2014-03-10 at 10:18	109990	2014-03-10 at 11:28
Ca, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Chloride (IC)	E 300.0	93058	2014-03-05 at 20:25	110053	2014-03-05 at 20:45
Hardness	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
K, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Mg, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
Na, Dissolved	S 6010C	93203	2014-03-17 at 13:32	110300	2014-03-18 at 15:22
pH	SM 4500-H+	92947	2014-03-04 at 08:23	110110	2014-03-04 at 14:42
SO4 (IC)	E 300.0	93058	2014-03-05 at 20:25	110053	2014-03-05 at 20:45
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 14030408 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: 356498 - MW-1

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hydroxide Alkalinity	U	3	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Carbonate Alkalinity	U	3	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Bicarbonate Alkalinity		3	**126**	**126**	<20.0	mg/L as CaCo3	1	20.0	20	20
Total Alkalinity		3	**126**	**126**	<20.0	mg/L as CaCo3	1	20.0	20	20

Sample: 356498 - MW-1

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Benzene	U	3	<0.000238	<0.00100	<0.000238	mg/L	1	0.000238	0.001	0.000238
Toluene	U	3	<0.000181	<0.00100	<0.000181	mg/L	1	0.000181	0.001	0.000181
Ethylbenzene	U	3	<0.000247	<0.00100	<0.000247	mg/L	1	0.000247	0.001	0.000247
Xylene	U	3	<0.000189	<0.00300	<0.000189	mg/L	1	0.000189	0.003	0.000189

Surrogate		F	C	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)				0.0883	mg/L	1	0.100	88	70 - 130
4-Bromofluorobenzene (4-BFB)	1	Q	3	0.0664	mg/L	1	0.100	66	70 - 130

Sample: 356498 - MW-1

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Dissolved Calcium		2	**6290**	**6290**	<4.41	mg/L	100	4.41	1	0.0441
Dissolved Potassium		2	**226**	**226**	<0.0443	mg/L	1	0.0443	1	0.0443
Dissolved Magnesium		2	**2850**	**2850**	<2.96	mg/L	100	2.96	1	0.0296
Dissolved Sodium	Qr Q4	2	**26800**	**26800**	<17.2	mg/L	100	17.2	1	0.172

Sample: 356498 - MW-1

Laboratory: El Paso
Analysis: Chloride (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | Sample Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Chloride		1	**55400**	**55400**	<3390	mg/L	5000	3390	2.5	0.678

Sample: 356498 - MW-1

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hardness (by ICP)			**27400**	**27400**	0.00	mg eq CaCO3/L	100	0.00		

Sample: 356498 - MW-1

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	F	C	RL Result	Units	Dilution	RL
pH		3	6.34	s.u.	1	0

Sample: 356498 - MW-1

Laboratory: El Paso
Analysis: SO4 (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | Sample Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Sulfate	J	1	**1340**	<2500	<26.0	mg/L	1000	26.0	2.5	0.026

Sample: 356498 - MW-1

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Total Dissolved Solids		3	**118000**	**118000**	<250	mg/L	100	250	2.5	2.5

Sample: 356499 - MW-2

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hydroxide Alkalinity	U	3	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Carbonate Alkalinity	U	3	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Bicarbonate Alkalinity		3	**90.0**	**90.0**	<20.0	mg/L as CaCo3	1	20.0	20	20
Total Alkalinity		3	**90.0**	**90.0**	<20.0	mg/L as CaCo3	1	20.0	20	20

Sample: 356499 - MW-2

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Benzene	U	3	<0.000238	<0.00100	<0.000238	mg/L	1	0.000238	0.001	0.000238
Toluene	U	3	<0.000181	<0.00100	<0.000181	mg/L	1	0.000181	0.001	0.000181
Ethylbenzene	U	3	<0.000247	<0.00100	<0.000247	mg/L	1	0.000247	0.001	0.000247
Xylene	U	3	<0.000189	<0.00300	<0.000189	mg/L	1	0.000189	0.003	0.000189

Surrogate	F	C	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0965	mg/L	1	0.100	96	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0718	mg/L	1	0.100	72	70 - 130

Sample: 356499 - MW-2

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Dissolved Calcium		2	**10600**	**10600**	<0.441	mg/L	10	0.441	1	0.0441
Dissolved Potassium		2	**54.0**	**54.0**	<0.0443	mg/L	1	0.0443	1	0.0443
Dissolved Magnesium		2	**2420**	**2420**	<0.296	mg/L	10	0.296	1	0.0296
Dissolved Sodium	Qr,Qs	2	**7190**	**7190**	<1.72	mg/L	10	1.72	1	0.172

Sample: 356499 - MW-2

Laboratory: El Paso
Analysis: Chloride (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | Sample Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Chloride		1	**23700**	**23700**	<678	mg/L	1000	678	2.5	0.678

Sample: 356499 - MW-2

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hardness (by ICP)			**36400**	**36400**	0.00	mg eq CaCO3/L	1	0.00		

Sample: 356499 - 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	F	C	RL Result	Units	Dilution	RL
pH		3	6.57	s.u.	1	0

Sample: 356499 - MW-2

Laboratory: El Paso
Analysis: SO4 (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | Sample Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Sulfate	J	1	**1210**	<1250	<13.0	mg/L	500	13.0	2.5	0.026

Sample: 356499 - MW-2

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Total Dissolved Solids		3	**54200**	**54200**	<125	mg/L	50	125	2.5	2.5

Sample: 356500 - MW-3

Laboratory: Midland

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hydroxide Alkalinity	U	B	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Carbonate Alkalinity	U	B	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Bicarbonate Alkalinity		B	**101**	**101**	<20.0	mg/L as CaCo3	1	20.0	20	20
Total Alkalinity		B	**101**	**101**	<20.0	mg/L as CaCo3	1	20.0	20	20

Sample: 356500 - 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	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Benzene	U	B	<0.000238	<0.00100	<0.000238	mg/L	1	0.000238	0.001	0.000238
Toluene	U	B	<0.000181	<0.00100	<0.000181	mg/L	1	0.000181	0.001	0.000181
Ethylbenzene	U	B	<0.000247	<0.00100	<0.000247	mg/L	1	0.000247	0.001	0.000247
Xylene	U	B	<0.000189	<0.00300	<0.000189	mg/L	1	0.000189	0.003	0.000189

Surrogate	F	C	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0909	mg/L	1	0.100	91	70 - 130
4-Bromofluorobenzene (4-BFB)	2	Q-r	0.0655	mg/L	1	0.100	66	70 - 130

Sample: 356500 - MW-3

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Dissolved Calcium		2	**6070**	**6070**	<4.41	mg/L	100	4.41	1	0.0441
Dissolved Potassium		2	**240**	**240**	<0.0443	mg/L	1	0.0443	1	0.0443
Dissolved Magnesium		2	**2150**	**2150**	<2.96	mg/L	100	2.96	1	0.0296
Dissolved Sodium	Qr, Q-	2	**24200**	**24200**	<17.2	mg/L	100	17.2	1	0.172

Sample: 356500 - MW-3

Laboratory: El Paso
Analysis: Chloride (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | Sample Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Chloride		1	**51300**	**51300**	<3390	mg/L	5000	3390	2.5	0.678

Sample: 356500 - MW-3

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hardness (by ICP)			**24000**	**24000**	0.00	mg eq CaCO3/L	100	0.00		

Sample: 356500 - 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	F	C	RL Result	Units	Dilution	RL
pH		3	6.30	s.u.	1	0

Sample: 356500 - MW-3

Laboratory: El Paso
Analysis: SO4 (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | Sample Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Sulfate	J	1	**1780**	<2500	<26.0	mg/L	1000	26.0	2.5	0.026

