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By OCD Dr Oberding at 10:50 am, Dec 06, 2016

TETRA TECH

July 1, 2016

APPROVED
By OCD Dr Oberding at 2:38 pm, Dec 06, 2016

Dr. Tomas Oberding
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87504

Re: COG Operating, LLC
Scratch State Com No. 1
Site Summary and Addendum to Closure Report
Section 24, Township 18 South, Range 33 East
Lea County, New Mexico
NMOCD AP - 094

Dr. Oberding:

This Site Summary and Addendum to Closure Report details the comprehensive results of the site investigation activities, which began in August 2007, performed at the Scratch State Com No. 1 (Site). The site is located approximately 8 miles southwest of Buckeye, New Mexico, Latitude 32.734979°, Longitude -103.623002°.

The facility was acquired by COG Operating, LLC (COG) in August 2010. Prior to COG acquiring the property, the facility was operated by Marbob Energy Corporation (Marbob). Marbob submitted the Stage 1 Abatement Plan (AP-094) to the NMOCD in October 2008. A copy of the Stage 1 Abatement Plan is included in Appendix A. The Site is on land owned by the New Mexico State Land Office (NMSLO).

FACILITY BACKGROUND

The subject Site is located southwest of Buckeye, New Mexico in Lea County. The legal description of the Site is Unit Letter E, Section 24, Township 18 South, and Range 33 East. The Site is a location containing a well that was completed in July of 2005, a tank battery, and a former reserve pit. The Site was previously operated by Marbob. The contamination at the Site is due to a drilling fluid leak that occurred through a rupture in the plastic liner of the former reserve pit.

Tetra Tech
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In August of 2007, Marbob retained BBC International, Inc. (BBC) to perform field screens of pit bottom soil samples at the Site for chloride content and to submit closing soil samples for laboratory analysis. Water was encountered on August 20, 2007 during the sampling process, and Marbob notified Wayne Price of the Oil Conservation Division (OCD) Energy, Minerals, and Natural Resources Department (EMNRD) by phone and email that afternoon. Marbob retained BBC to manage further investigation activities at the Site.

SITE DESCRIPTION / GROUNDWATER

The Site is located in southern Lea County in the southeastern corner of New Mexico. The area is in the Pecos River Valley section of the Great Plains physiographic province. The site is located in the Querecho Plains southwest of the Mescalero Ridge and the Llano Estacado. The region is mostly covered by shifting dune sand sometimes overlying caliche with an uneven surface broken by shallow playa lakes. The climate of the area is classified as semi-arid to arid and is characterized by low annual rainfall, low humidity, and a high average annual temperature. Local precipitation averages approximately 10 to 12 inches per year (Nicholson and Clebsch, 1961).

The main aquifer in the area is the Alluvium Aquifer. The Alluvium formation consists of sand and gravel along dry washes, silt and sand in lake beds and includes some wind-deposited sands around depressions. The Ogallala Aquifer terminates north and east of the Site along the Mescalero Ridge. The Ogallala Aquifer is also present to the southeast of the Querecho Plains.

According to *Geology and Ground-Water Conditions in Southern Lea County, New Mexico*, (Nicholson & Clebsch, 1961), on the basis of limited available data, there does not seem to be a continuous saturated zone in the thin cover of alluvium in the Querecho Plains.

According to the New Mexico Office of the State Engineer (NMOSE) data base, a well located in Section 24 showed depth to ground water of 195 feet below ground surface. However, after contacting the NMOSE, the well was never installed in that Section. Additional wells were reported in Section 10, 11, 13 and 14 with groundwater depths ranging from 32’ to 62’ below surface. The surface elevation on these water wells ranged from 3,967’ to 3,990’ and the Site elevation is approximately 3,890’. The surface elevation differences are approximately 70’ to 100’. The water well data and information are presented in Appendix B.

TETRA TECH

BBC - EXCAVATION ACTIVITIES AND SITE INVESTIGATION

Soils — Excavation Activities

The BBC Site soil investigation and excavation began on August 9, 2007. BBC screened soil samples from the pit bottom for chloride content. Screening results showed that chloride levels in the south portion of the pit came within NMOCD guidelines at 12 feet below ground surface (bgs). Chlorides in the central part of the excavation dropped to within NMOCD guidelines at 22 feet bgs. However, soil samples in the north portion of the pit continued to exceed NMOCD guidelines. A composite sample, made from the south and central sample points, was submitted for laboratory analysis on August 14, 2007. The sample contained 128 parts per million (ppm or mg/Kg) chlorides. Soil laboratory analytical results are in Appendix A**.**

Excavation and sample screening continued in the north section of the pit. On August 20, 2007, water was encountered at approximately 40 feet bgs in the trench of the northeast quarter of the excavation. A trench of the same depth was excavated in the northwest quarter however water was not encountered at that location.

Monitoring Well Installation

On September 10, 2007, BBC contracted Eco/Enviro Drilling to place a monitoring well (MW1) near the northeast corner of the excavation. A Site diagram including position of existing monitoring wells and analytical results can be viewed in Appendix A**.** A hollow stem auger rig equipped with a continuous core sampling tool was used to drill soil borings, collect soil samples, and complete ground water monitoring wells. The monitoring wells were installed with 15 feet of 0.20 mm well screen with 10 feet of the well screen below the water level.

MW1 was located on the east side of the pit near the north corner. Four (4) soil samples were collected during drilling of MW1. At 35 feet bgs, chloride content was less than 16 ppm, the 40 foot sample contained 3,919 ppm, the 45 foot sample contained 3,479 ppm, and the 50 foot sample showed 208 ppm. Drilling ceased at 50 feet bgs.

Eco/Enviro Drilling returned on September 27-28, 2007 to install two additional monitoring wells (MW2 and MW3) in order to determine the water gradient.

MW2 was placed on the north side of the excavation and toward the east corner. Five soil samples were collected during drilling of MW2. At 35 feet bgs, chloride content was 9,800 ppm, the 40 foot sample contained 5,040 ppm, the 45 foot sample contained 3,240 ppm, the 50 foot sample showed 5,040 ppm, and the 55 foot sample contained 528 ppm. Drilling of MW2 ceased at 55 feet bgs.

MW3 was placed on the south side of the excavation directly south of MW2. Five soil samples were collected during drilling of MW3. At 35 feet bgs, chloride content was 48 ppm, the 40 foot sample contained 64 ppm, the 45 foot sample contained 192 ppm, the 50 foot sample showed 176 ppm, and the 55 foot sample contained 64 ppm. Drilling ceased at 55 feet bgs.

The bottom of the pit in the north section was lined with plastic, and BBC received permission from Chris Williams of the NMOCD Hobbs office on September 20, 2007 for Marbob to backfill the excavation.

Water Sampling

On September 11, 2007, BBC sampled the water for chloride at MW1. The sample contained 396 ppm (mg/L). To reference the ground water laboratory analytical results summary, please view Appendix A**.**

BBC developed MW2 on the afternoon of September 28, 2007. MW3 had not yet recharged and development of MW3 was postponed until October 1, 2007.

On October 1, 2007, BBC sampled the water for chloride at MW2. The sample contained 45,590 ppm. BBC also developed MW3 the same day. Initial gauging data indicated that only 4.97 feet of water existed in MW3 (0.81 gallons).

BBC returned to collect ground water samples for chloride on October 2, 2007 from both MW1 and MW3 for the purpose of having near simultaneous water data for all three monitoring wells. The water sample from MW1 contained 708 ppm. The sample from MW3 contained 472 ppm. MW3 contained only 2.94 feet of water in the water column from which 0.5 gallons were purged.

On October 3, 2007, BBC purged MW2 and MW3. MW2 was, from this date on, purged as often as possible due to the results of the laboratory data from the samples collected on October 1, 2007. MW3 was purged to encourage recharge of the well. 1.32 feet of water (0.22 gallons) existed in the water column and 0.25 gallons were purged.

On October 22, 2007, the Site was surveyed by John West Surveying Company. In MW3, 1.59 feet of water (0.26 gallons) existed in the water column and 0.25 gallons were purged.

BBC collected water samples from all three monitoring wells on October 23, 2007. The sample from MW1 contained 2,260 ppm chloride, the sample from MW2 contained 42,800 ppm, and the sample from MW3 contained 400 ppm. The water level in MW3 remained at less than 0.5 feet in the water column.

On December 4, 2007, BBC purged all monitoring wells, however, from this date forward BBC only sampled water from MW1 and MW2. MW3 was not sampled on this date or again thereafter due to failure of the well to recharge after purging.

The sample from MW1 contained 512 ppm chloride and MW2 contained 42,400 ppm.

On January 24, 2008, BBC collected water samples from MW1 and MW2. The sample from MW1 contained 35,200 ppm chloride and the sample from MW2 showed 44,400 ppm. Due to laboratory analytical results of these samples, both MW1 and MW2 were purged as often as possible from this date forward.

On April 14, 2008, BBC collected water samples from MW1 and MW2. The sample from MW1 contained 14,600 ppm chloride and the sample from MW2 contained 48,800 ppm.

On August 20, 2008, BBC collected water samples from MW1 and MW2. The sample from MW1 contained 35,000 ppm chloride and the sample from MW2 contained 52,500 ppm.

TETRA TECH ACTIVITIES

Water Monitoring and Soil Assessment Activities

Since March 2011, Tetra Tech gauged and sampled the water from the three monitor wells on a quarterly basis. During each water sampling event, the monitor wells were gauged with an electronic water level meter. The gauging data is presented in Table 1. During these sampling events, the water samples were analyzed for Benzene, Toluene, Ethylbenzene and Xylene (BTEX) by Method 8021B and chloride by EPA Method 300.0. During this time, the analytical results for MW-1 were all below regulatory limits for BTEX and the chloride results ranged from 37,800 – 50,200 mg/L. For MW-2, the analytical results for BTEX were all below the regulatory limits and chloride results ranged from 38,400 - 84,600 mg/L. For MW-3, the analytical results for BTEX were below the regulatory limits and chloride results ranged from 773 – 5,690 mg/L. The water analytical results are presented in Table 2.

On October 30 and 31, 2014, Tetra Tech personnel mobilized to the Site to supervise Scarborough Drilling from Lamesa, Texas, with the installation of four delineation monitor wells. The four 2-inch monitor wells (MW-4, MW-5 MW-6 and MW-7) were drilled to a Total Depth (TD) of approximately 60-feet bgs. The bottom of the wells terminated in a dense clay layer that was encountered at approximately 45-feet bgs. The location of the monitor wells are presented on Figure 3. Water was not encountered during the installation of these monitor wells. Monitor well MW-5 eventually developed water and was purged dry by bailing 6-gallons of water each time from the well on November 11 and December 9, 2014. Monitor wells MW-4, MW-6 and MW-7 have remained dry from the date of installation. The monitor wells were surveyed on December 9, 2014, by John West Survey Company of Hobbs, New Mexico for horizontal and vertical control.

On January 5, 2015, Tetra Tech personnel were on location to gauge and sample all of the wells on the Site. Monitor wells MW-4, MW-6 and MW-7 were dry and not sampled. Based on the gauging data, the water gradient for the Site is to the northwest. The water gradient map for January 2015 is presented on Figure 4. The analytical results indicate that BTEX concentrations in all the wells sampled on January 5, 2015, MW-1, MW-2, MW-3 and MW-5, were below the NMWQCC regulatory limits. The chloride concentrations in all the sampled wells exceeded the NMWQCC standards. The chloride analytical results were: (MW-1) 32,700 mg/L; (MW-2) 55,900 mg/L; (MW-3) 2,170 mg/L; and (MW-5) 22,800 mg/L. The chloride concentration map for January 2015 is presented on Figure 6. These preceding activities were submitted to the NMOCD in the *Stage 1 Abatement Plan Site Investigation Report and Closure Request AP-094,* dated February 27, 2015.

The Site was gauged and sampled again on March 31, 2015 by Tetra Tech personnel. Monitor wells MW-4, MW-6 and MW-7 were dry and not sampled. Based on the gauging data, the water gradient for the Site is to the west-northwest. The water gradient map for March 2015 is presented on Figure 5. The analytical results indicate that BTEX concentrations in all the wells sampled on March 31, 2015, MW-1, MW-2, MW-3 and MW-5, were below the NMWQCC regulatory limits. The chloride concentrations in all the sampled wells exceeded the NMWQCC standards. The chloride analytical results were: (MW-1) 31,500 mg/L; (MW-2) 59,400 mg/L; (MW-3) 1,530 mg/L; and (MW-5) 24,800 mg/L. The chloride concentration map for March 2015 is presented on Figure 7. Copies of the laboratory analyses are enclosed in Appendix C.

NMOCD Correspondence

In email correspondence from Dr. Tomas Oberding, dated June 22 and October 16, 2015, the NMOCD denied the closure request. Subsequently, a conference call was conducted on Friday, October 30, 2015 with NMOCD, Tetra Tech and COG personnel to discuss the denied closure request and concerns of the NMOCD regarding chloride concentrations and recommendations to move forward. During the conference call, it was agreed that two additional delineation monitor wells would be drilled at the Site, one to the east and another to the west of the Site. Also, a soil boring was agreed to be installed to a depth of 100’ bgs to investigate if there was a deeper groundwater aquifer at the Site.

Installation of Monitor Wells and Deep Soil Boring

On April 4 and 5, 2016, Tetra Tech personnel supervised the installation of two delineation monitor wells. The monitor wells (MW-8 and MW-9) were installed east and west of the Site, and one deep soil boring (SB-1) southeast in the area of MW-4. The two 2-inch monitor wells were drilled to a TD of approximately 60-feet bgs and field screened with a photoionization detector (PID). The bottom of the wells terminated in a dense clay layer that was encountered at approximately 45-feet bgs. The locations of the monitor wells MW-8, MW-9 and soil boring SB-1 are presented on Figure 8.

The monitor wells were constructed of 2-inch Schedule 40 PVC, with the bottom 20-feet of 0.020-inch slot screen and 40-feet of solid riser. The sand pack was installed from TD to two feet above the screen. Portland grout was added from 38-feet bgs to the surface. A concrete pad and steel vault with locking collar were installed above ground surface. During the installation, water was not encountered in monitor wells MW-8 and MW-9. The well construction logs are presented in Appendix D. The well lithology logs are presented in Appendix E.

The soil boring SB-1 was field screened with a PID and advanced to 100' bgs near MW-4. Water was not encountered in SB-1. In SB-1, dry dense red clay was encountered at 43' bgs and continued down to TD at 100' bgs. Once completed, the soil boring was plugged with bentonite pellets to grade. The lithology of soil boring SB-1 demonstrates the presence of approximately 40' of dry dense red clay below the TD of the monitor wells at the Site. The boring lithology log is presented in Appendix E.

Monitor Well Gauging

Tetra Tech personnel gauged the monitor wells with an electronic water level meter on April 4, 19 and 25, 2016. Monitor wells MW-8 and MW-9 were dry for each of the gauging events. Monitor wells MW-4, MW-6, MW-7, MW-8 and MW-9 have remained dry. Gauging data for the Site is provided in Table 1.

On April 25, 2016, the monitor wells MW-8 and MW-9 were surveyed by a licensed professional land surveyor from John West Surveying Company of Hobbs, New Mexico. A copy of the survey is provided in Appendix F.

TETRA TECH

PROJECT SUMMARY

1. On a former reserve pit, Marbob conducted soil and water investigation activities at the Site from September 2007 to August 2008, including the installation of three monitor wells (MW-1, MW-2 and MW-3). Marbob submitted the Stage 1 Abatement Plan (AP-094) to the NMOCD in October 2008.

2. The facility was acquired by COG in August 2010.

3. Tetra Tech has conducted quarterly water monitoring at the Site since March 2011. During these sampling events, the water samples were analyzed for BTEX and chloride. The analytical results for the three wells (MW-1, MW-2 and MW-3) were all below regulatory limits for BTEX. The chloride analytical results were: (MW-1) 37,800 – 50,200 mg/L; (MW-2) 38,400 - 84,600 mg/L and (MW-3) 773 – 5,690 mg/L.

4. On October 30-31, 2014, Tetra Tech supervised the installation of four 2-inch monitor wells (MW-4, MW-5, MW-6 and MW-7) by Scarborough Drilling of Lamesa, Texas. All of the monitor wells were surveyed for horizontal and vertical control. The water gradient for the site is to the northwest.

5. On January 5 and March 31, 2015, Tetra Tech personnel collected water samples for analysis of BTEX and chloride. Monitor wells MW-4, MW-6 and MW-7 have been dry since installation and were not sampled. The BTEX analytical results for monitor wells MW-1, MW-2, MW-3 and MW-5 were below the NMWQCC regulatory limits. The chloride concentrations in all of the sampled wells exceeded the NMWQCC standards of 250 mg/L. The chloride analytical results ranges were: (MW-1) 31,500 - 32,700 mg/L; (MW-2) 55,900 - 59,400 mg/L; (MW-3) 1,530 - 2,170 mg/L; and (MW-5) 22,800 – 24,800 mg/L.

6. Based on the results, Tetra Tech submitted a Closure Report to the NMOCD for review and approval. The closure request was denied by the NMOCD via email on June 22 and October 16, 2015.

7. October 30, 2015, a conference call was conducted with NMOCD, Tetra Tech and COG personnel to discuss the denied closure request and concerns of the NMOCD regarding chloride concentrations at the Site and recommendations moving forward. During the conference call it was agreed that two delineation monitor wells would be drilled at the Site, one to the east and another to the west of the Site. Also, a soil boring was agreed to be installed to a depth of 100' bgs to investigate if there is any deeper water located at the Site.

8. On April 4-5, 2016, Tetra Tech personnel supervised the installation of two 2-inch monitor wells and one deep soil boring. Monitor wells MW-8 and MW-9 were installed into the dry, dense red clay and remain dry since installation. The soil boring SB-1 was advanced to 100' bgs near MW-4. Water was not encountered in SB-1. The lithology of soil boring SB-1 demonstrates the presence of approximately 40' of dry dense red clay below the TD of the monitor wells at the Site.

CONCLUSIONS AND RECOMMENDATIONS

The Site is located on the Querecho Plains, south and west on the Mescalero Ridge in Lea County, New Mexico. The main (shallow) aquifer in the area is the Alluvium Aquifer. The Alluvium formation consists of sand and gravel along dry washes, silt and sand in lake beds and includes some wind-deposited sands around depressions. The Ogallala Aquifer terminates north and east of the Site along the Mescalero Ridge. The Ogallala Aquifer is also present to the southeast of the Querecho Plains.

According to *Geology and Ground-Water Conditions in Southern Lea County, New Mexico*, (Nicholson & Clebsch, 1961), on the basis of limited available data, there does not seem to be a continuous saturated zone in the thin cover of alluvium in the Querecho Plains.

The monitor wells were installed to a total depth of 60' below surface and a dense red clay was encountered at approximately 40' to 60' below surface. The site is delineated and the five perimeter monitor wells (MW-4, MW-6, MW-7, MW-8 and MW-9) at the site are dry. The remaining wells have limited water and can be purged dry. The trap water at the Site appears to be limited and confined to the immediate area of the former reserve pit. Also, the trap water appears to not be connected with any aquifer.

The soil boring SB-1 was advanced to a total depth of 100' bgs to determine if a deeper groundwater aquifer was present. A dry dense red clay was encountered at a depth of 43' bgs to a depth of 100' bgs. No water was encountered during the installation of SB-1.

Based on the limited water and subsurface geology, the trapped water appears to be from the leakage of water from the former reserve pit that has accumulated on top of the dense red clay and does not appear to be the shallow aquifer or perched groundwater zone for the area.

TETRA TECH

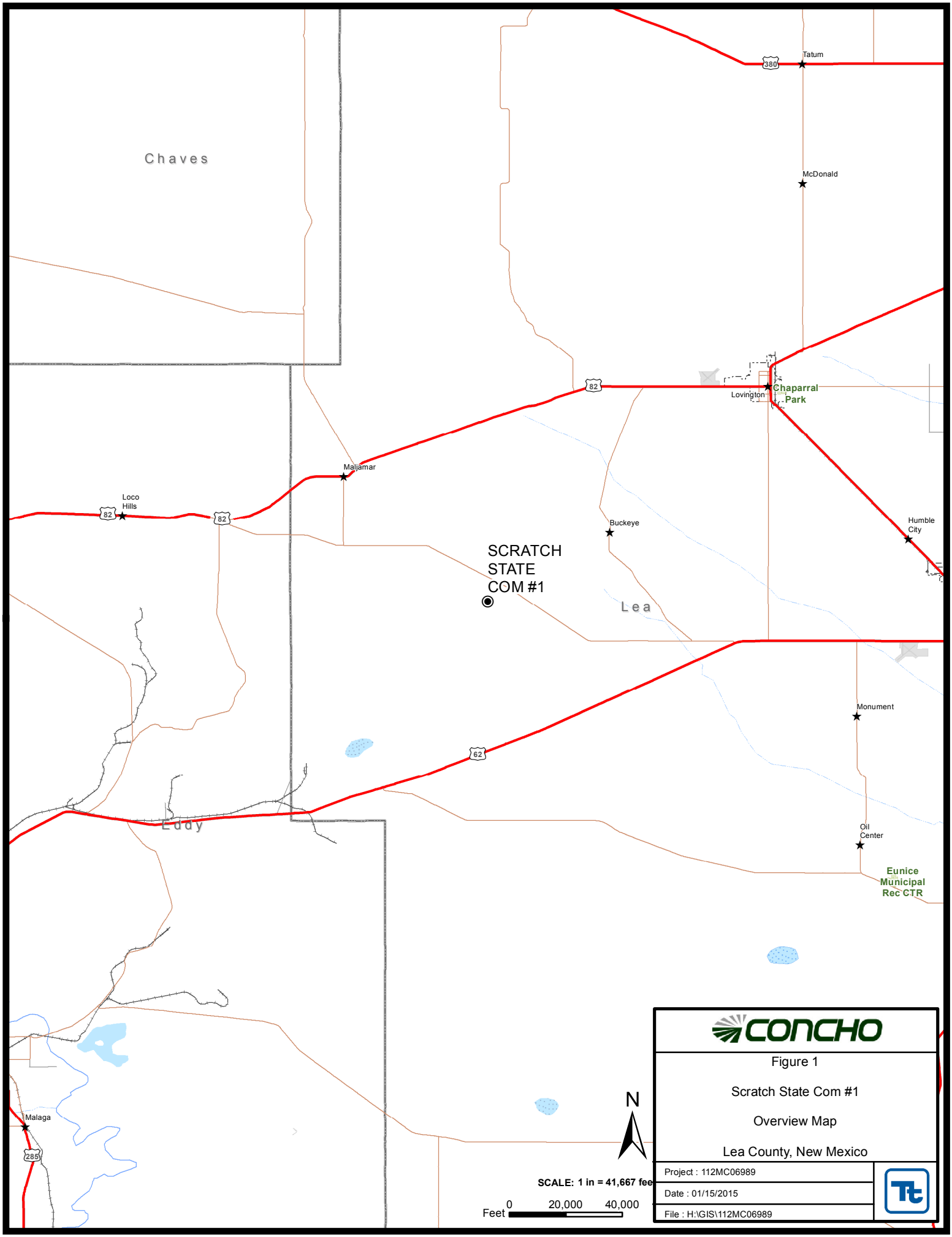
Based on the investigation findings, COG requests closure and no further action for this Site. If you have any question or comments concerning this closure request, please call me at (432) 682-4559.

Respectfully submitted,
Tetra Tech, Inc.

Todd Wells
Project Manager

cc: Robert McNeil – COG Operating
Ike Tavarez – Tetra Tech
Amber Groves – NMSLO
Dana Strang – NMSLO
Ed Martin – NMSLO
Mark Naranjo -- NMSLO

FIGURES



Drawn By: Isabel Marmolejo

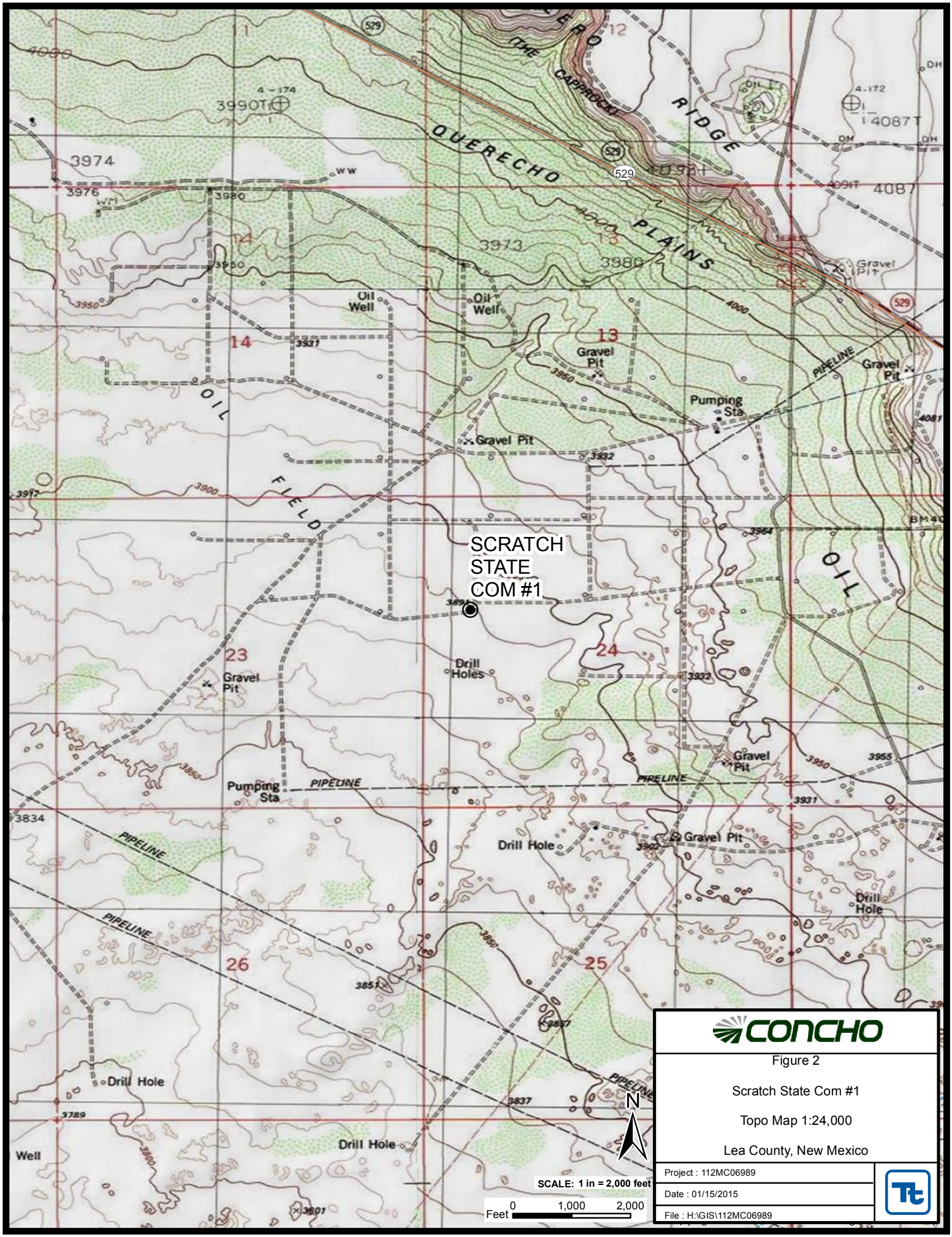


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Figure 2

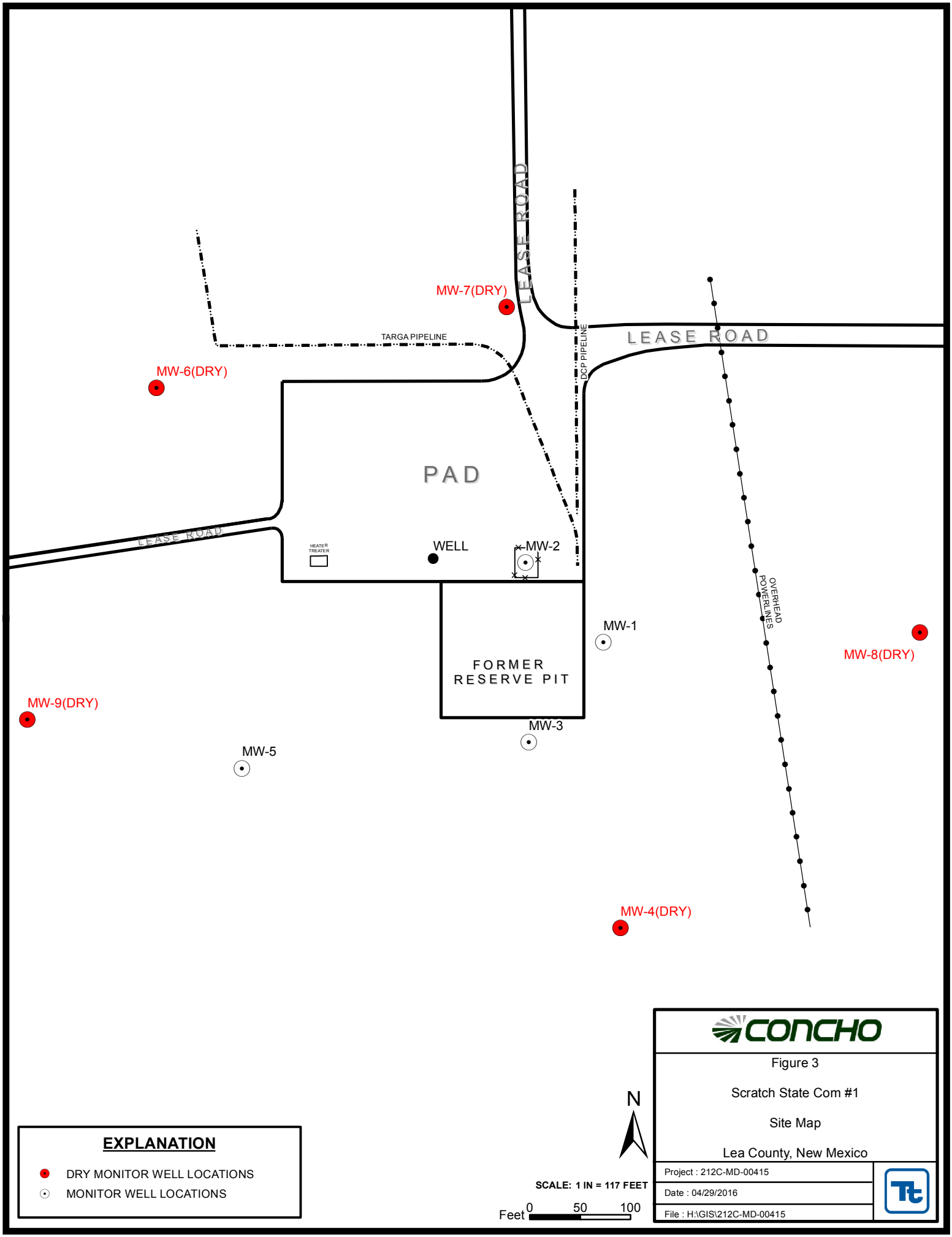
Scratch State Com #1

Topo Map 1:24,000

Lea County, New Mexico

Project : 112MC06989	
Date : 01/15/2015	
File : H:\GIS\112MC06989	

Drawn By: Isabel Marmolejo



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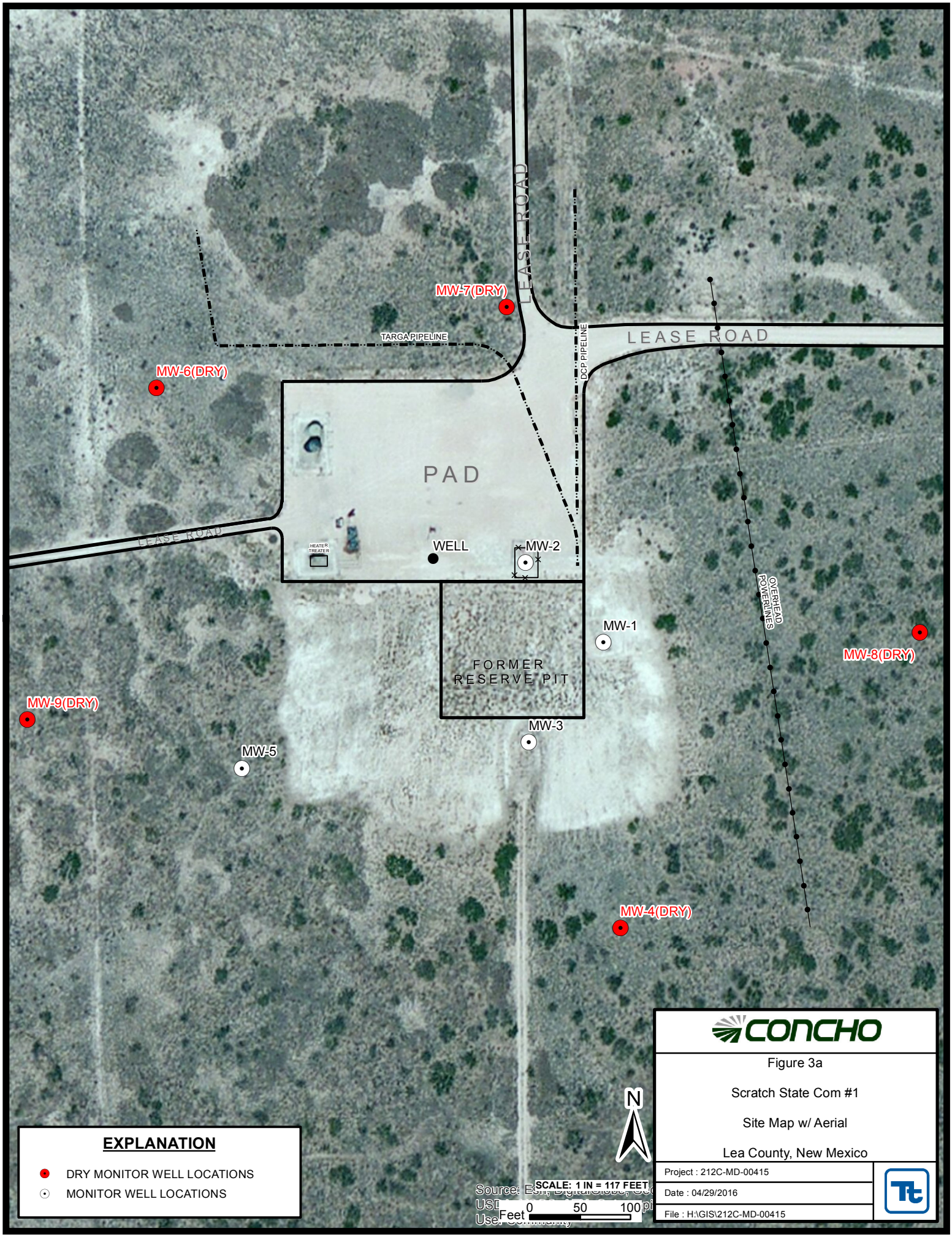