Sample: 356500 - MW-3

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Total Dissolved Solids		3	**112000**	**112000**	<250	mg/L	100	250	2.5	2.5

Sample: 356501 - MW-4

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hydroxide Alkalinity	U	3	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Carbonate Alkalinity	U	3	<20.0	<20.0	<20.0	mg/L as CaCo3	1	20.0	20	20
Bicarbonate Alkalinity		3	**118**	**118**	<20.0	mg/L as CaCo3	1	20.0	20	20
Total Alkalinity		3	**118**	**118**	<20.0	mg/L as CaCo3	1	20.0	20	20

Sample: 356501 - MW-4

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Benzene	U	3	<0.000238	<0.00100	<0.000238	mg/L	1	0.000238	0.001	0.000238
Toluene	U	3	<0.000181	<0.00100	<0.000181	mg/L	1	0.000181	0.001	0.000181
Ethylbenzene	U	3	<0.000247	<0.00100	<0.000247	mg/L	1	0.000247	0.001	0.000247
Xylene	U	3	<0.000189	<0.00300	<0.000189	mg/L	1	0.000189	0.003	0.000189

Surrogate	F	C	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0910	mg/L	1	0.100	91	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0695	mg/L	1	0.100	70	70 - 130

Sample: 356501 - MW-4

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Dissolved Calcium		2	**2770**	**2770**	<4.41	mg/L	100	4.41	1	0.0441
Dissolved Potassium		2	**249**	**249**	<0.0443	mg/L	1	0.0443	1	0.0443
Dissolved Magnesium		2	**1300**	**1300**	<2.96	mg/L	100	2.96	1	0.0296
Dissolved Sodium	Qr,Qs	2	**17200**	**17200**	<17.2	mg/L	100	17.2	1	0.172

Sample: 356501 - MW-4

Laboratory: El Paso
Analysis: Chloride (IC) | Analytical Method: E 300.0 | Prep Method: N/A
QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | Sample Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Chloride		1	**36200**	**36200**	<678	mg/L	1000	678	2.5	0.678

Sample: 356501 - MW-4

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

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Hardness (by ICP)			**10500**	**10500**	0.00	mg eq CaCO3/L	100	0.00		

Sample: 356501 - 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	F	C	RL Result	Units	Dilution	RL
pH		J	6.55	s.u.	1	0

Sample: 356501 - MW-4

Laboratory:	El Paso				
Analysis:	SO4 (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	110053	Date Analyzed:	2014-03-05	Analyzed By:	JR
Prep Batch:	93058	Sample Preparation:	2014-03-05	Prepared By:	JR

Parameter	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Sulfate	J	I	**1130**	<1250	<13.0	mg/L	500	13.0	2.5	0.026

Sample: 356501 - MW-4

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	F	C	SDL Based Result	MQL Based Result	Method Blank Result	Units	Dilution	SDL	MQL (Unadjusted)	MDL (Unadjusted)
Total Dissolved Solids		J	**66700**	**66700**	<125	mg/L	50	125	2.5	2.5

Method Blanks

Method Blank (1)

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

Parameter	F	C	Result	Units	Reporting Limits
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: 109973
Prep Batch: 92992
Date Analyzed: 2014-03-09
QC Preparation: 2014-03-08
Analyzed By: AK
Prepared By: AK

Parameter	F	C	Result	Units	Reporting Limits
Benzene		3	<0.000238	mg/L	0.000238
Toluene		3	<0.000181	mg/L	0.000181
Ethylbenzene		3	<0.000247	mg/L	0.000247
Xylene		3	<0.000189	mg/L	0.000189

Surrogate	F	C	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
Prep Batch: 93006
Date Analyzed: 2014-03-10
QC Preparation: 2014-03-10
Analyzed By: AK
Prepared By: AK

Parameter	F	C	Result	Units	Reporting Limits
Benzene		3	<0.000238	mg/L	0.000238
Toluene		3	<0.000181	mg/L	0.000181

continued ...

method blank continued ...

Parameter	F	C	Result	Units	Reporting Limits
Ethylbenzene		3	<0.000247	mg/L	0.000247
Xylene		3	<0.000189	mg/L	0.000189

Surrogate	F	C	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: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | QC Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	Result	Units	Reporting Limits
Chloride		1	1.26	mg/L	0.678

Method Blank (1)

QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | QC Preparation: 2014-03-05 | Prepared By: JR

Parameter	F	C	Result	Units	Reporting Limits
Sulfate		1	<0.0260	mg/L	0.026

Method Blank (1)

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

Parameter	F	C	Result	Units	Reporting Limits
Total Dissolved Solids		3	4.00	mg/L	2.5

Method Blank (1)

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

Parameter	F	C	Result	Units	Reporting Limits
Dissolved Calcium		2	<0.0441	mg/L	0.0441
Dissolved Potassium		2	<0.0443	mg/L	0.0443
Dissolved Magnesium		2	<0.0296	mg/L	0.0296
Dissolved Sodium		2	<0.172	mg/L	0.172

Duplicate (1) Duplicated Sample: 356470

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

Param	F	C	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
Hydroxide Alkalinity		3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Carbonate Alkalinity		3	<20.0	<20.0	mg/L as CaCo3	1	0	20
Bicarbonate Alkalinity		3	79.0	94.0	mg/L as CaCo3	1	17	20
Total Alkalinity		3	79.0	94.0	mg/L as CaCo3	1	17	20

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

Duplicate (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

continued ...

duplicate continued . . .

Param	F	C	Duplicate Result	Sample Result	Units	Dilution	RPD	RPD Limit
pH		3	7.68	7.88	s.u.	1	3	10

Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

QC Batch: 109973
Prep Batch: 92992

Date Analyzed: 2014-03-09
QC Preparation: 2014-03-08

Analyzed By: AK
Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		3	0.107	mg/L	1	0.100	<0.000238	107	70 - 130
Toluene		3	0.107	mg/L	1	0.100	<0.000181	107	70 - 130
Ethylbenzene		3	0.102	mg/L	1	0.100	<0.000247	102	70 - 130
Xylene		3	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		3	0.110	mg/L	1	0.100	<0.000238	110	70 - 130	3	20
Toluene		3	0.110	mg/L	1	0.100	<0.000181	110	70 - 130	3	20
Ethylbenzene		3	0.106	mg/L	1	0.100	<0.000247	106	70 - 130	4	20
Xylene		3	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	F	C	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
Prep Batch: 93006

Date Analyzed: 2014-03-10
QC Preparation: 2014-03-10

Analyzed By: AK
Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		3	0.106	mg/L	1	0.100	<0.000238	106	70 - 130
Toluene		3	0.107	mg/L	1	0.100	<0.000181	107	70 - 130
Ethylbenzene		3	0.103	mg/L	1	0.100	<0.000247	103	70 - 130
Xylene		3	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.

continued ...

control spikes continued ...

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

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

Surrogate	F	C	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: 110053
Prep Batch: 93058

Date Analyzed: 2014-03-05
QC Preparation: 2014-03-05

Analyzed By: JR
Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	23.8	mg/L	1	25.0	<0.678	95	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	23.8	mg/L	1	25.0	<0.678	95	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: 110053
Prep Batch: 93058

Date Analyzed: 2014-03-05
QC Preparation: 2014-03-05

Analyzed By: JR
Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	24.0	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.

continued ...

control spikes continued ...

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	23.9	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: 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.