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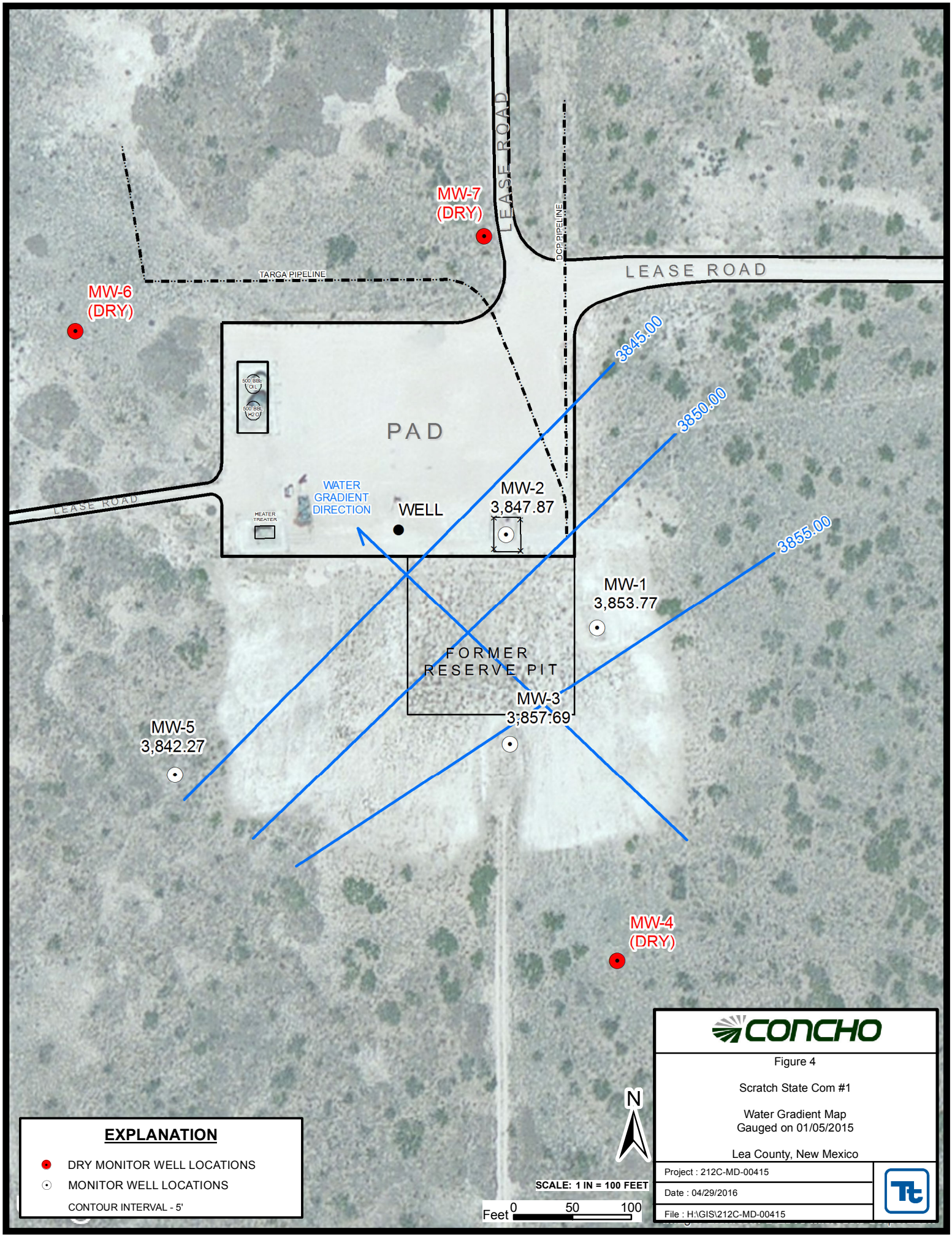

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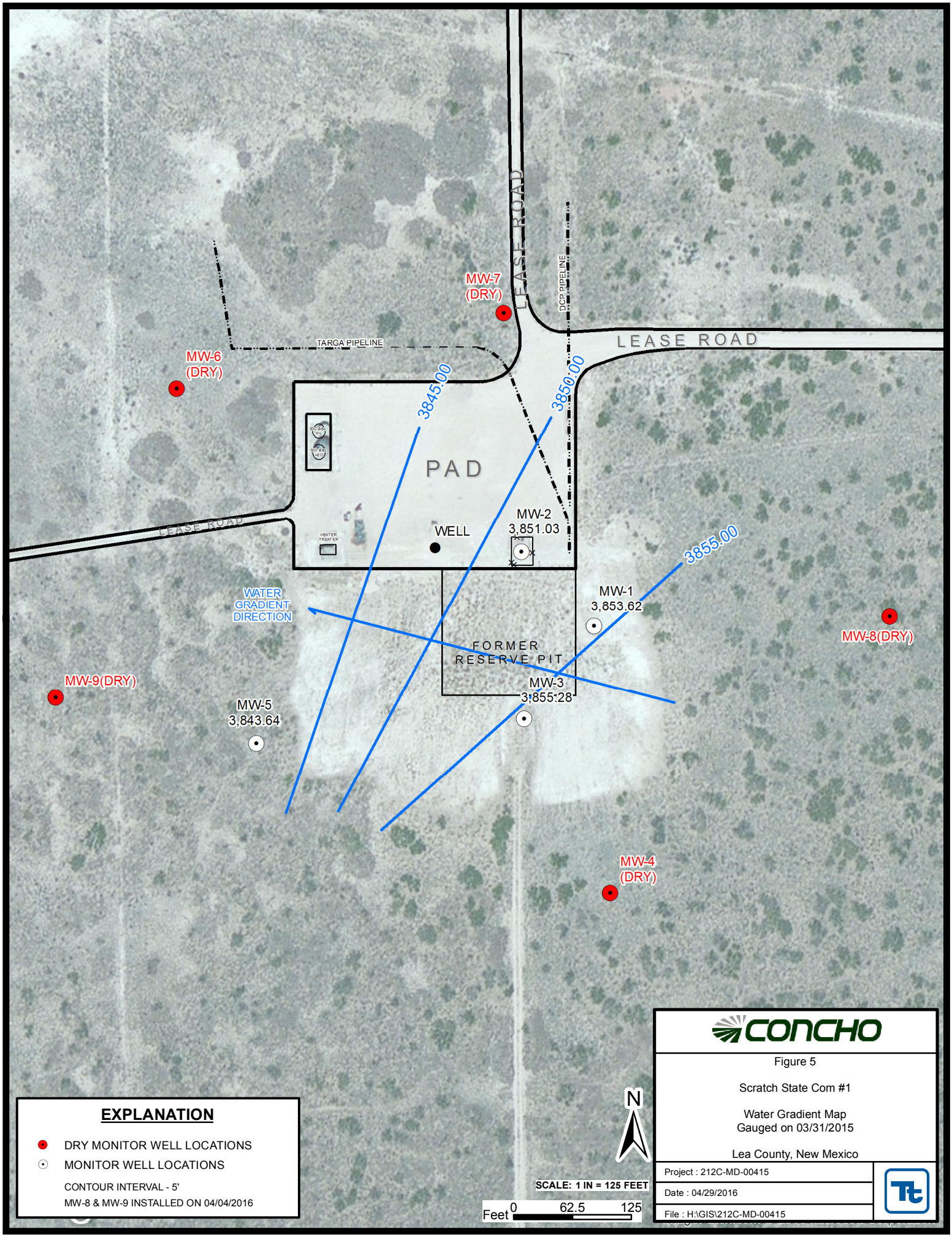

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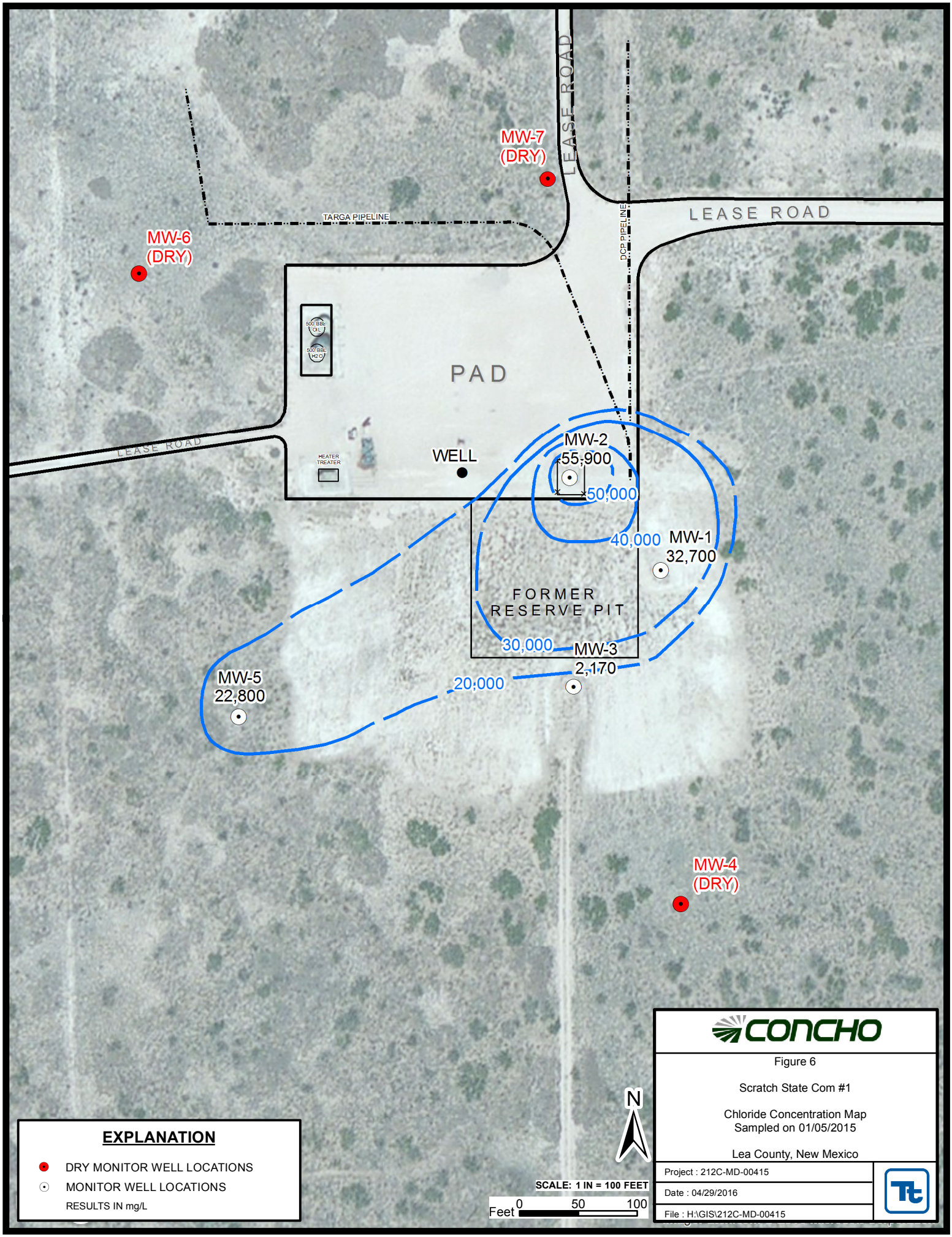
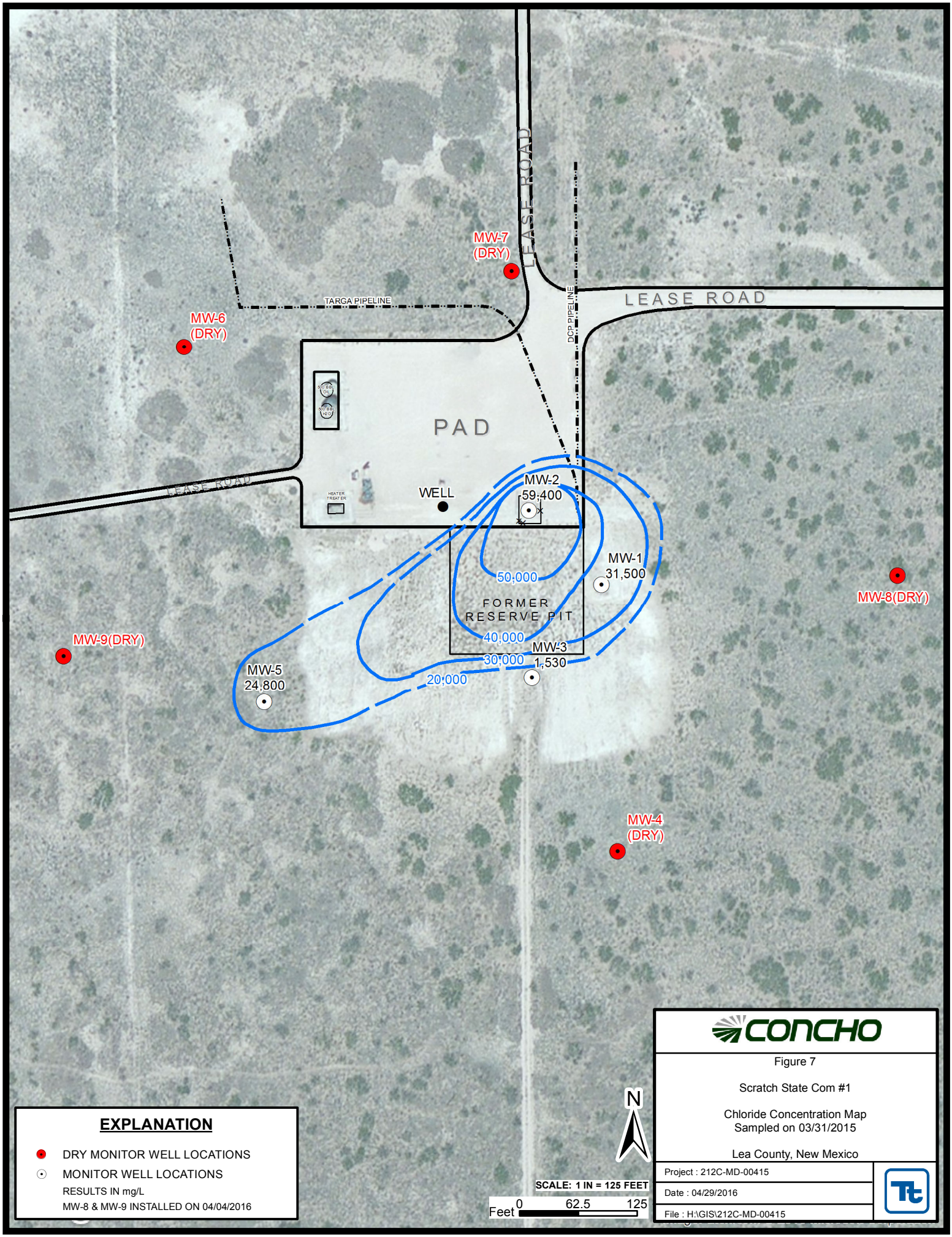