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		a	0.116	mg/L	1	0.100	<0.000238	116	70 - 130
Toluene		a	0.116	mg/L	1	0.100	<0.000181	116	70 - 130
Ethylbenzene		a	0.111	mg/L	1	0.100	<0.000247	111	70 - 130
Xylene		a	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		a	0.113	mg/L	1	0.100	<0.000238	113	70 - 130	3	20
Toluene		a	0.113	mg/L	1	0.100	<0.000181	113	70 - 130	3	20
Ethylbenzene		a	0.110	mg/L	1	0.100	<0.000247	110	70 - 130	1	20
Xylene		a	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	F	C	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		a	0.111	mg/L	1	0.100	<0.000238	111	70 - 130
Toluene		a	0.111	mg/L	1	0.100	<0.000181	111	70 - 130
Ethylbenzene		a	0.108	mg/L	1	0.100	<0.000247	108	70 - 130
Xylene		a	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		a	0.112	mg/L	1	0.100	<0.000238	112	70 - 130	1	20
Toluene		a	0.106	mg/L	1	0.100	<0.000181	106	70 - 130	5	20
Ethylbenzene		a	0.0890	mg/L	1	0.100	<0.000247	89	70 - 130	19	20
Xylene		a	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	F	C	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
Trifluorotoluene (TFT)			0.103	0.0929	mg/L	1	0.1	103	93	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0884	0.0827	mg/L	1	0.1	88	83	70 - 130

Matrix Spike (MS-1) Spiked Sample: 356686

QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | QC Preparation: 2014-03-05 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1	2160	mg/L	55.6	1390	688	106	80 - 120

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride		1	2140	mg/L	55.6	1390	688	104	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: 356686

QC Batch: 110053 | Date Analyzed: 2014-03-05 | Analyzed By: JR
Prep Batch: 93058 | QC Preparation: 2014-03-05 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Sulfate		1	2370	mg/L	55.6	1390	898	106	80 - 120

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Sulfate		1	2340	mg/L	55.6	1390	898	104	80 - 120	1	20

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

Matrix Spike (MS-1) Spiked Sample: 356497

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

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Dissolved Calcium		2	3230	mg/L	10	500	2709	104	75 - 125
Dissolved Potassium		2	762	mg/L	1	500	212.8	110	75 - 125
Dissolved Magnesium		2	1720	mg/L	10	500	1223	99	75 - 125
Dissolved Sodium	Q4	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	Q1,Q4	2	14000	mg/L	100	500	14520	-104	75 - 125	39	20

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

Calibration Standards

Standard (ICV-1)

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

Param	F	C	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	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	F	C	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: 109973 Date Analyzed: 2014-03-09 Analyzed By: AK

Param	F	C	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	F	C	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	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		3	mg/L	0.100	0.108	108	80 - 120	2014-03-09
Toluene		3	mg/L	0.100	0.108	108	80 - 120	2014-03-09
Ethylbenzene		3	mg/L	0.100	0.102	102	80 - 120	2014-03-09
Xylene		3	mg/L	0.300	0.312	104	80 - 120	2014-03-09

Standard (CCV-1)

QC Batch: 109990 Date Analyzed: 2014-03-10 Analyzed By: AK

Param	F	C	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	F	C	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	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		3	mg/L	0.100	0.104	104	80 - 120	2014-03-10
Toluene		3	mg/L	0.100	0.104	104	80 - 120	2014-03-10
Ethylbenzene		3	mg/L	0.100	0.100	100	80 - 120	2014-03-10
Xylene		3	mg/L	0.300	0.307	102	80 - 120	2014-03-10

Standard (CCV-1)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.5	98	90 - 110	2014-03-05

Standard (CCV-1)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.7	99	90 - 110	2014-03-05

Standard (CCV-2)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1	mg/L	25.0	24.6	98	90 - 110	2014-03-05

Standard (CCV-2)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.7	99	90 - 110	2014-03-05

Standard (CCV-3)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	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	2014-03-05

Standard (CCV-3)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-05

Standard (CCV-4)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	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	2014-03-05

Standard (CCV-4)

QC Batch: 110053 Date Analyzed: 2014-03-05 Analyzed By: JR

Param	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Sulfate		1	mg/L	25.0	24.8	99	90 - 110	2014-03-05

Standard (ICV-1)

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

Param	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs 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	F	C	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	F	C	Units	CCVs True Conc.	CCVs Found Conc.	CCVs 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	F	C	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

Limits of Detection (LOD)

Test	Method	Matrix	Instrument	Analyte	Spike Amount	Pass
Alkalinity	SM 2320B	water	N/A	Hydroxide Alkalinity	0.00	-
Alkalinity	SM 2320B	water	N/A	Carbonate Alkalinity	0.00	-
Alkalinity	SM 2320B	water	N/A	Bicarbonate Alkalinity	0.00	-
Alkalinity	SM 2320B	water	N/A	Total Alkalinity	0.00	-
BTEX	S 8021B	water	BTEX-1	Benzene	0.00130	Pass
BTEX	S 8021B	water	BTEX-1	Toluene	0.00100	Pass
BTEX	S 8021B	water	BTEX-1	Ethylbenzene	0.00130	Pass
BTEX	S 8021B	water	BTEX-1	Xylene	0.00270	Pass
Ca, Dissolved	S 6010C	water	PE 8300	Dissolved Calcium	0.250	Pass
Chloride (IC)	E 300.0	water	Dionex IC	Chloride	0.750	Pass
Hardness	S 6010C	water	PE 8300	Hardness (by ICP)	0.00	-
K, Dissolved	S 6010C	water	PE 8300	Dissolved Potassium	0.250	Pass
Mg, Dissolved	S 6010C	water	PE 8300	Dissolved Magnesium	0.200	Pass
Na, Dissolved	S 6010C	water	PE 8300	Dissolved Sodium	0.250	Pass
pH	SM 4500-H+	water	pH Meter	pH	0.00	-
SO4 (IC)	E 300.0	water	Dionex IC	Sulfate	0.0694	Pass
TDS	SM 2540C	water	N/A	Total Dissolved Solids	0.00	-

Appendix

Report Definitions

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

Laboratory Certifications

C	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704221-12-3	El Paso
2	NELAP	T104704219-13-9	Lubbock
3	NELAP	T104704392-13-7	Midland

Standard Flags

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

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.

14030408

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.: 114-6401633

PROJECT NAME: Rock Queen Drick's Queen #3

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			
356498	2/20/14	1415	W		X	MW-1	6		X		X		X											X				X				6
499	↓	1430	↓		X	MW-2	↓		↓		↓		↓											↓				↓				1
500		1445			X	MW-3																										6
501	↓	1500	↓		X	MW-4	↓		↓		↓		↓											↓				↓				7

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

RELINQUISHED BY: (Signature) — Date: 03/03/14 Time: 1620
RECEIVED BY: (Signature) — Date: 3/3/14 Time: 16.20

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

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

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

TETRA TECH CONTACT PERSON: GREG POPE

Results by: STD

RUSH Charges Authorized: Yes No

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

SAMPLE CONDITION WHEN RECEIVED: -0.8

REMARKS: Midland - TDS/BTEX/pH/Ca Rubbish cations/hardness CP-Cl/SO4

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

14030408

Analysis Request of Chain of Custody Record

PAGE: | OF: 1

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

ANALYSIS REQUEST
(Circle or Specify Method No.)