Mapped By: Isabel Marmolejo



EXPLANATION

- DRY MONITOR WELL LOCATIONS
- MONITOR WELL LOCATIONS

RESULTS IN mg/L

MW-8 & MW-9 INSTALLED ON 04/04/2016

CONCHO

Figure 7

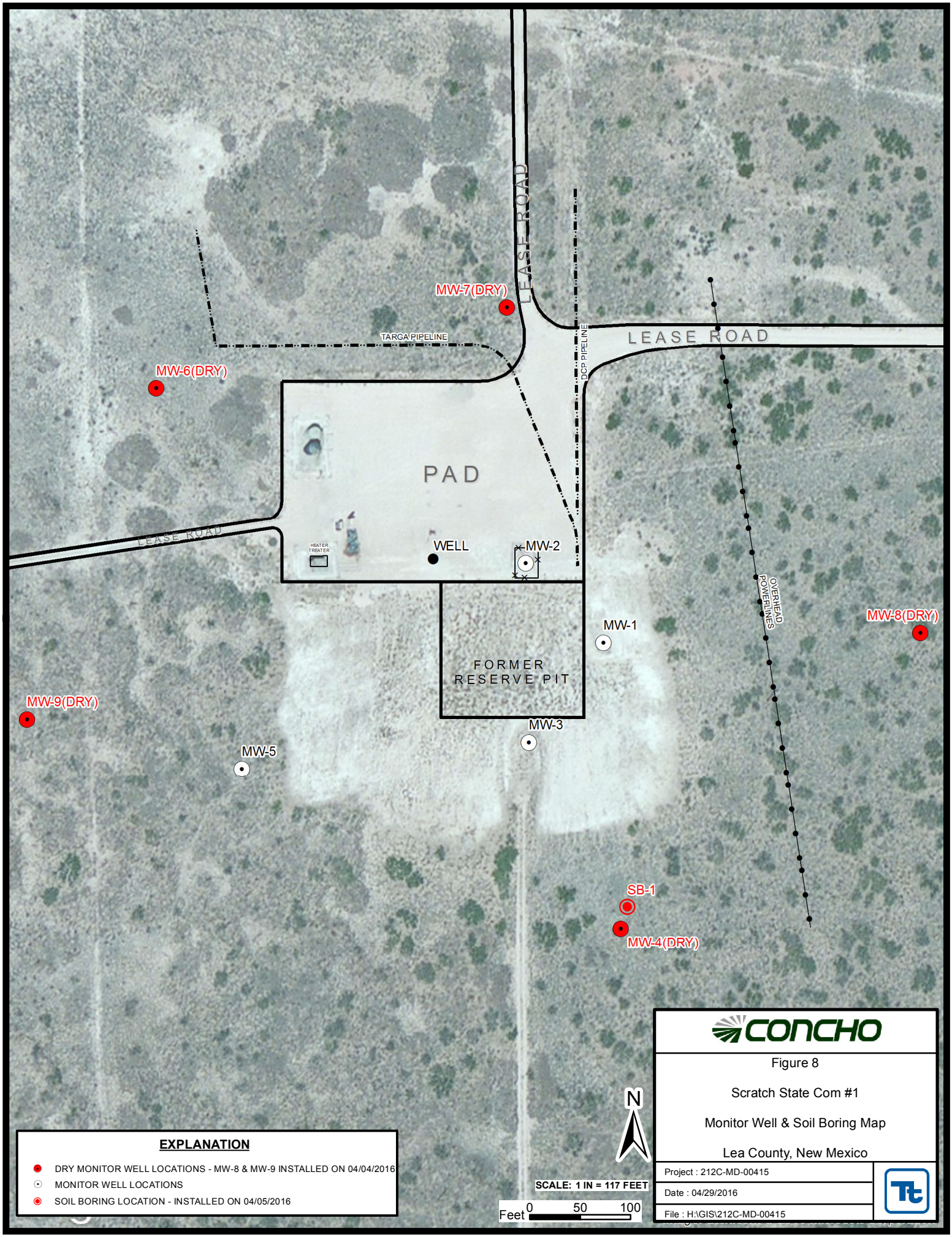
Scratch State Com #1

Chloride Concentration Map
Sampled on 03/31/2015

Lea County, New Mexico

Project : 212C-MD-00415	
Date : 04/29/2016	
File : H:\GIS\212C-MD-00415	

Mapped By: Isabel Marmolejo



Mapped By: Isabel Marmolejo

TABLES

Table 1
COG Operating, LLC
Water Gauging Data
Scratch State Commingle #1
Lea County, New Mexico

Well/ Borehole ID	Date Measurement	Top of Casing Elevation, feet AMSL	Total Well Depth (in ft)	Product (ft) (TOC)	Water level (ft) (TOC)	PSH Thickness (ft)	Groundwater Elevation (ft)
MW-1	03/15/11	3894.31		--	41.27	--	3853.04
	07/06/11			--	42.52	--	3851.79
	09/12/11			--	42.35	--	3851.96
	12/07/11			--	42.19	--	3852.12
	03/19/12			--	42.37	--	3851.94
	06/18/12			--	42.56	--	3851.75
	09/24/12			--	42.73	--	3851.58
	12/05/12			--	42.90	--	3851.41
	06/10/13			--	43.10	--	3851.21
	06/24/13			--	43.13	--	3851.18
	07/08/13			--	43.16	--	3851.15
	07/23/13			--	43.15	--	3851.16
	08/06/13			--	44.51	--	3849.80
	09/30/13		52	--	43.28	--	3851.03
	12/24/13		52	--	43.46	--	3850.85
	05/19/14			--	43.57	--	3850.74
	06/25/14		52	--	43.68	--	3850.63
	10/01/14		51.35	--	43.73	--	3850.58
	12/09/14		51.37	--	40.62	--	3853.69
	01/05/15		51.36	--	40.54	--	3853.77
	03/31/15		51.36	--	40.69	--	3853.62
	11/02/15		51.36	--	41.28	--	3853.03
	02/03/16		51.32	--	40.30	--	3854.01
	04/04/16		51.36		40.53		3853.78
	04/19/16		51.36		40.57		3853.74
MW-2	03/15/11	3896.45		--	45.35	--	3851.10
	07/06/11			--	46.23	--	3850.22
	09/12/11			--	46.68	--	3849.77
	12/07/11			--	47.12	--	3849.33
	03/19/12			--	48.81	--	3847.64
	06/18/12			--	50.50	--	3845.95
	09/24/12			--	52.19	--	3844.26
	12/05/12			--	53.89	--	3842.56
	06/10/13			--	53.61	--	3842.84
	06/24/13			--	53.72	--	3842.73
	07/08/13			--	54.10	--	3842.35
	07/23/13			--	53.91	--	3842.54
	08/06/13			--	53.93	--	3842.52
	09/30/13		59	--	53.83	--	3842.62
	12/24/13			--	53.97	--	3842.48
	05/19/14			--	47.38	--	3849.07
	06/25/14		59	--	47.52	--	3848.93
	10/01/04		58.05	--	47.70	--	3848.75
	12/09/14		58.07	--	46.92	--	3849.53
	01/05/15		58.04	--	48.58	--	3847.87
	03/31/15		58.04	--	45.42	--	3851.03
	11/02/15		58.04	--	45.31	--	3851.14
	02/03/16		58.04	--	44.84	--	3851.61
	04/04/16		58.04		44.68		3851.77
	04/19/16		58.04		44.66		3851.79

Table 1
COG Operating, LLC
Water Gauging Data
Scratch State Commingle #1
Lea County, New Mexico

Well/ Borehole ID	Date Measurement	Top of Casing Elevation, feet AMSL	Total Well Depth (in ft)	Product (ft) (TOC)	Water level (ft) (TOC)	PSH Thickness (ft)	Groundwater Elevation (ft)
MW-3	03/15/11	3894.77		--	41.48	--	3853.29
	07/06/11			--	42.23	--	3852.54
	09/12/11			--	43.82	--	3850.95
	12/07/11			--	45.40	--	3849.37
	03/19/12			--	45.07	--	3849.70
	06/18/12			--	44.75	--	3850.02
	09/24/12			--	44.43	--	3850.34
	12/05/12			--	44.10	--	3850.67
	06/10/13			--	44.55	--	3850.22
	06/24/13			--	44.48	--	3850.29
	07/08/13			--	44.58	--	3850.19
	07/23/13			--	44.52	--	3850.25
	08/06/13			--	44.51	--	3850.26
	09/30/13		57	--	43.51	--	3851.26
	12/24/13		57	--	44.12	--	3850.65
	05/19/14			--	44.61	--	3850.16
	06/25/14		57	--	44.83	--	3849.94
	10/01/14		56.71	--	44.75	--	3850.02
	12/09/14		56.56	--	36.19	--	3858.58
	01/05/15		56.57	--	37.08	--	3857.69
	03/31/15		56.56	--	39.49	--	3855.28
	11/02/15		56.56	--	39.03	--	3855.74
	02/03/16		56.39	--	38.19	--	3856.58
	04/04/16		56.51	--	39.66	--	3855.11
	04/19/16		56.51	--	39.88	--	3854.89
MW-4	10/30/14	3891.41	61.95	--	Dry	--	Dry
	11/11/14		61.95	--	Dry	--	Dry
	12/09/14		61.95	--	Dry	--	Dry
	01/05/15		61.95	--	Dry	--	Dry
	03/31/15		61.95	--	Dry	--	Dry
	11/02/15		61.96	--	Dry	--	Dry
	02/03/16		61.99	--	Dry	--	Dry
	04/04/16		61.96	--	Dry	--	Dry
	04/19/16		61.96	--	Dry	--	Dry
MW-5	10/30/14	3890.52	61.05	--	Dry	--	Dry
	11/11/14		61.05	--	48.05	--	3842.47
	12/09/14		61.05	--	47.69	--	3842.83
	01/05/15		61.06	--	48.25	--	3842.27
	03/31/15		61.06	--	46.88	--	3843.64
	11/02/15		61.06	--	46.60	--	3843.92
	02/03/16		61.07	--	46.17	--	3844.35
	04/04/16		61.06		45.91		3844.61
	04/19/16		61.06		45.83		3844.69
MW-6	10/30/14	3893.56	61.85	--	Dry	--	Dry
	11/11/14		61.85	--	Dry	--	Dry
	12/09/14		61.85	--	Dry	--	Dry
	01/05/15		61.85	--	Dry	--	Dry
	03/31/15		61.85	--	Dry	--	Dry

Table 1
COG Operating, LLC
Water Gauging Data
Scratch State Commingle #1
Lea County, New Mexico

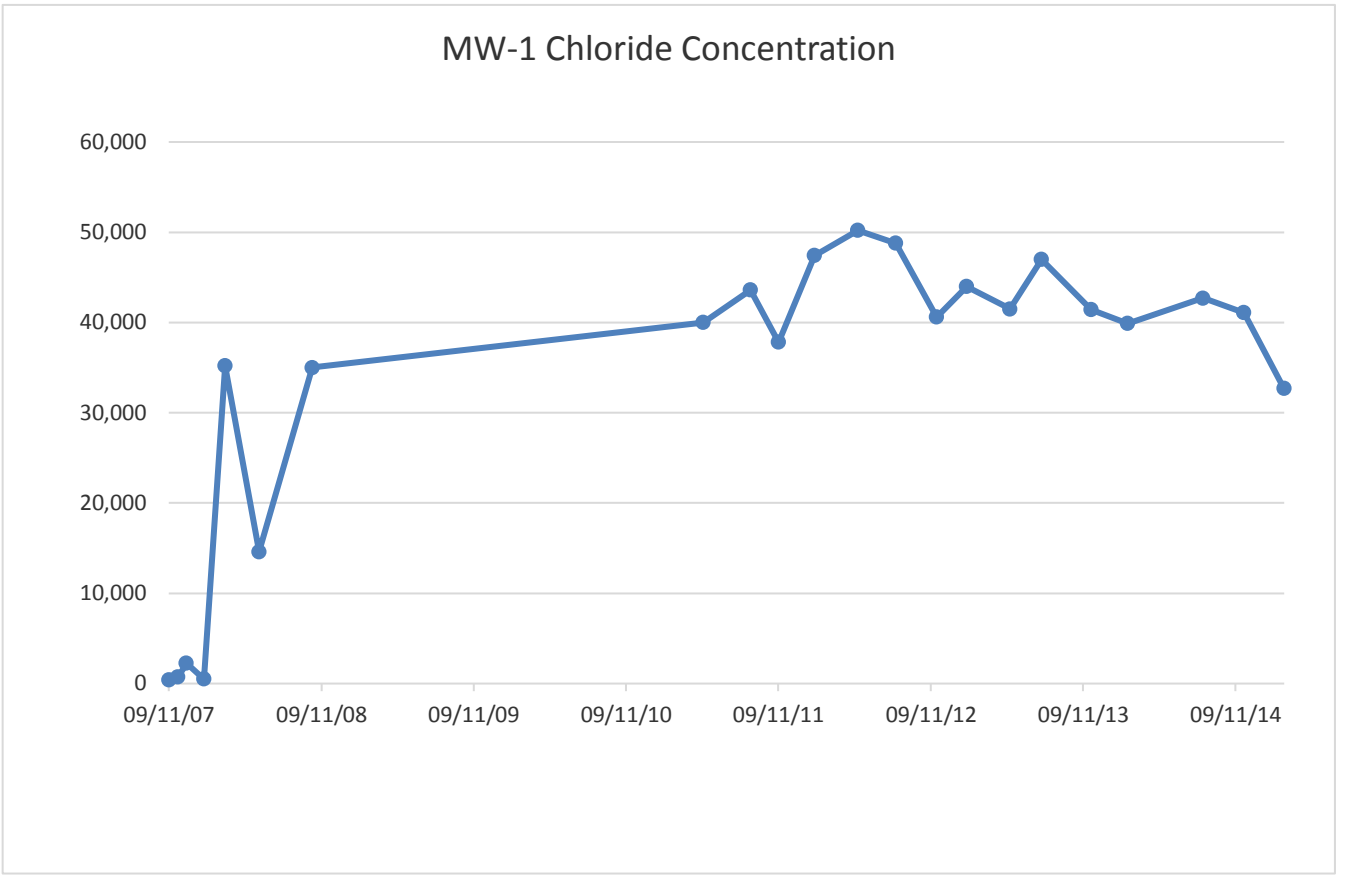
Well/ Borehole ID	Date Measurement	Top of Casing Elevation, feet AMSL	Total Well Depth (in ft)	Product (ft) (TOC)	Water level (ft) (TOC)	PSH Thickness (ft)	Groundwater Elevation (ft)
MW-6	11/02/15		61.86	--	Dry	--	Dry
	02/03/16		61.85	--	Dry	--	Dry
	04/04/16		61.86		Dry		Dry
	04/19/16		61.86		Dry		Dry
MW-7	10/30/14	3898.52	58.53	--	Dry	--	Dry
	11/11/14		58.53	--	Dry	--	Dry
	12/09/14		58.50	--	Dry	--	Dry
	01/05/15		58.50	--	Dry	--	Dry
	03/31/15		58.50	--	Dry	--	Dry
	11/02/15		58.54	--	Dry	--	Dry
	02/03/16		58.49	--	Dry	--	Dry
	04/04/16		58.50	--	Dry	--	Dry
	04/19/16		58.50	--	Dry	--	Dry
MW-8	04/05/16	3896.20	63.21	--	Dry	--	Dry
	04/19/16		63.21	--	Dry	--	Dry
	04/25/16		63.21	--	Dry	--	Dry
MW-9	04/05/16	3890.78	61.96	--	Dry	--	Dry
	04/19/16		61.96	--	Dry	--	Dry
	04/25/16		61.96	--	Dry	--	Dry

(-) No data (TOC) Top of casing

Table 2
COG Operating, LLC
Water Analytical Results
Scratch State Commingle #1
Lea County, New Mexico