CLIENT NAME: Celero Energy | SITE MANAGER: Greg Pope

PROJECT NO.: 114-6401633 | PROJECT NAME: Rock Queen Drinkard Queen #3

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				
356498	2/20/14	1415	W		X	MW-1	6		X		X		X											X			X						6
499	↓	1430	↓		X	MW-2	↓		↓		↓		↓											↓			↓						1
500		1445			X	MW-3																											6
501	↓	1500	↓		X	MW-4	↓		↓		↓		↓											↓			↓						1

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

RELINQUISHED BY: (Signature) — Date: 03/03/14 Time: 1620 — RECEIVED BY: (Signature) — Date: 3/3/14 Time: 16.20

RELINQUISHED BY: (Signature) — Date: 3/4/14 Time: 5:30 — RECEIVED BY: (Signature) — Date: — Time:

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

SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS — AIRBILL: 5: ZQ951 5/0 — OTHER:

TETRA TECH CONTACT PERSON: GREG POPE — Results by: STD

RUSH Charges Authorized: Yes No

RECEIVING LABORATORY: TA LUBBOCK — ADDRESS: — CITY: — STATE: — ZIP: — CONTACT: — PHONE: — RECEIVED BY: (Signature) — DATE: 3/5/14 — TIME: 9:00

SAMPLE CONDITION WHEN RECEIVED: -0.8 3.8/3.6

REMARKS: Midland - TDS/BTEX/pH/alk Rudlod cations/hardness CP-cl/804

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

Cation-Anion Balance Sheet

DATE: 3/21/2014

Sample #	Calcium ppm	Magnesium ppm	Sodium ppm	Potassium ppm	Alkalinity ppm	Sulfate ppm	Chloride ppm	Nitrate-N ppm	Fluoride ppm	Bromide ppm	TDS ppm	EC µMHOs/cm
356498	6290	2850	26800	226	126.00	1340	55400				118000	
356499	10600	2420	7190	54	90.00	1210	23700				54200	
356500	6070	2150	24200	240	101.00	1780	51300				112300	
356501	2770	1300	17200	249	118.00	1130	36200				66700	

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*
356498	313.87	234.53	1165.80	5.78	2.52	27.90	1562.83	0.00	0.00	0.00	1719.98	1593.25	3.824839423
356499	528.94	199.14	312.77	1.38	1.80	25.19	668.58	0.00	0.00	0.00	1042.23	695.57	19.948179
356500	302.89	176.92	1052.70	6.14	2.02	37.06	1447.17	0.00	0.00	0.00	1538.66	1486.25	1.7323864
356501	138.22	106.98	748.20	6.37	2.36	23.53	1021.20	0.00	0.00	0.00	999.77	1047.09	2.31179591

	EC/Cation	EC/Anion				
356498	171997.858	159325.28	range	0	to	0
356499	104222.812	69556.92	range	0	to	0
356500	153865.57	148625.26	range	0	to	0
356501	99976.942	104708.86	range	0	to	0

TDS/EC	TDS/Cat		TDS/Anion	
#DIV/0!	0.69		0.74	needs to be 0.55-0.77
#DIV/0!	0.52		0.78	needs to be 0.55-0.77
#DIV/0!	0.73		0.76	needs to be 0.55-0.77
#DIV/0!	0.67		0.64	needs to be 0.55-0.77

APPENDIX D
SLUG TEST DATA

Data Set: H:\WinSitu Data\Celero Caprock Slug Test Data\Exported Data\DQ Tract 3 MW-2\DQTract3MW-2slugi
Title: Falling Head Slug Test
Date: 04/28/14
Time: 11:05:28

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Date: 03/27/14
Test Well: MW-2Slugin

AQUIFER DATA

Saturated Thickness: 17.92 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.526 ft
Static Water Column Height: 13.46 ft
Casing Radius: 0.0833 ft
Well Radius: 0.2817 ft
Well Skin Radius: 1. ft
Screen Length: 17.92 ft
Total Well Penetration Depth: 17.92 ft

No. of Observations: 62

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	13.46	1920.	13.51
120.	13.98	1980.	13.51
180.	13.91	2040.	13.51
240.	13.86	2100.	13.51
300.	13.83	2160.	13.49
360.	13.8	2220.	13.5
420.	13.77	2280.	13.51
480.	13.75	2340.	13.5
540.	13.73	2400.	13.49
600.	13.7	2460.	13.49
660.	13.69	2520.	13.49
720.	13.65	2580.	13.49
780.	13.66	2640.	13.49
840.	13.65	2700.	13.47
900.	13.63	2760.	13.48
960.	13.61	2820.	13.49
1020.	13.6	2880.	13.49
1080.	13.6	2940.	13.48
1140.	13.58	3000.	13.48
1200.	13.58	3060.	13.48
1260.	13.57	3120.	13.48
1320.	13.57	3180.	13.47
1380.1	13.56	3240.	13.47
1440.2	13.56	3300.	13.48
1500.	13.54	3360.	13.48
1560.1	13.54	3420.	13.46
1620.2	13.53	3480.	13.47
1680.	13.52	3540.	13.47
1740.1	13.52	3600.	13.46
1800.	13.52	3660.	13.47

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
1860.	13.52	3720.	13.49

SOLUTION

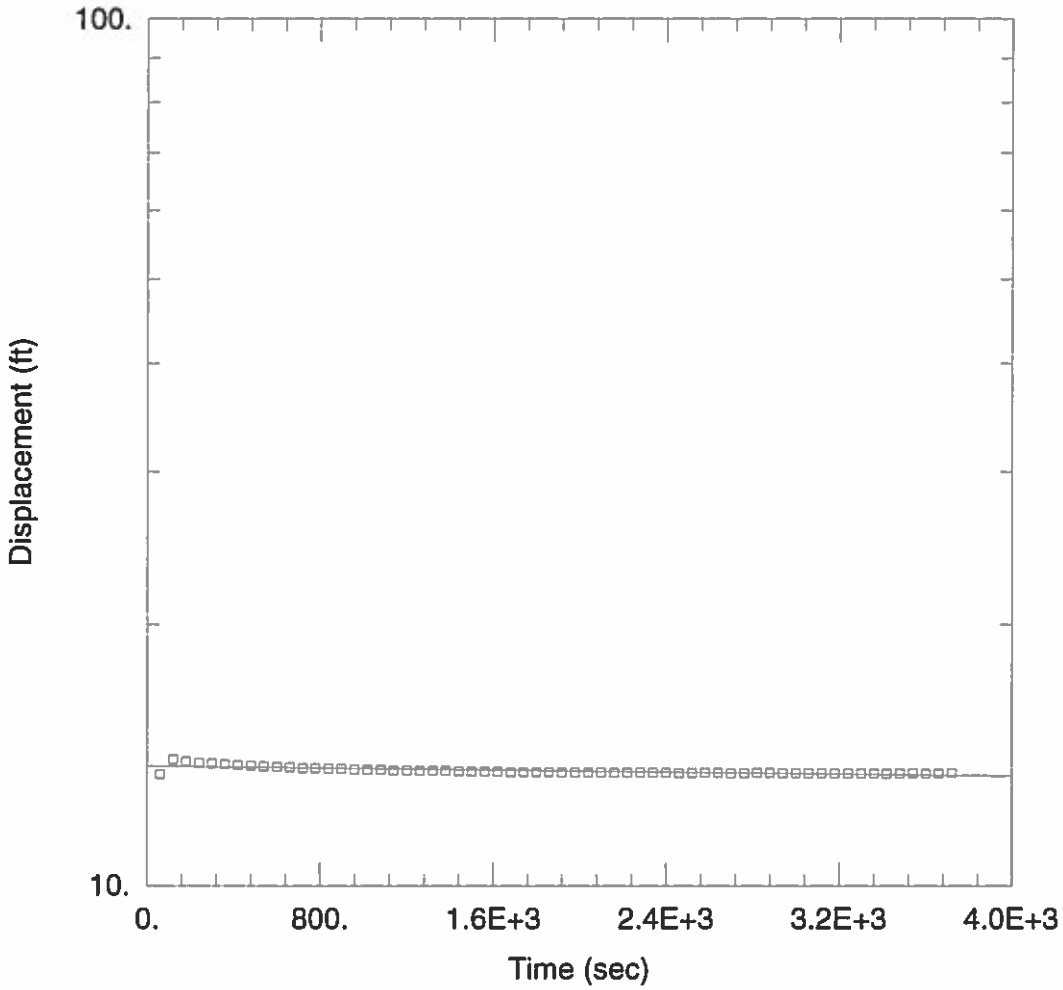
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	4.676E-5	m/day
y0	13.73	ft