Sample ID	Sample Date	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylene (mg/L)	Total BTEX (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	TDS (mg/L)
MW-1	09/11/07	-	-	-	-	-	396	-	-
	10/02/07	-	-	-	-	-	708	-	-
	10/23/07	-	-	-	-	-	2,260	-	-
	12/04/07	-	-	-	-	-	512	-	-
	01/24/08	-	-	-	-	-	35,200	-	-
	04/14/08	-	-	-	-	-	14,600	-	-
	08/20/08	-	-	-	-	-	35,000	-	-
	03/15/11	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	40,000	-	-
	07/06/11	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	43,600	-	-
	09/12/11	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	37,800		
	12/07/11	-	-	-	-	-	47,400	-	-
	03/19/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	50,200	-	-
	06/18/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	48,800	-	-
	09/24/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	40,600	-	-
	12/05/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	44,000	-	-
	03/19/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	41,500	-	-
	06/03/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	47,000	-	-
	09/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	41,400	-	-
	12/26/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300	39,900	-	-
	06/25/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300	42,700	-	-
	10/01/14	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	41,100	-	-
	01/05/15	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	32,700	-	-
	03/31/15	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	31,500	-	-
MW-2	10/01/07	-	-	-	-	-	45,590	-	-
	10/23/07	-	-	-	-	-	42,800	-	-
	12/04/07	-	-	-	-	-	42,400	-	-
	01/24/08	-	-	-	-	-	44,400	-	-
	04/14/08	-	-	-	-	-	48,800	-	-
	08/20/08	-	-	-	-	-	52,500	-	-
	03/15/11	<0.00100	0.00830	<0.00100	<0.00100	0.00830	60,200	-	-
	07/06/11	<0.00100	0.00800	<0.00100	<0.00100	0.00800	61,900	-	-
	09/12/11	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	45,600	-	-
	12/07/11	-	-	-	-	-	38,400	-	-
	03/19/12	<0.00100	0.0109	<0.00100	<0.00100	0.0109	61,900	-	-
	06/18/12	<0.00100	<0.00100	<0.00100	0.0232	0.0232	84,600	-	-
	09/24/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	53,400	-	-
	12/05/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	67,000	-	-
	03/19/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	62,900	-	-
	06/03/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	83,200	-	-
	09/30/13	0.00110	<0.00100	<0.00100	0.00170	0.00280	65,000	-	-
	12/26/13	<0.00100	0.00530	<0.00100	<0.00300	0.00530	58,800	-	-
	06/25/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300	60,900	-	-
	10/01/14	<0.00100	<0.00100	0.00180	0.00100	<0.00100	52,700	-	-
	01/05/15	0.00220	<0.00100	<0.00100	<0.00100	<0.00100	55,900	-	-
	03/31/15	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	59,400	-	-
MW-3	10/02/07	-	-	-	-	-	472	-	-
	10/23/07	-	-	-	-	-	400	-	-
	03/15/11	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	3,400	-	-
	07/06/11	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	4,920	-	-
	09/12/11	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	4,680	-	-
	12/07/11	-	-	-	-	-	5,690	-	-
	03/19/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	5,680	-	-
	06/18/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	5,640	-	-
	09/24/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	5,670	-	-
	12/05/12	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	5,390	-	-
	03/19/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	4,370	-	-
	06/03/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	4,810	-	-
	09/30/13	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	4,710	-	-
	12/26/13	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300	4,440	-	-
	06/25/14	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300	4,240	-	-
	10/01/14	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	773	-	-
	01/05/15	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	2,170	-	-
	03/31/15	<0.00100	<0.00100	<0.00100	<0.00300	<0.00300	1,530	-	-
MW-5	01/05/15	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	22,800	-	-
Dup	01/05/15	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	22,800	-	-
MW-5	03/31/15	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	24,800	-	-
Dup	03/31/15	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	24,700	-	-

(-) Not Analyzed or Sampled


MW-1 Chloride Concentration
60,000
50,000
40,000
30,000
20,000
10,000
0
09/11/07
09/11/08
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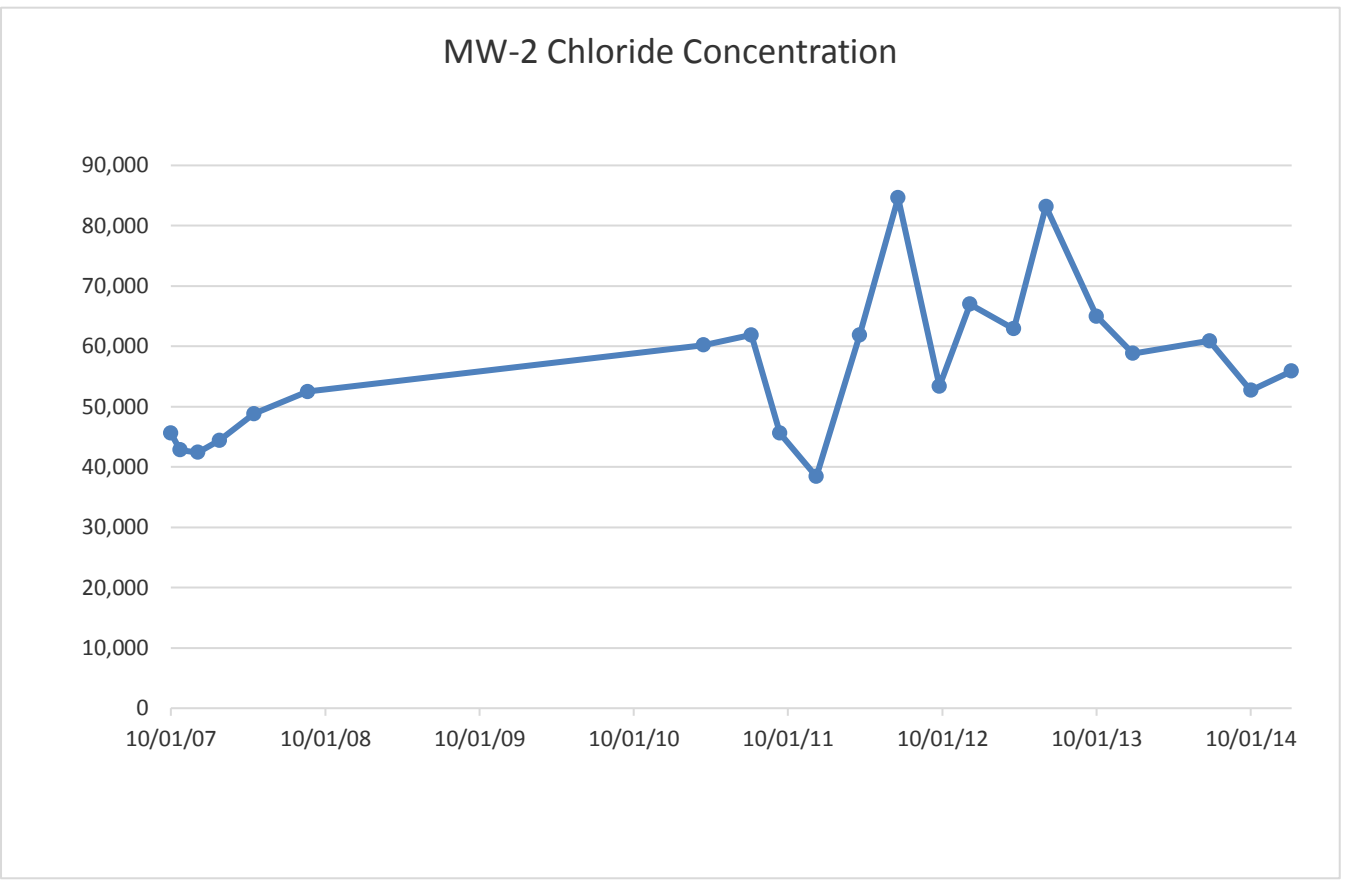
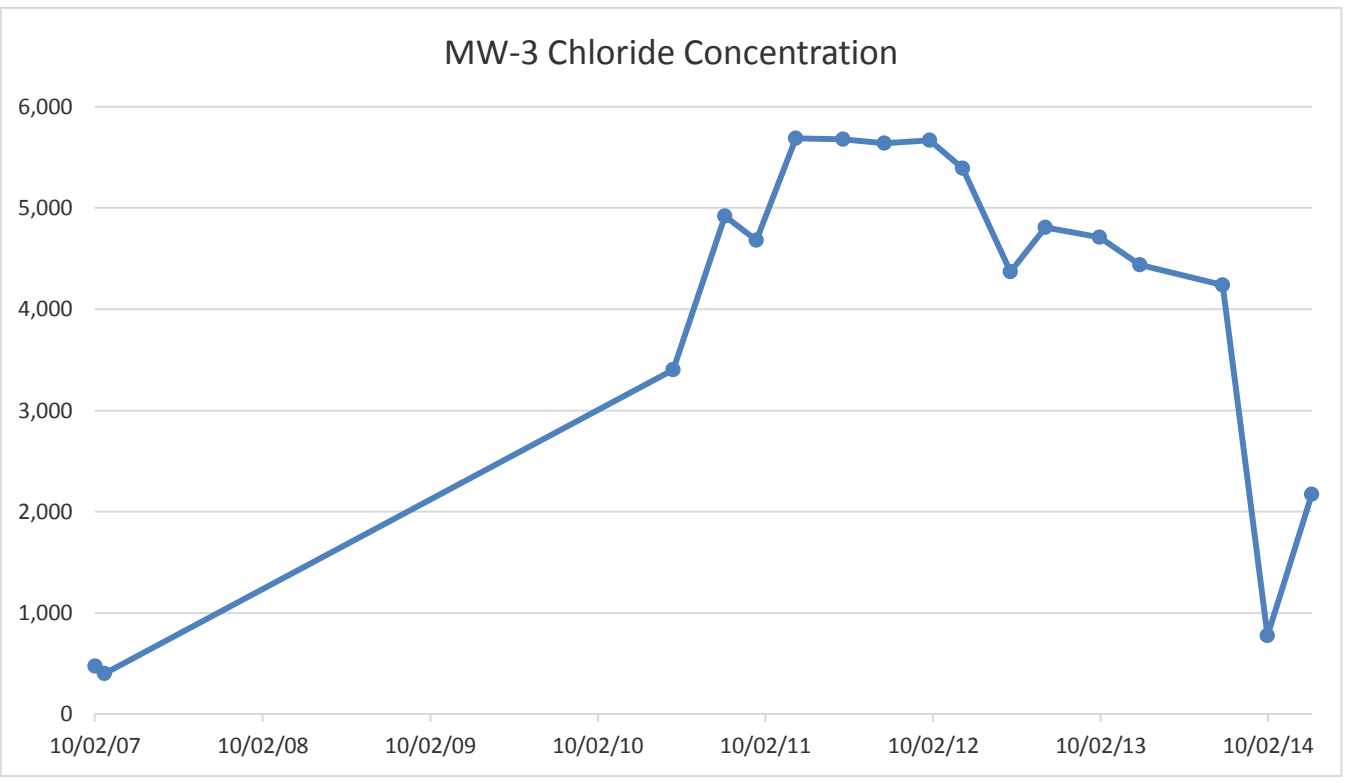
09/11/10
09/11/11
09/11/12
09/11/13
09/11/14


MW-2 Chloride Concentration
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
10/01/07
10/01/08
10/01/09
10/01/10
10/01/11
10/01/12
10/01/13
10/01/14


MW-3 Chloride Concentration
6,000
5,000
4,000
3,000
2,000
1,000
0
10/02/07
10/02/08
10/02/09
10/02/10
10/02/11
10/02/12
10/02/13
10/02/14

APPENDIX A

AP - 094

STAGE 1 WORKPLAN

10/30/2008

AP094
10/30/2008

BBC INTERNATIONAL
INCORPORATED

SCRATCH STATE COM No. 1

SECTION 24, TOWNSHIP 18 SOUTH, RANGE 33 EAST
LEA COUNTY, NEW MEXICO

STAGE 1 ABATEMENT PLAN (AP-094)

OCTOBER 2008

MARBOB ENERGY CORPORATION

ARTESIA, NM

PREPARED BY:

BBC INTERNATIONAL, INC.
WORLD-WIDE ENVIRONMENTAL SPECIALISTS
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TABLE OF CONTENTS

1.0 INTRODUCTION

The subject site is located southwest of Buckeye, New Mexico in Lea County. The legal description of the site is Unit Letter E, Section 24, Township 18 South, and Range 33 East. The site is a location containing a well that was completed in July of 2005, a tank battery, and an associated pit. Scratch State Com No. 1 (herein referred to as the Site or Site) is currently operated by Marbob Energy Corporation (Marbob). The contamination at the Site is due to a drilling fluid leak that occurred through a rupture in the plastic liner of the associated pit.

In August of 2007, Marbob retained BBC International, Inc. (BBC) to perform field screens of pit bottom soil samples at the Site for chloride content and to submit closing soil samples for laboratory analysis. Groundwater was encountered on August 20, 2007 during the sampling process, and Marbob notified Wayne Price of the Oil Conservation Division (OCD) Energy, Minerals, and Natural Resources Department (EMNRD) by phone and email that afternoon.

Marbob retained BBC to manage further investigation activities at the Site.

2.0 SITE DESCRIPTION

The Site is located in southern Lea County in the southeastern corner of New Mexico. The area is in the Pecos River Valley section of the Great Plains physiographic province. The site is located in the Querecho Plains southwest of the Mescalero Ridge and the Llano Estacado. The region is mostly covered by shifting dune sand sometimes overlying caliche with an uneven surface broken by shallow playa lakes. The climate of the area is classified as semi-arid to arid and is characterized by low annual rainfall, low humidity, and a high average annual temperature. Local precipitation averages approximately 10 to 12 inches per year (Nicholson and Clebsch). According to the New Mexico Office of the State Engineer, depth to groundwater at the Site is greater than 50 feet below ground surface (bgs).

Currently, the site is situated on and surrounded by New Mexico state land.

3.0 EXCAVATION ACTIVITIES AND SITE INVESTIGATION

3.1 Soils – Excavation Activities

Site soil investigation and excavation began on August 9, 2007. BBC screened soil samples from the pit bottom for chloride content. Screen results showed that chloride levels in the south portion of the pit came within New Mexico Oil Conservation Division (NMOCD) guidelines at 12 feet below ground surface (bgs). Chloride in the central part of the excavation dropped to within NMOCD guidelines at 22 feet bgs. However, soil samples in the north portion of the pit continued to exceed NMOCD guidelines. A composite sample, made from the south and central sample points, was submitted for laboratory analysis on August 14, 2007. The sample contained 128 parts per million (ppm or mg/Kg) chlorides. Soil laboratory analytical results can be viewed in **Appendix I**, and a summary of laboratory results can be viewed in **Table 1**.

Excavation and sample screening continued in the north section of the pit. On August 20, 2007, ground water was encountered at approximately 40 feet bgs in the trench of the northeast quarter of the excavation. A trench of the same depth was excavated in the northwest quarter however ground water was not encountered at that location.

3.2 Soils – Ground Water Monitoring Well Installation

On September 10, 2007, BBC contracted Eco/Enviro Drilling to place a monitoring well (MW1) near the northeast corner of the excavation. A Site diagram including position of existing monitoring wells can be viewed in **Figure 1**. A hollow stem auger rig equipped with a continuous core sampling tool was used to drill soil borings, collect soil samples, and complete ground water monitoring wells. The monitoring wells were installed with 15 feet of 0.20 mm well screen with 10 feet of the well screen below the water table.

MW1 was located on the east side of the pit near the north corner. Four (4) soil samples were collected during drilling of MW1. Please see **Table 1** for a summary of laboratory analytical results, and drilling logs can be found in **Appendix III**. At 35 feet bgs chloride content was less than 16 ppm, the 40 foot sample contained 3,919 ppm, the 45 foot sample contained 3,479 ppm, and the 50 foot sample showed 208 ppm. Drilling ceased at 50 feet bgs.

Eco/Enviro Drilling returned on September 27-28, 2007 to install two additional monitoring wells (MW2 and MW3) in order to determine the ground water gradient.

MW2 was placed on the north side of the excavation and toward the east corner. Five soil samples were collected during drilling of MW2. At 35 feet bgs chloride content was 9,800 ppm, the 40 foot sample contained 5,040 ppm, the 45 foot sample contained 3,240 ppm, the 50 foot sample showed 5,040 ppm, and the 55 foot sample contained 528 ppm. Drilling of MW2 ceased at 55 feet bgs.