K = 5.412E-8 cm/sec
T = K*b = 0.0002554 m²/day (2.956E-5 sq. cm/sec)



FALLING HEAD SLUG TEST

Data Set: H:\...\DQTract3MW-2slugin.aqt
Date: 04/28/14 Time: 11:06:12

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-2Slugin
Test Date: 03/27/14

AQUIFER DATA

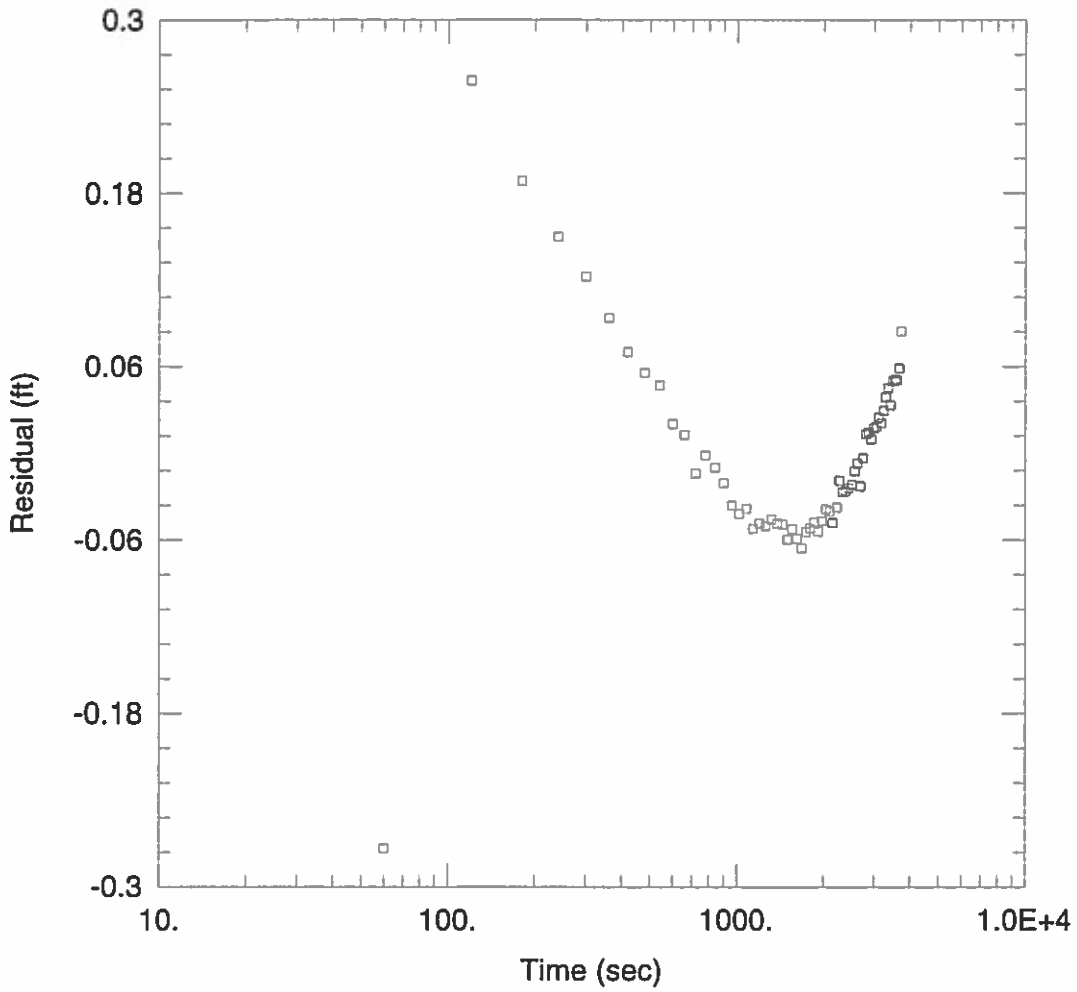
Saturated Thickness: 17.92 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.526 ft
Total Well Penetration Depth: 17.92 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 13.46 ft
Screen Length: 17.92 ft
Well Radius: 0.2817 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 4.676E-5 m/day
y0 = 13.73 ft



FALLING HEAD SLUG TEST

Data Set: H:\...\DQTract3MW-2slugin.aqt
Date: 04/28/14 Time: 11:06:36

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-2Slugin
Test Date: 03/27/14

AQUIFER DATA

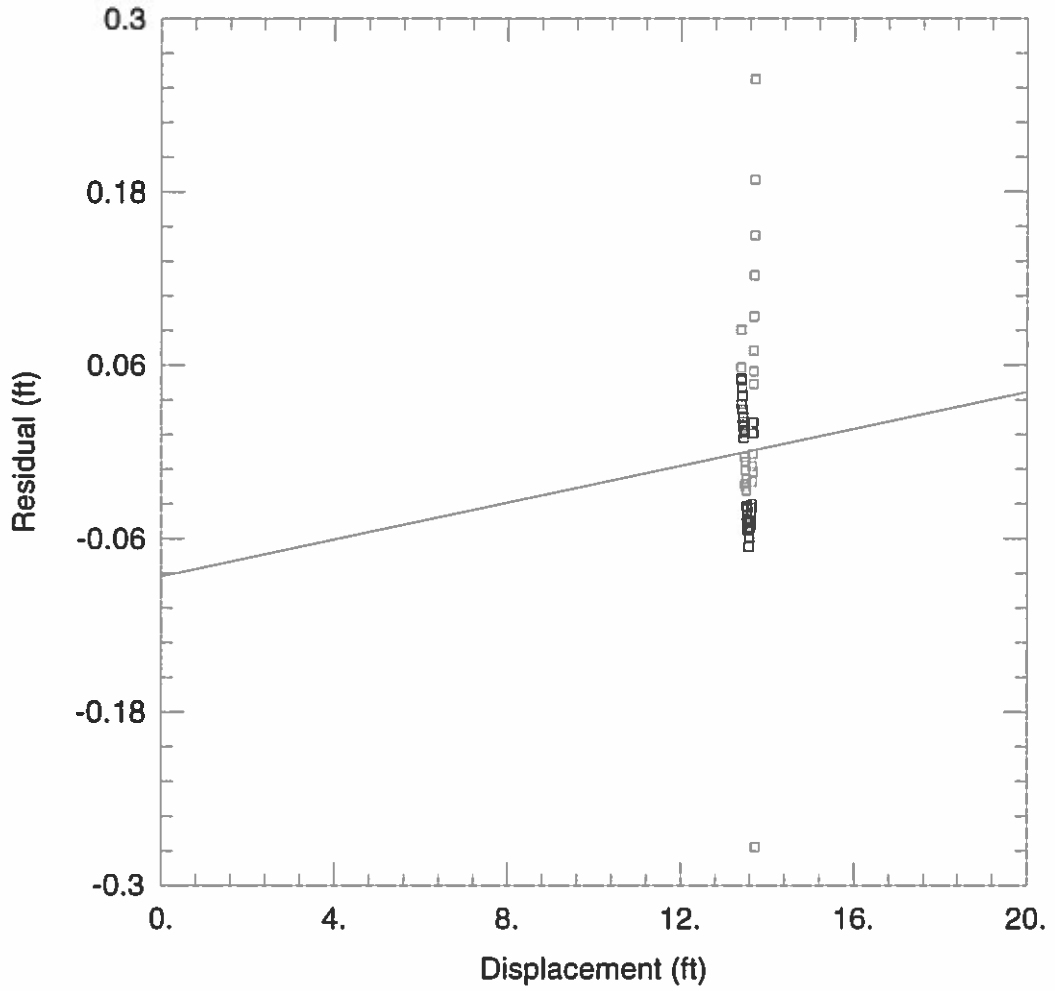
Saturated Thickness: 17.92 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.526 ft
Total Well Penetration Depth: 17.92 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 13.46 ft
Screen Length: 17.92 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:\...\DQTract3MW-2slugin.aqt
Date: 04/28/14 Time: 11:06:46