MW3 was placed on the south side of the excavation directly south of MW2. Five soil samples were collected during drilling of MW3. At 35 feet bgs chloride content was 48 ppm, the 40 foot sample contained 64 ppm, the 45 foot sample contained 192 ppm, the 50 foot sample showed 176 ppm, and the 55 foot sample contained 64 ppm. Drilling ceased at 55 feet bgs.

The bottom of the pit in the north section was lined with plastic, and BBC received permission from Chris Williams of the NMOCD Hobbs office on September 20, 2007 for Marbob to backfill the excavation.

3.3 Ground Water

BBC developed MW1 on the afternoon of September 10, 2007. On September 11, 2007, BBC sampled the ground water for chloride at MW1. The sample contained 396 ppm (mg/L). Please see **Table 2** for a summary of ground water laboratory analytical results. To reference the ground water laboratory analytical results summary, please view **Appendix II**.

BBC developed MW2 on the afternoon of September 28, 2007. MW3 had not yet recharged and development of MW3 was postponed until October 1, 2007.

On October 1, 2007, BBC sampled the ground water for chloride at MW2. The sample contained 45,590 ppm. BBC also developed MW3 the same day. Initial gauging data indicated that only 4.97 feet of water existed in MW3 (0.81 gallons).

BBC returned to collect ground water samples for chloride on October 2, 2007 from both MW1 and MW3 for the purpose of having near simultaneous ground water data for all three monitoring wells. The ground water sample from MW1 contained 708 ppm. The sample from MW3 contained 472 ppm. MW3 contained only 2.94 feet of water in the water column from which 0.5 gallons were purged.

On October 3, 2007, BBC purged MW2 and MW3. MW2 was from this date on, purged as often as possible due to the results of the laboratory data from the samples collected on October 1, 2007. MW3 was purged to encourage recharge of the well. 1.32 feet of water (0.22 gallons) existed in the water column and 0.25 gallons were purged.

All three monitoring wells were set with cement and vaults on October 19, 2007.

On October 22, 2007, the site was surveyed by John West Surveying Company (see **Figure 1**). In MW3, 1.59 feet of water (0.26 gallons) existed in the water column and 0.25 gallons were purged.

BBC collected ground water samples from all three monitoring wells on October 23, 2007. The sample from MW1 contained 2,260 ppm chloride, the sample from MW2 contained 42,800 ppm, and the sample from MW3 contained 400 ppm. The water level in MW3 remained at less than 0.5 feet in the water column.

On December 4, 2007, BBC purged all monitoring wells however from this date forward BBC only sampled ground water from MW1 and MW2. MW3 was not sampled on this date or again thereafter due to failure of the well to recharge after purging. The sample from MW1 contained 512 ppm chloride and MW2 contained 42,400 ppm.

On January 24, 2008, BBC collected ground water samples from MW1 and MW2. The sample from MW1 contained 35,200 ppm chloride and the sample from MW2 showed 44,400 ppm. Due to laboratory analytical results of these samples, both MW1 and MW2 were purged as often as possible from this date forward.

On April 14, 2008, BBC collected ground water samples from MW1 and MW2. The sample from MW1 contained 14,600 ppm chloride and the sample from MW2 contained 48,800 ppm.

On August 20, 2008, BBC collected ground water samples from MW1 and MW2. The sample from MW1 contained 35,000 ppm chloride and the sample from MW2 contained 52,500 ppm.

4.0 PROPOSED SITE INVESTIGATION

Marbob is submitting this Stage 1 Abatement Plan in accordance with the NMOCD's Rule 19 (19.15.1.19 NMAC) to investigate potential ground water contamination at Marbob Scratch State Com No.1 site

located in the northwest quarter of Section 24, Township 18 South, Range 33 East, Lea County, New Mexico.

Marbob proposes the following to investigate and delineate the site by drilling soil borings for the completion of ground water monitoring wells and the associated analytical data collected from soil and ground water samples.

4.1 Ground Water

A minimum of nine (9) monitoring wells will be drilled at the site. The proposed locations and depths of the ground water monitoring wells are depicted in **Figure 2**. Six (6) of the monitoring wells will be completed at 60 feet bgs in order to further delineate the vertical and horizontal extent of potential contamination present in the vadose zone and ground water. The remaining (3) monitoring wells will be completed around the outer perimeter of the Site at 100 feet bgs in order to determine whether or not ground water encountered at the Site is perched water.

Based on the current understanding and data from the site, the proposed locations of the 60 foot monitoring wells are needed to confirm the aerial extent of the vadose zone and possible ground water contamination. As depicted in **Figure 2**, these ground water monitoring wells will be drilled in positions surrounding every side of the former pit focusing on the assumed origin of contamination in the northeast corner of the pit and gradient direction, with:

- One monitor well completed up gradient from the site in an uncontaminated location to confirm the back ground concentrations of constituents of concern (COCs) entering the site, and aid in the development of site specific parameters detailed below;
- One monitor well on the northeast side and one monitor well on the southeast side of the former pit to delineate the eastern and southern boundaries of the plume;
- One monitor well on the south side of the former pit near MW3 to replace the lack of data from MW3 and assist in delineating the southern boundary of the plume;
- One monitor well near the southwest corner of the former pit in the most direct down gradient position of the plume; and
- One monitor well near the northwest corner of the former pit to delineate the western and northern boundaries of the plume

The proposed locations of the 100 foot monitoring wells are required at the greatest distance away from the Site in order to prevent opening a conduit for transfer of COCs.

- One monitor well completed up gradient from the site to locate a confining layer of soil materials and/or ground water;
- One monitor well completed down gradient from the site to locate a confining layer of soil materials and/or ground water; and
- One monitor well completed at the southeast side of the former pit to locate a confining layer of soil materials and/or ground water

Data collected from the associated ground water monitoring wells at these locations will be used confirm the site geology and develop hydrogeology and fate and transport of contaminants at the site. This will include the determination of the hydraulic conductivity, transmissivity, storativity, and rate and direction of contaminant migration for the aquifer on a localized scale. If site conditions warrant the collection of additional data concerning the aquifer characteristics, additional soil borings and ground water monitoring wells may be completed.

An air rotary drilling rig equipped with a core sampling tool will be used to drill soil borings, collect soil samples, and complete ground water monitoring wells. The soil borings drilled at the site will be sampled initially near the surface (0-3 feet bgs), and sampled every five feet there after until the boring reaches the saturated zone.

4.2 QA/QC Sampling Procedures-Soil (Soil Borings)

The soil samples will be obtained by personnel utilizing appropriate sampling tools and wearing clean disposable gloves. The soil samples will be collected using sampling tools that will be decontaminated using an Alconox detergent solution and rinsed with distilled water between sample collections. The drilling equipment will be decontaminated prior to being brought on the site as well as decontaminated in between soil borings.

Each soil sampling interval will be split into two equal portions and placed in separate containers. The first portion of the sample will be placed into a container to field screen the soil using chloride titration analysis and head space sampling for volatile organic carbons. The second portion of the sample will be placed in a new, clean, and sterile glass container equipped with a Teflon-lined lid furnished by the analytical laboratory. Each container will be filled to capacity with soil.

All containers will be labeled, individually bagged, and placed on ice in an insulated cooler, and chilled to a temperature of approximately 40^0F (4^0C). The cooler will be custody sealed for delivery to the laboratory for laboratory testing utilizing proper chain of custody documentation throughout the sampling process. The samples will be delivered for analysis to Trace Analysis, Inc. in Lubbock, Texas.

The laboratory will be responsible for proper QA/QC procedures utilized during the analytical process. These procedures are either transmitted with the laboratory reports or are on file at the laboratory.

4.3 Laboratory Analysis-Soil (Soil Borings)

The soil samples will be analyzed for all constituents contained in the following analytical methods for initial site characterization according to NMOCD requirements:

- Metals – EPA Method SW-846 6020
- Total Mercury – EPA Method SW-846 7471A
- Total Petroleum Hydrocarbons (TPH) – EPA Method SW-846 8015C Modified (DRO/GRO)
- Volatile Organic Compounds (VOCs (including BTEX)) – EPA Method SW-846 8260B
- Semi-volatile Organic Compounds (SVOCs) – EPA Method SW-846 8270C
- Chloride – EPA Method 300.0
- Cyanide – EPA Method 335.3
- Nitrogen, Nitrite – EPA Method 354.1
- pH – EPA Method 150.1

4.4 Ground Water Monitor Well Construction and Development

The proposed ground water monitor wells will be completed in the locations as depicted in **Figure 2**. The monitor wells should be drilled to ten (10) feet below the top of the local ground water aquifer. The monitor wells will be constructed of a minimum of fifteen (15) feet of two-inch (2") PVC well screen with ten (10) feet of well screen below the water table. Blank schedule 40 PVC riser will be extended to a minimum of two (2) feet above the ground surface. The monitor wells shall be drilled and completed with two-inch schedule 40 PVC, and gravel packed with a minimum of two inches of 8/16 Brady gravel or equivalent between the annulus of the drilled hole and the outside of the casing. The well screen should be 0.040-inch, mill-slot PVC, extending through the entire saturated portion of the drilled hole. The gravel pack should extend at least 3 feet above the top of the screen with a minimum of three feet of bentonite on top of the gravel. A steel

locking sleeve should be centered on the PVC casing and set approximately 2 feet below land surface. The annulus of the hole between the drilled hole and the casing should then be grouted with neat cement to ground level. The remaining annulus between the steel sleeve and the casing should be grouted with neat cement to ground level. The surface of the well should contain a 4' X 4' X 1.5' concrete slab, with approximately 12 inches below grade and encasing the steel locking sleeve. The bentonite seal on top of the gravel pack, the annulus cement grout, steel locking sleeve, and concrete slab shall not be placed until the well has been fully developed and the gravel pack has been brought up to the proper level above the screen following completion of the well development to account for any gravel settlement.

The monitor wells shall be developed by bailing or pumping after placement of the well screen, casing and gravel pack. After the well has started clearing, the well shall be developed by jetting or by pump until the water being removed is clear and free of sand.

Following development, the wells will be gauged for depth to ground water. A minimum of twenty-four (24) hours after development, the wells will be gauged, purged, and sampled for the required constituents.

4.5 QA/QC Sampling Procedures-Ground Water

The ground water monitor wells will be developed and purged prior to sampling. A minimum of twenty-four (24) hours after development, monitoring wells with a sufficient recharge will be purged prior to sampling by removing a minimum of three well bore and gravel pack volumes. Monitoring wells that do not recharge sufficiently to allow for the removal of three well bore and gravel pack volumes, will be purged until no additional ground water can be obtained.

Ground water samples will be collected with a clean, new disposable Teflon sampler and polyethylene line by personnel wearing clean, disposable gloves or by low-flow sampling via a submersible bladder-type pump following EPA Method 540/S-95-504. Groundwater sample containers will be filled in the order of decreasing volatilization sensitivity (i.e., BTEX containers filled first, PAH containers second, etc.).

Groundwater samples collected for BTEX analysis will be placed in 40 ml glass VOA vials, with the appropriate preservative, equipped with Teflon lined caps that will be provided by the analytical laboratory. The

vials will be filled to a positive meniscus, sealed, and visually checked to ensure the absence of air bubbles.

Ground water samples collected for PAH analysis will be filled to capacity in sterile, one (1) liter glass containers equipped with Teflon lined caps. Ground water samples collected for metals analysis will be filled to capacity in sterile, one (1) liter plastic containers, including the appropriate preservative, equipped with Teflon lined caps, as provided by the analytical laboratory.

All containers will be labeled, individually bagged, and placed on ice in an insulated cooler, and chilled to a temperature of approximately 40^0F (4^0C). The cooler will be custody sealed for delivery to the laboratory for testing utilizing proper chain of custody documentation throughout the sampling process. The samples will be delivered for analysis to Trace Analysis, Inc. in Lubbock, Texas.

The laboratory will be responsible for proper QA/QC procedures utilized during the analytical process. These procedures are either transmitted with the laboratory reports or are on file at the laboratory.

4.6 Laboratory Analysis-Ground Water

The ground water samples will be analyzed for all constituents contained in the following analytical methods for initial site characterization according to NMOCD requirements:

- Metals – EPA Method SW-846 6020
- Total Mercury – EPA Method SW-846 7470A
- Total Petroleum Hydrocarbons (TPH) – EPA Method SW-846 8015C Modified (DRO/GRO)
- Volatile Organic Compounds (VOCs (including BTEX)) – EPA Method SW-846 8260B
- Semi-volatile Organic Compounds (SVOCs) – EPA Method SW-846 8270C
- Chloride – EPA Method 300.0
- Cyanide – EPA Method 335.3
- Nitrogen, Nitrite – EPA Method 354.1

pH – EPA Method 150.1

5.0 MONITORING PLAN

All site ground water monitoring wells will be gauged and sampled on a quarterly basis during the life of the abatement process. The constituents analyzed will be determined in consultation with the NMOCD after the initial characterization of the site conducted during

the first sampling event after the installation of the ground water monitoring wells.

6.0 AQUIFER DESCRIPTION

Several aquifers are located near the surrounding area of the Site, the Quaternary alluvium, the Ogallala formation, and the Triassic Dockum Group which is composed of the Chinle formation and the Santa Rosa Sandstone. The area surrounding the Site seems to have an intermittent saturated zone partly due to the fact that the Santa Rosa Sandstone formation lies beneath the Querecho Plains to a great extent and is permeable enough to accept the scant precipitation infiltrating through the surface alluvium (Nicholson and Clebsch). According to the New Mexico Office of the State Engineer (NMOSE), current depth to water in the site vicinity is approximately 195 feet and ground water flow direction in the aquifer is towards the southwest.

7.0 INVENTORY OF WATER WELLS WITHIN ONE MILE

An inventory of water wells located within one mile of the site can be found in **Appendix IV**. These well locations were obtained from the website of the New Mexico Office of the State Engineer.

8.0 SURFACE OWNERSHIP

Marbob will conduct a one-mile radius search from the site of all known and registered surface owners. A review of the public tax rolls of Lea County, NM will identify the name and addresses of the surface owners within one mile of the site and a list will be generated. A diagram depicting the one-mile radius search will be furnished.

9.0 SCHEDULE OF ACTIVITIES

All Stage 1 Abatement Plan activities will commence within 30 days of the final approval of the Stage 1 Abatement Plan following the public notice period and approval from the NMOCD. A schedule of site activities will be submitted to the NMOCD upon final approval of the Stage 1 Abatement Plan along with follow up quarterly progress reports then a final report upon completion of investigative Stage 1 Abatement activities.

10.0 DELIVERABLES

A Stage 1 Abatement Plan Site Investigation Report will be submitted within 60 days upon completion of investigative activities which will include, but not limited to, a description and history of the site, site

map, a description of site investigative activities, summary data tables, laboratory analytical data, ground water gradient map and any data necessary to select and design an effective abatement option under NMOCD Rule 19 Stage 2 Abatement requirements.

A paper and electronic copy of all work plans and/or reports will be submitted to both the Santa Fe, New Mexico and Hobbs, New Mexico offices of the NMOCD.

11.0 ABATEMENT PROCESS

On behalf of Marbob Energy Corporation, BBC has submitted this Stage 1 Abatement Plan in accordance with NMOCD Rule 19 NMAC 15.1.19.

Upon NMOCD approval of the Stage 1 Abatement Plan, all public notice and participation requirements under Rule 19 (19.15.1.19 NMAC), specifically Rule 19G, will be followed.

12.0 REFERENCES

Nicholson, Jr., Alexander and Clebsch, Jr. Alfred, 1961, *Geology and Ground-Water Conditions in Southern Lea County, New Mexico, Ground-Water Report 6*, New Mexico Bureau of Mines and Mineral Resources, Socorro, New Mexico, 120pp.

NMOSE – New Mexico Office of the State Engineer, iWaters website: **http://iwaters.ose.state.nm.us:7001/iWATERS/**

FIGURES

SITE DIAGRAM WITH EXISTING MONITOR WELLS

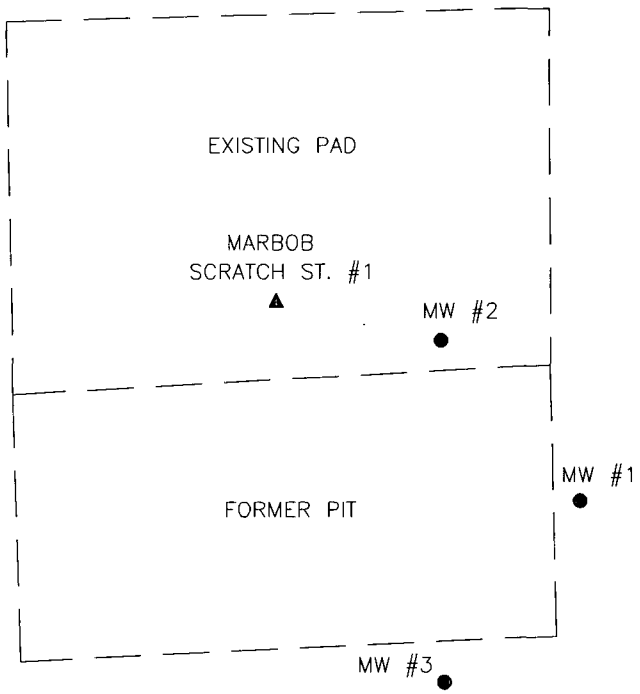
SITE DIAGRAM WITH GROUND WATER GRADIENT AND PROPOSED LOCATIONS OF MONITOR WELLS

SCRATCH STATE COM NO. 1

October 2008

Marbob Energy Corporation
Artesia, NM

Prepared by:
BBC International, Inc.