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-2Slugin
Test Date: 03/27/14

AQUIFER DATA

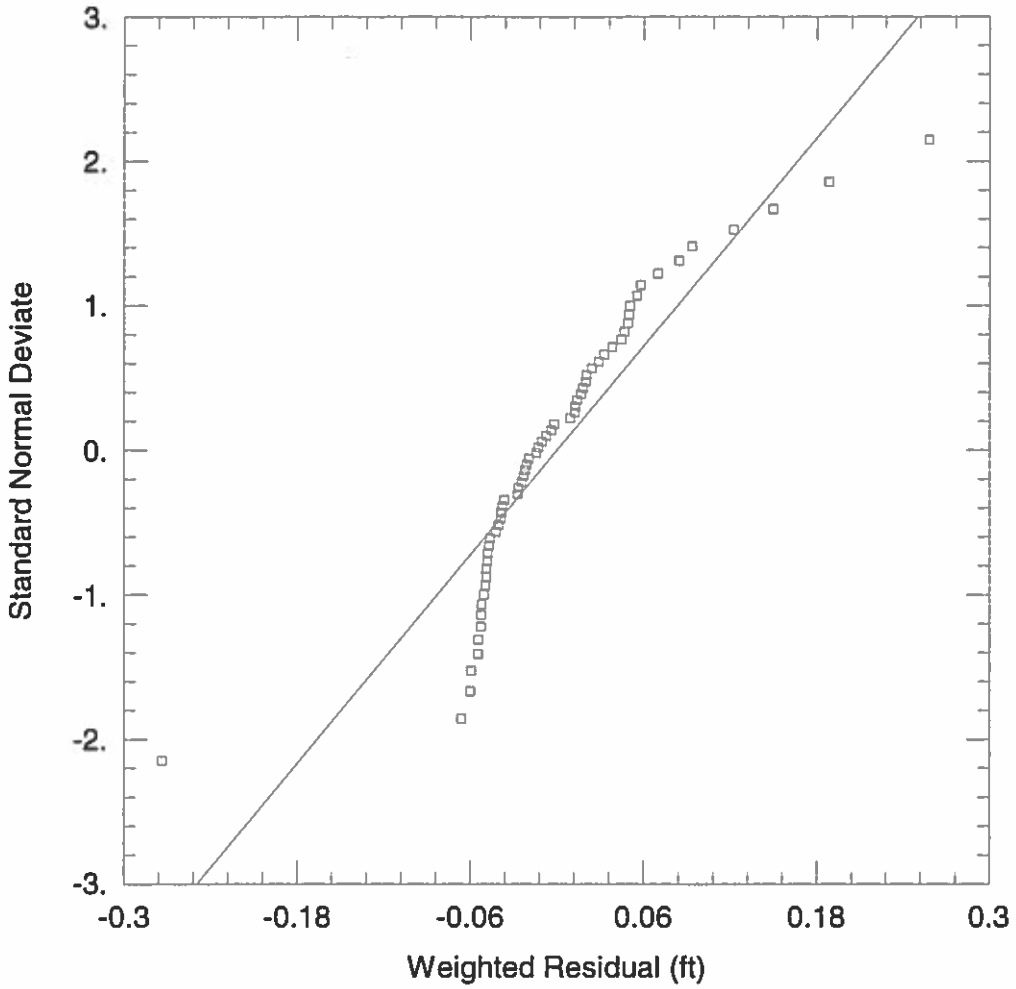
Saturated Thickness: 17.92 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.526 ft Static Water Column Height: 13.46 ft
Total Well Penetration Depth: 17.92 ft Screen Length: 17.92 ft
Casing Radius: 0.0833 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:\...\DQTract3MW-2slugin.aqt
Date: 04/28/14 Time: 11:06:56

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-2Slugin
Test Date: 03/27/14

AQUIFER DATA

Saturated Thickness: 17.92 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.526 ft
Total Well Penetration Depth: 17.92 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 13.46 ft
Screen Length: 17.92 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\DQTract 3 MW-3\DQTract3MW-3slugir
Title: Falling-Head Slug Test
Date: 05/13/14
Time: 14:54:05

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Date: 03/27/14
Test Well: MW-3slugin

AQUIFER DATA

Saturated Thickness: 24.7 ft
Anisotropy Ratio (Kz/Kr): 1.

SLUG TEST WELL DATA

Test Well: New Well

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

Initial Displacement: 0.507 ft
Static Water Column Height: 15.56 ft
Casing Radius: 0.0833 ft
Well Radius: 0.2813 ft
Well Skin Radius: 1. ft
Screen Length: 24.7 ft
Total Well Penetration Depth: 24.7 ft

No. of Observations: 60

Observation Data

Time (sec)	Displacement (ft)	Time (sec)	Displacement (ft)
60.	15.57	1860.	15.63
120.	15.56	1920.	15.62
180.	15.56	1980.	15.64
240.	16.09	2040.	15.61
300.	16.07	2100.	15.63
360.	16.	2160.	15.62
420.	15.96	2220.	15.62
480.	15.91	2280.	15.61
540.	15.88	2340.	15.61
600.	15.85	2400.	15.62
660.	15.83	2460.	15.62
720.	15.8	2520.	15.61
780.	15.78	2580.	15.6
840.	15.77	2640.	15.6
900.	15.76	2700.	15.61
960.	15.75	2760.	15.6
1020.	15.73	2820.	15.59
1080.	15.72	2880.	15.6
1140.	15.7	2940.	15.6
1200.	15.7	3000.	15.59
1260.	15.68	3060.	15.61
1320.	15.68	3120.	15.6
1380.	15.66	3180.	15.59
1440.	15.68	3240.	15.58
1500.	15.67	3300.	15.59
1560.	15.66	3360.	15.6
1620.	15.65	3420.	15.6
1680.	15.65	3480.	15.59
1740.	15.64	3540.	15.59
1800.	15.64	3600.	15.6