WELL	COORDINATES	ELEVATIONS
MW #1	631744.7 N 759929.6 E	NATURAL GROUND – 3891.36' TOP OF PVC – 3894.31' TOP OF CONCRETE – 3891.47'
MW #2	631831.0 N 759853.6 E	NATURAL GROUND – 3893.55' TOP OF PVC – 3896.50' TOP OF CONCRETE – 3893.76'
MW #3	631645.9 N 759855.5 E	NATURAL GROUND – 3891.82' TOP OF PVC – 3894.78' TOP OF CONCRETE – 3892.05'

NOTE: COORDINATES SHOWN ARE "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983.

100 0 100 200 FEET

Scale:1"=100'

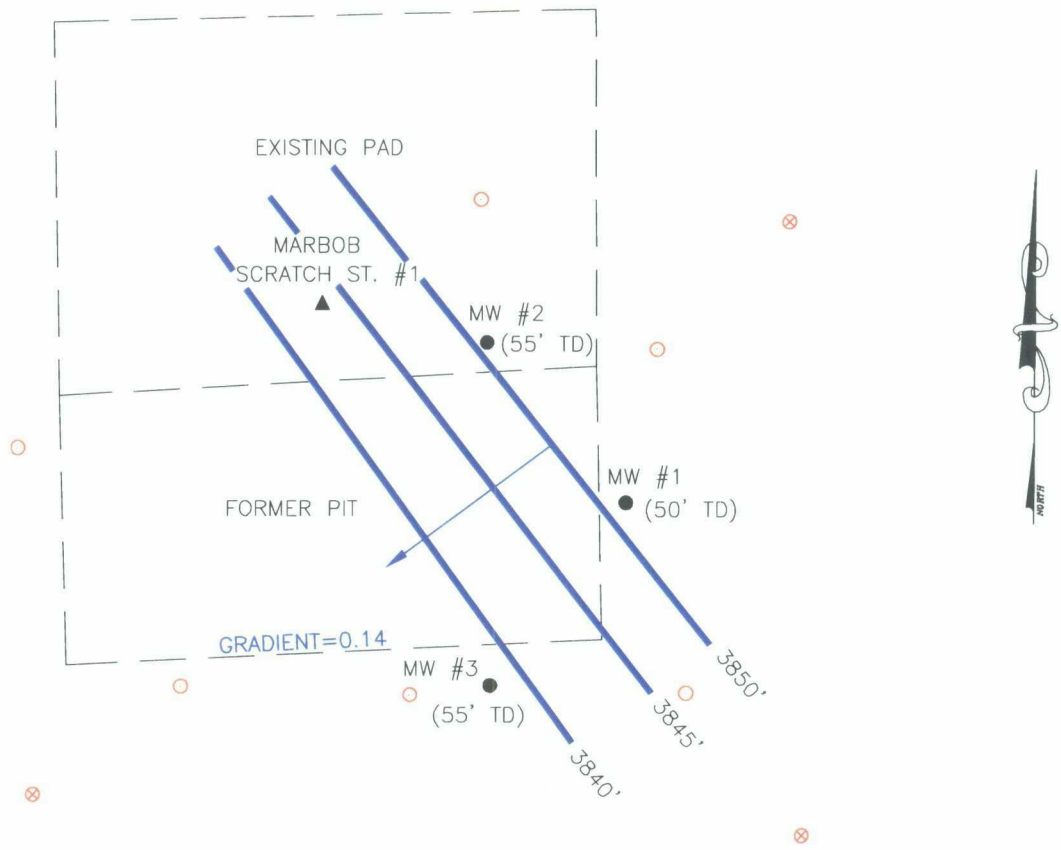
PROVIDING SURVEYING SERVICES
SINCE 1946
JOHN WEST SURVEYING COMPANY
412 N. DAL PASO
HOBBS, N.M. 88240
(505) 393-3117

BBC INTERNATIONAL, INC.

SCRATCH STATE COM #1

SECTION 24, TOWNSHIP 18 SOUTH, RANGE 33 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 10/22/07		Sheet 1 of 1 Sheets	
W.O. Number: 07.11.1397		Drawn By: L.A.	
Date: 10/26/08		07111397	REV:8/24/08



WELL	COORDINATES	ELEVATIONS
MW #1	631744.7 N 759929.6 E	NATURAL GROUND – 3891.36' TOP OF PVC – 3894.31' TOP OF CONCRETE – 3891.47'
MW #2	631831.0 N 759853.6 E	NATURAL GROUND – 3893.55' TOP OF PVC – 3896.50' TOP OF CONCRETE – 3893.76'
MW #3	631645.9 N 759855.5 E	NATURAL GROUND – 3891.82' TOP OF PVC – 3894.78' TOP OF CONCRETE – 3892.05'

LEGEND

- ● – DENOTES EXISTING MONITOR WELL
- ○ – DENOTES PROPOSED 60' DEPTH MONITOR WELLS
- ⊗ – DENOTES PROPOSED 100' DEPTH MONITOR WELLS

NOTE: COORDINATES SHOWN ARE "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983.

100 0 100 200 FEET

Scale:1"=100'

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SINCE 1946
JOHN WEST SURVEYING COMPANY
412 N. DAL PASO
HOBBS, N.M. 88240
(505) 393-3117

BBC INTERNATIONAL, INC.

SCRATCH STATE COM #1

SECTION 24, TOWNSHIP 18 SOUTH, RANGE 33 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO

Survey Date: 10/22/07		Sheet 1 of 1 Sheets
W.O. Number: 08.13.1776		Drawn By: L.A.
Date: 10/7/08	REL:07111397	08131776

TABLES

SOIL LABORATORY ANALYTICAL RESULTS SUMMARY

GROUND WATER LABORATORY ANALYTICAL RESULTS SUMMARY

SCRATCH STATE COM NO. 1

October 2008

Marbob Energy Corporation
Artesia, NM

Prepared by:
BBC International, Inc.

Table 1. Soil Laboratory Analytical Results Summary

		Sample	Pit Bottom
Analyte	Method	Date	
			mg/Kg
Chloride	4500-Cl⁻B	08/14/07	128

		Sample	MW1 @ 35'	MW1 @ 40'	MW1 @ 45'	MW1 @ 50'
Analyte	Method	Date				
			mg/Kg	mg/Kg	mg/Kg	mg/Kg
Chloride	4500-Cl⁻B	09/10/07	<16	3,919	3,479	208

		Sample	MW2 @ 35'	MW2 @ 40'	MW2 @ 45'	MW2 @ 50'	MW2 @ 55'
Analyte	Method	Date					
			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Chloride	4500-Cl⁻B	09/27/07	9,800	5,040	3,240	5,040	528

		Sample	MW3 @ 35'	MW3 @ 40'	MW3 @ 45'	MW3 @ 50'	MW3 @ 55'
Analyte	Method	Date					
			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Chloride	4500-Cl⁻B	09/28/07	48	64	192	176	64

Note: Analyses performed on 1:4 w:v aqueous extracts

Table 2. Ground Water Laboratory Analytical Results Summary

		Sample	MW1
Analyte	Method	Date	
			mg/L
Chloride	4500-Cl⁻B	09/11/07	396

		Sample	MW2
Analyte	Method	Date	
			mg/L
Chloride	4500-Cl⁻B	10/01/07	45,590

		Sample	MW1	MW3
Analyte	Method	Date		
			mg/L	mg/L
Chloride	4500-Cl⁻B	10/02/07	708	472

		Sample	MW1	MW2	MW3
Analyte	Method	Date			
			mg/L	mg/L	mg/L
Chloride	4500-Cl⁻B	10/23/07	2,260	42,800	400

		Sample	MW1	MW2
Analyte	Method	Date		
			mg/L	mg/L
Chloride	4500-Cl⁻B	12/04/07	512	42,400

		Sample	MW1	MW2
Analyte	Method	Date		
			mg/L	mg/L
Chloride	4500-Cl⁻B	01/24/08	35,200	44,400

		Sample	MW1	MW2
Analyte	Method	Date		
			mg/L	mg/L
Chloride	4500-Cl⁻B	04/14/08	14,600	48,800

		Sample	MW1	MW2
Analyte	Method	Date		
			mg/L	mg/L
Chloride	4500-Cl⁻B	08/22/08	35,000	52,500

APPENDIX I

SOIL LABORATORY ANALYTICAL RESULTS

SCRATCH STATE COM NO. 1

October 2008

Marbob Energy Corporation
Artesia, NM

Prepared by:
BBC International, Inc.

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (505) 397-0397

Receiving Date: 09/04/07
Reporting Date: 09/06/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 09/06/07
Sampling Date: 08/14/07
Sample Type: SOIL
Sample Condition: INTACT
Sample Received By: NF
Analyzed By: KS

LAB NUMBER	SAMPLE ID	Cl^- (mg/Kg)
H13233-1	PIT BOTTOM	128
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-ClB

Note: Analysis performed on a 1:4 w:v aqueous extract.

Chemist

09/06/07
Date

H13233 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

		BILL TO	
Company Name:	BBC International, Inc.	P.O. #:	
Project Manager:	Cliff Brunson	Company:	
Address:	1324 W. Marland	Attn:	SAME
City:	Hobbs State: NM Zip: 88240	Address:	
Phone #:	505-397-6388 Fax #: 505-397-0397	City:	
Project #:	Project Owner: Marbob	State:	Zip:
Project Name:	Scratch St. Com #1	Phone #:	
Project Location:	Maljamar	Fax #:	
Sampler Name:	Amy Ruth		

FOR LAB USE ONLY				MATRIX							PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H13233-1	Pit Bottom	C	1			✓					✓		8/14/07	1100	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 1.5% per annum from the original date of invoice, and all costs of collection, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	
	Time:		
Relinquished By:	Date: 9/4/07	Received By: (Lab Staff)	
	Time: 15:46		
Delivered By: (Circle One) Sampler - UPS - Bus - Other:		Sample Condition: Cool ☐ Yes ☐ No; Intact ☑ Yes ☐ No	CHECKED BY: (Initials) MT

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (505) 397-0397

Receiving Date: 09/12/07
Reporting Date: 09/14/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 09/13/07
Sampling Date: 09/10/07
Sample Type: SOIL
Sample Condition: COOL& INTACT
Sample Received By: NF
Analyzed By: HM

LAB NUMBER	SAMPLE ID	Cl^- (mg/Kg)
H13282-1	MW1 @ 35'	< 16
H13282-2	MW1 @ 40'	3919
H13282-3	MW1 @ 45'	3479
H13282-4	MW1 @ 50'	208
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-ClˉB

Note: Analyses performed on 1:4 w:v aqueous extracts.

Chemist

09-14-07
Date

H13282 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Page 1 of 1

Company Name:	BBC International, Inc.
Project Manager:	Cliff Brunson
Address:	1324 W. Marland
City:	Hobbs State: NM Zip: 88240
Phone #:	505-397-6388 Fax #: 505-397-0397
Project #:	Project Owner: Marbob
Project Name:	Scratch St. Com #1
Project Location:	Maljamar, NM
Sampler Name:	Amy Ruth

BILL TO

P.O. #:	
Company:	
Attn:	SAME
Address:	
City:	
State:	Zip:
Phone #:	
Fax #:	

ANALYSIS REQUEST: Chloride

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	Chloride
#13382-1	MW1 @ 35'	G	1			✓							9/10/07	1345	✓
-2	MW1 @ 40'	G	1			✓							9/10/07	1410	✓
-3	MW1 @ 45'	G	1			✓							9/10/07	1438	✓
-4	MW1 @ 50'	G	1			✓							9/10/07	1457	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 1.5% per annum from the original date of invoice, and all costs of collection, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	
	Time:		
Relinquished By:	Date: 9/12/07	Received By: (Lab Staff)	
	Time: 1020		
Delivered By: (Circle One)	Sample Condition: Cool: Yes / No; Intact: Yes / No	CHECKED BY: (Initials)	
Sampler - UPS - Bus - Other:			

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (505) 397-0397

Receiving Date: 09/27/07
Reporting Date: 09/28/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 09/28/07
Sampling Date: 09/27/07
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: KS
Analyzed By: HM

LAB NUMBER	SAMPLE ID	Cl^- (mg/Kg)
H13393-1	MW2 35'	9,800
H13393-2	MW2 40'	5,040
H13393-3	MW2 45'	3,240
H13393-4	MW2 50'	5,040
H13393-5	MW2 55'	528
Quality Control		490
True Value QC		500
% Recovery		98.0
Relative Percent Difference		2.0

METHOD: Standard Methods	4500-ClB

Note: Analyses performed on 1:4 w:v aqueous extracts.

Chemist

09-28-07
Date

H13393 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 101 East Marland, Hobbs, NM 88240
(915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

Company Name: BBC International	BILL TO
Project Manager: Cliff Brunson	P.O. #:
Address: 1324 W. Marland	Company:
City: Hobbs State: NM Zip: 88240	Attn: SAME
Phone #: 505-397-6388 Fax #: 505-397-0397	Address:
Project #: Project Owner: Marbob	City:
Project Name: Scratch St. Com #1	State: Zip:
Project Location: Maljamar	Phone #:
Sampler Name: Amy Ruth	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER :	ACID/BASE:	ICE / COOL	OTHER :	DATE	TIME	Chloride
H13393-1	MW 2 35'	G	1			✓					✓		9/27/07	958	✓
-2	MW 2 40'	G	1			✓					✓		9/27/07	1047	✓
-3	MW 2 45'	G	1			✓					✓		9/27/07	1116	✓
-4	MW 2 50'	G	1			✓					✓		9/27/07	1156	✓
-5	MW 2 55'	G	1			✓					✓		9/27/07	1220	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
	Time:		Fax Result: ☐ Yes ☐ No Add'l Fax #:
Relinquished By:	Date: 9/27/07	Received By: (Lab Staff) Kristen Sapiobo	REMARKS:
	Time: 2:10		
Delivered By: (Circle One) Sampler - UPS - Bus - Other:		Sample Condition Cool ☑ Yes ☐ No Intact ☑ Yes ☐ No	CHECKED BY: (Initials) KS

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (505) 397-0397

Receiving Date: 10/02/07
Reporting Date: 10/02/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 10/02/07
Sampling Date: 09/28/07
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: NF
Analyzed By: KS

LAB NUMBER	SAMPLE ID	Cl^- (mg/Kg)
H13410-1	MW3 35'	48
H13410-2	MW3 40'	64
H13410-3	MW3 45'	192
H13410-4	MW3 50'	176
H13410-5	MW3 55'	64
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-Cl^-B

Note: Analyses performed on 1:4 w:v aqueous extracts.

Kristen Dupriest
Chemist

10/02/07
Date

H13410 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Company Name: BBC International, Inc.		**BILL TO**	
Project Manager: Cliff Brunson		P.O. #:	
Address: 1324 W. Marland		Company:	SAME
City: Hobbs	State: NM Zip: 88240	Attn:	
Phone #: 505-397-6388	Fax #: 505-397-0397	Address:	
Project #:	Project Owner: Marbob	City:	
Project Name: Scratch St. Com #1		State:	Zip:
Project Location: Maljamar		Phone #:	
Sampler Name: Amy Ruth		Fax #:	

Lab I.D. (FOR LAB USE ONLY)	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	MATRIX: WASTEWATER	MATRIX: SOIL	MATRIX: CRUDE OIL	MATRIX: SLUDGE	MATRIX: OTHER:	PRESERV.: ACID/BASE:	PRESERV.: ICE / COOL	PRESERV.: OTHER:	SAMPLING: DATE	SAMPLING: TIME	ANALYSIS REQUEST: Chloride
H13410-1	MW3 35'	G	1			✓					✓		9/28/07	1023	✓
-2	MW3 40'	G	1			✓					✓		9/28/07	1027	✓
-3	MW3 45'	G	1			✓					✓		9/28/07	1043	✓
-4	MW3 50'	G	1			✓					✓		9/28/07	1140	✓
-5	MW3 55'	G	1			✓					✓		9/28/07	1207	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished:	Date: / Time:	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By: Amy [signature]	Date: 10/2/07 / Time: 830	Received By: (Lab Staff) [signature]	Fax Result: ☐ Yes ☐ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:		Sample Condition: Cool ☒ Yes ☐ No; Intact ☒ Yes ☐ No — CHECKED BY: (Initials) NF	REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

APPENDIX II

GROUND WATER LABORATORY ANALYTICAL RESULTS

SCRATCH STATE COM NO. 1

October 2008

Marbob Energy Corporation
Artesia, NM

Prepared by:
BBC International, Inc.