SOLUTION

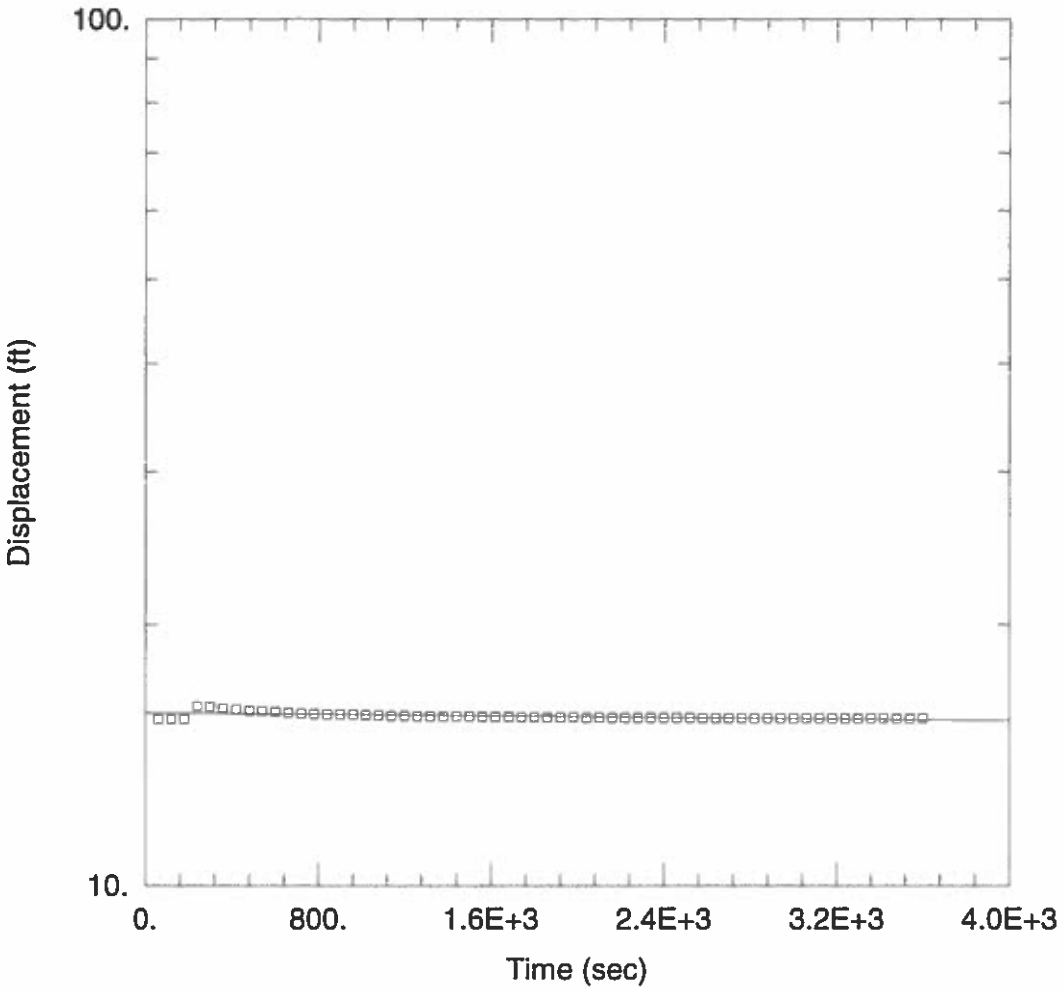
Slug Test
Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
ln(Re/rw): 0.

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
K	2.811E-5	m/day
y0	15.82	ft

K = 3.254E-8 cm/sec
T = K*b = 0.0002116 m²/day (2.449E-5 sq. cm/sec)



FALLING-HEAD SLUG TEST

Data Set: H:\...\DQTract3MW-3slugin.aqt
Date: 04/28/14 Time: 11:14:43

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-3slugin
Test Date: 03/27/14

AQUIFER DATA

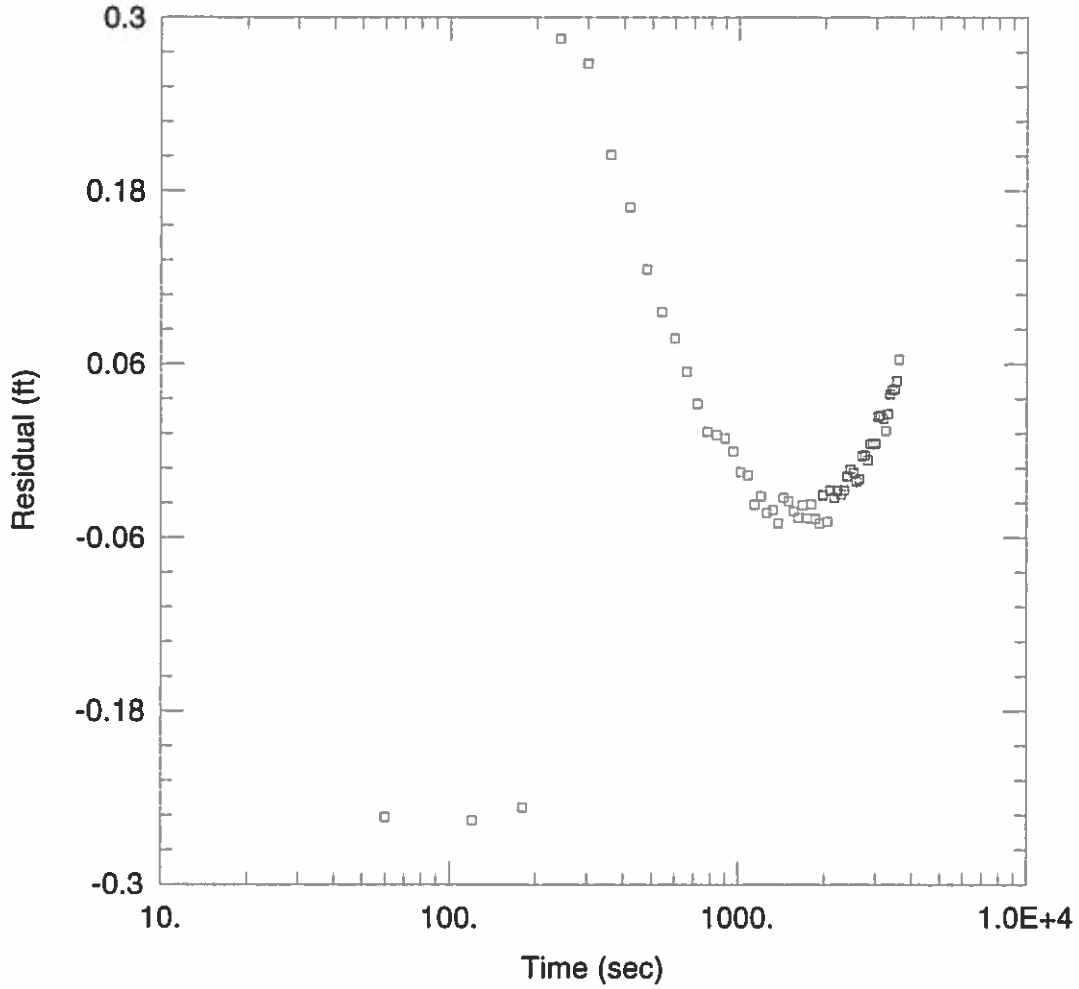
Saturated Thickness: 24.7 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.507 ft
Total Well Penetration Depth: 24.7 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 15.56 ft
Screen Length: 24.7 ft
Well Radius: 0.2813 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.811E-5 m/day
y0 = 15.82 ft



FALLING-HEAD SLUG TEST

Data Set: H:\...\DQTract3MW-3slugin.aqt
Date: 04/28/14 Time: 11:15:36

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-3slugin
Test Date: 03/27/14

AQUIFER DATA

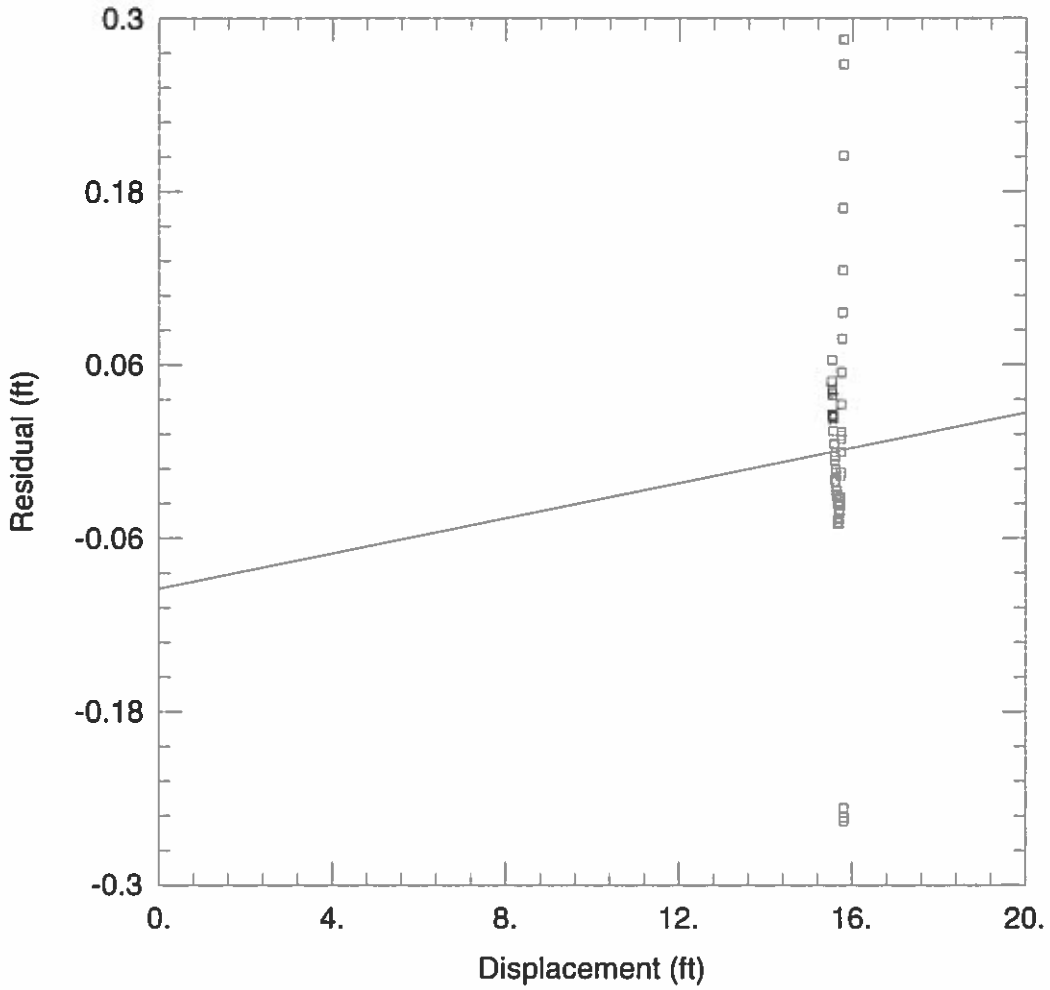
Saturated Thickness: 24.7 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.507 ft
Total Well Penetration Depth: 24.7 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 15.56 ft
Screen Length: 24.7 ft
Well Radius: 0.2813 ft

SOLUTION

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



FALLING-HEAD SLUG TEST

Data Set: H:\...\DQTract3MW-3slugin.aqt
Date: 04/28/14 Time: 11:15:43

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-3slugin
Test Date: 03/27/14

AQUIFER DATA

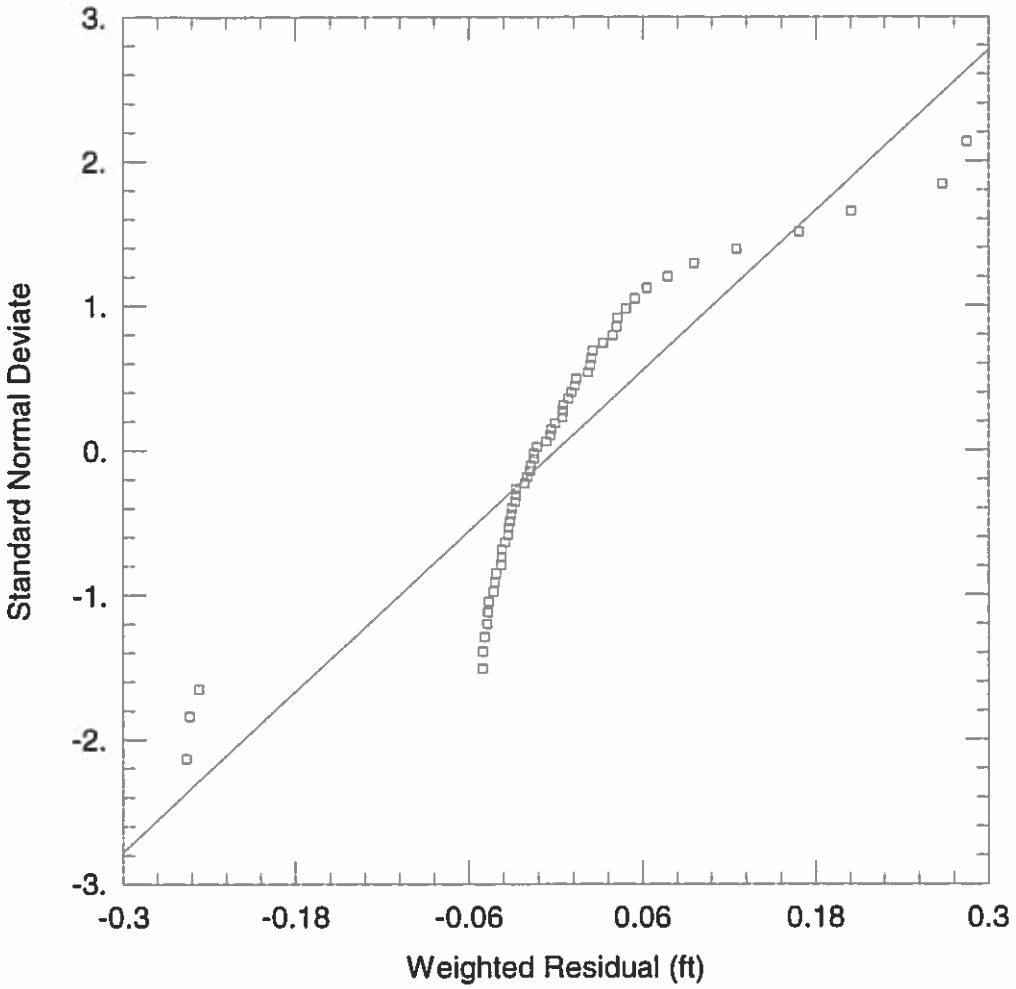
Saturated Thickness: 24.7 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.507 ft Static Water Column Height: 15.56 ft
Total Well Penetration Depth: 24.7 ft Screen Length: 24.7 ft
Casing Radius: 0.0833 ft Well Radius: 0.2813 ft

SOLUTION

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



FALLING-HEAD SLUG TEST

Data Set: H:\...\DQTract3MW-3slugin.aqt
Date: 04/28/14 Time: 11:16:13

PROJECT INFORMATION

Company: Tetra Tech
Client: Celero
Project: 114-640
Location: DQTract3
Test Well: MW-3slugin
Test Date: 03/27/14

AQUIFER DATA

Saturated Thickness: 24.7 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (New Well)

Initial Displacement: 0.507 ft
Total Well Penetration Depth: 24.7 ft
Casing Radius: 0.0833 ft
Static Water Column Height: 15.56 ft
Screen Length: 24.7 ft
Well Radius: 0.2813 ft

SOLUTION

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