CARDINAL
LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (505) 397-0397

Receiving Date: 09/12/07
Reporting Date: 09/13/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 09/13/07
Sampling Date: 09/11/07
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: NF
Analyzed By: KS

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H13281-1	MW 1	396
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-Cl^-B

Kristen Sugimoto
Chemist

09/13/07
Date

H13281 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Company Name:	BBC International, Inc.
Project Manager:	Cliff Brunson
Address:	1324 W. Marland
City:	Hobbs State: NM Zip: 88240
Phone #:	505-397-6388 Fax #: 505-397-0397
Project #:	Project Owner: Marbob
Project Name:	Scratch St. Com #1
Project Location:	Maljamar, NM
Sampler Name:	Amy Ruth

BILL TO

P.O. #:	
Company:	
Attn:	SAME
Address:	
City:	
State:	Zip:
Phone #:	
Fax #:	

ANALYSIS REQUEST: Chloride

FOR LAB USE ONLY Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	PRESERV.: ACID/BASE:	ICE / COOL	OTHER:	SAMPLING: DATE	TIME	Chloride
H13381-1	MW 1	G	1	✓							✓		9/11/07	1655	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 1.5% per month from the original date of invoice, and all costs of collection, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	
	Time:		
Relinquished By:	Date: 9/12/07	Received By: (Lab Staff)	
Delivered By: (Circle One)	Time: 1020	Sample Condition: Cool ☒ Yes ☐ No; Intact ☒ Yes ☐ No	CHECKED BY: (Initials) NT
Sampler - UPS - Bus - Other:			

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (505) 397-0397

Receiving Date: 10/02/07
Reporting Date: 10/02/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 10/02/07
Sampling Date: 10/01/07
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: NF
Analyzed By: KS

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H13411-1	MW 2	45,590
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-ClB

Kristin Supplako
Chemist

10/02/07
Date

H13411 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 (915) 673-7001 Fax (915) 673-7020
101 East Marland, Hobbs, NM 88240 (505) 393-2326 Fax (505) 393-2476

Page 1 of 1

		BILL TO	
Company Name:	BBC International, Inc.	P.O. #:	
Project Manager:	Cliff Brunson	Company:	
Address:	1324 W. Marland	Attn:	SAME
City:	Hobbs State: NM Zip: 88240	Address:	
Phone #:	505-397-6388 Fax #: 505-397-0397	City:	
Project #:	Project Owner: Marbob	State:	Zip:
Project Name:	Scratch St. Com #1	Phone #:	
Project Location:	Maljamar	Fax #:	
Sampler Name:	Amy Ruth		

FOR LAB USE ONLY				MATRIX							PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H13411-1	MW 2	G	1	✓							✓		10/1/07	1200	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 2.0% per month from the original date of invoice, and all costs of collection, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	Phone Result: ☐ Yes ☐ No	Add'l Phone #:
	Time:		Fax Result: ☐ Yes ☐ No	Add'l Fax #:
Relinquished By:	Date: 10/2/07	Received By: (Lab Staff)	REMARKS:	
	Time: 830			
Delivered By: (Circle One)	Sample Condition: Cool ☒ Yes ☐ No; Intact ☒ Yes ☐ No	CHECKED BY: (Initials)		
Sampler - UPS - Bus - Other:				

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (505) 397-0397

Receiving Date: 10/03/07
Reporting Date: 10/04/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 10/03/07
Sampling Date: 10/02/07
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: AB
Analyzed By: HM

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H13431-1	MW 1	708
H13431-2	MW 3	472
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-ClB

Kristen Sypniewski
Chemist

10/04/07
Date

H13431 BBC

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name: BBC International	**BILL TO**
Project Manager: Cliff Brunson	P.O. #:
Address: 1324 W. Marland	Company:
City: Hobbs State: NM Zip: 88240	Attn: SAME
Phone #: 505-397-6388 Fax #: 505-397-0397	Address:
Project #: Project Owner: Marbob	City:
Project Name: Scratch St. Com #1	State: Zip:
Project Location: Maljamar	Phone #:
Sampler Name: Amy Ruth	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H13431-1	MW1	G	1	✓							✓		10/2/07	1825	✓
-2	MW3	G	1	✓							✓		10/2/07	1835	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By:	Date:	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
	Time:		Fax Result: ☐ Yes ☐ No Add'l Fax #:
Relinquished By: Amy Ruth	Date: 10/3/07 Time: 1200	Received By:	REMARKS:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition: Cool ☒ Yes ☐ No Intact ☒ Yes ☐ No	CHECKED BY: (Initials)	

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

CARDINAL LABORATORIES

PHONE (325) 673-7001 • 2111 BEECHWOOD • ABILENE, TX 79603
PHONE (505) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (575) 397-0397

Receiving Date: 10/24/07
Reporting Date: 10/24/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 10/24/07
Sampling Date: 10/23/07
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: BC
Analyzed By: KS

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H13569-1	MW 1	2,260
H13569-2	MW 2	42,800
H13569-3	MW 3	400
Quality Control		490
True Value QC		500
% Recovery		98.0
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-Cl^-B

Kristin Noppolo
Chemist

10/24/07
Date

H13569 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 101 East Marland, Hobbs, NM 88240
(915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

Company Name: BBC International, Inc.	BILL TO
Project Manager: Cliff Brunson	P.O. #:
Address: 1324 W. Marland	Company:
City: Hobbs State: NM Zip: 88240	Attn: SAME
Phone #: 505-397-6388 Fax #: 505-397-0397	Address:
Project #: Project Owner: Marbob	City:
Project Name: Scratch St. Com #1	State: Zip:
Project Location: Maljamar, NM	Phone #:
Sampler Name: Amy Ruth	Fax #:

FOR LAB USE ONLY				MATRIX							PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H3597-1	MW1	G	1	✓							✓		10/23/07	1310	✓
-2	MW2	G	1	✓							✓		10/23/07	1350	✓
-3	MW3	G	1	✓							✓		10/23/07	1210	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising, whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims, including those for negligence and any other cause whatsoever, shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including, without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Interest and Charges. Interest will be charged on all accounts past due at the rate of 1.5% per month from the original date of invoice, and all costs of collection, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
	Time:		Fax Result: ☐ Yes ☐ No Add'l Fax #:
Relinquished By: Amy Ruth	Date: 10/24/07	Received By: (Lab Staff) Brian Cooke	REMARKS:
Delivered By: (Circle One)	Time: 812	Sample Condition: Cool: Yes ☒ No ☐ Intact: Yes ☒ No ☐	CHECKED BY: (Initials)
Sampler - UPS - Bus - Other:			

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (575) 397-0397

Receiving Date: 12/04/07
Reporting Date: 12/05/07
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 12/05/07
Sampling Date: 12/04/07
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: NF
Analyzed By: HM

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H13842-1	MW1	512
H13842-2	MW2	42,400
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-ClˉB

Kristin Snyder
Chemist

12/05/07
Date

H13842 BBC

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

CARDINAL LABORATORIES, INC.
2111 Beechwood, Abilene, TX 79603 101 East Marland, Hobbs, NM 88240
(915) 673-7001 Fax (915) 673-7020 (505) 393-2326 Fax (505) 393-2476

Page 1 of 1

Company Name: BBC International, Inc.	BILL TO
Project Manager: Cliff Brunson	P.O. #:
Address: 1324 W. Marland	Company:
City: Hobbs State: NM Zip: 88240	Attn: SAME
Phone #: 505-397-6388 Fax #: 505-397-0397	Address:
Project #: Project Owner: Marbob	City:
Project Name: Scratch St. Com #1	State: Zip:
Project Location: Maljamar, NM	Phone #:
Sampler Name: Amy Ruth	Fax #:

FOR LAB USE ONLY				MATRIX							PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	CRUDE OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H13842-1	MW1	G	1	✓							✓		12/4/07	14:10	✓
-2	MW2	G	1	✓							✓		12/4/07	14:20	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 1.5% per month from the original date of invoice, and all costs of collection, including attorney's fees.

Sampler Relinquished:	Date:	Received By:	
	Time:		
Relinquished By:	Date: 12/4/07	Received By: (Lab Staff)	
	Time: 1658		
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool: Yes / No; Intact: Yes / No	CHECKED BY: (Initials)	

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476.

CARDINAL LABORATORIES

PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (575) 397-0397

Receiving Date: 01/24/08
Reporting Date: 01/25/08
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 01/25/08
Sampling Date: 01/24/08
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: KS

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H14155-1	MW1	35,200
H14155-2	MW2	44,400
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		< 0.1

METHOD: Standard Methods	4500-Cl^-B

Kristen Sanders
Chemist

01/25/08
Date

H14155 BBC

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name: BBC International	**BILL TO**
Project Manager: Cliff Brunson	P.O. #:
Address: 1324 W. Marland	Company:
City: Hobbs State: NM Zip: 88240	Attn: SAME
Phone #: 505-397-6388 Fax #: 505-397-0397	Address:
Project #: Project Owner: Marbob	City:
Project Name: Scratch St. Com #1	State: Zip:
Project Location: Maljamar, NM	Phone #:
Sampler Name: Amy Ruth	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H14155-1	MW1	G	1	✓							✓		1/24/08	1245	✓
-2	MW2	G	1	✓							✓		1/24/08	1430	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By:	Date: 1-24-08	Received By:	Phone Result: ☐ Yes ☐ No Add'l Phone #:
	Time: 3:55	Misty LeBert	Fax Result: ☐ Yes ☐ No Add'l Fax #:
Relinquished By:	Date:	Received By:	REMARKS:
	Time:		

Delivered By: (Circle One)
Sampler - UPS - Bus - Other:

Sample Condition		CHECKED BY: (Initials)
Cool	Intact	
☑ Yes	☑ Yes	MC&B
☐ No	☐ No	

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

CARDINAL LABORATORIES

PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (575) 397-0397

Receiving Date: 04/15/08
Reporting Date: 04/15/08
Project Owner: MARBOB
Project Name: SCRATCH ST. COM #1
Project Location: MALJAMAR, NM

Analysis Date: 04/15/08
Sampling Date: 04/14/08
Sample Type: GROUNDWATER
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: KS

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H14646-1	MW1	14,600
H14646-2	MW2	48,800
Quality Control		500
True Value QC		500
% Recovery		100
Relative Percent Difference		2.0

METHOD: Standard Methods	4500-ClˉB

Kristin Snyder
Chemist

04/15/08
Date

H14646 BBC

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name:	BBC International, Inc.	**BILL TO**	
Project Manager:	Cliff Brunson	P.O. #:	
Address:	1324 W. Marland	Company:	
City:	Hobbs State: NM Zip: 88240	Attn:	SAME
Phone #:	575-397-6388 Fax #: 575-397-0397	Address:	
Project #:	Project Owner: Marbob	City:	
Project Name:	Scratch St. Com #1	State: Zip:	
Project Location:	Maljamar, NM	Phone #:	
Sampler Name:	Amy Ruth	Fax #:	

ANALYSIS REQUEST

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H14646-1	MW1	G	1	✓							✓		4.14.08	1800	✓
-2	MW2	G	1	✓							✓		4.14.08	1833	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: Amy Ruth	Date: 4-15-08 Time: 810	Received By: Misty LeBert	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☐ No Add'l Fax #:
			REMARKS:

Delivered By: (Circle One)
Sampler - UPS - Bus - Other:

Sample Condition: Cool ☑ Yes ☐ No; Intact ☑ Yes ☐ No

CHECKED BY: (Initials) MCAB

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

CARDINAL LABORATORIES

PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
BBC INTERNATIONAL, INC.
ATTN: CLIFF BRUNSON
P.O. BOX 805
HOBBS, NM 88241
FAX TO: (575) 397-0397

Receiving Date: 08/21/08
Reporting Date: 08/22/08
Project Owner: MARBOB
Project Name: SCRATCH STATE COM #1
Project Location: MALJAMAR, NM

Analysis Date: 08/22/08
Sampling Date: 08/20/08
Sample Type: GROUNDWATER
Sample Condition: INTACT
Sample Received By: ML
Analyzed By: HM

LAB NUMBER	SAMPLE ID	Cl^- (mg/L)
H15782-1	MW1	35,000
H15782-2	MW2	52,500
Quality Control		520
True Value QC		500
% Recovery		104
Relative Percent Difference		3.9

METHOD: Standard Methods	4500-Cl^-B

Hope L Morris
Chemist

08-22-08
Date

H15782 BBC

CARDINAL LABORATORIES

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

101 East Marland, Hobbs, NM 88240 2111 Beechwood, Abilene, TX 79603
(505) 393-2326 FAX (505) 393-2476 (325) 673-7001 FAX (325)673-7020

Company Name: BBC International, Inc.	**BILL TO**
Project Manager: Cliff Brunson	P.O. #:
Address: P.O. Box 805	Company: Same
City: Hobbs State: NM Zip: 88241	Attn:
Phone #: 575-397-6388 Fax #: 575-397-0397	Address:
Project #: Project Owner: Marbob	City:
Project Name: Scratch State Com #1	State: Zip:
Project Location: Maljamar, NM	Phone #:
Sampler Name: Amy C. Ruth	Fax #:

FOR LAB USE ONLY				MATRIX						PRESERV.			SAMPLING		ANALYSIS REQUEST
Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP.	# CONTAINERS	GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER:	ACID/BASE:	ICE / COOL	OTHER:	DATE	TIME	Chloride
H15782-1	MW1	G	1	✓							✓		8.20.08	1533	✓
-2	MW2	G	1	✓							✓		8.20.08	1635	✓

PLEASE NOTE: Liability and Damages. Cardinal's liability and client's exclusive remedy for any claim arising whether based in contract or tort, shall be limited to the amount paid by the client for the analyses. All claims including those for negligence and any other cause whatsoever shall be deemed waived unless made in writing and received by Cardinal within 30 days after completion of the applicable service. In no event shall Cardinal be liable for incidental or consequential damages, including without limitation, business interruptions, loss of use, or loss of profits incurred by client, its subsidiaries, affiliates or successors arising out of or related to the performance of services hereunder by Cardinal, regardless of whether such claim is based upon any of the above stated reasons or otherwise.

Relinquished By: Amy C. Ruth	Date: 8-21-08 Time: 815	Received By: Misty LeBeau	Phone Result: ☐ Yes ☐ No Add'l Phone #:
Relinquished By:	Date: Time:	Received By:	Fax Result: ☐ Yes ☐ No Add'l Fax #:
Delivered By: (Circle One) Sampler - UPS - Bus - Other:	Sample Condition Cool ☐ Yes ☐ No Intact ☑ Yes ☐ No	CHECKED BY: (Initials) MCAB	REMARKS:

† Cardinal cannot accept verbal changes. Please fax written changes to 505-393-2476

APPENDIX III

DRILLING LOGS

SCRATCH STATE COM NO. 1

October 2008

Marbob Energy Corporation
Artesia, NM

Prepared by:
BBC International, Inc.

BBC INTERNATIONAL

RECORD OF SUBSURFACE EXPLORATION

Project Name: Marbob Energy / Scratch State Com #1 **Project No.:**

Borehold Number: MW1 **Logged by:**

Drilled by: Eco/Enviro Drilling **Drilling/Rig Method(s):** Hollow Stem Auger

Date/Time Started: 9/10/07 **Date/Time Completed:** 9/10/07

Air Monitoring Type: **GWL Depth:**

Depth (feet)	Sample Number	Sample Interval	Sample Type	Sample Description	PID Readings (ppm)	USCS Symbol	Comments
--0		0' – 1'		Tan Sand w/ Caliche			
-- 10		1' – 30'		Caliche w/ Tan Sand			
--20							
--30		30' – 40'		Reddish sandy clay w/ caliche			
--40		40' – 50'		Red Bed Clay			
--50							
--60							
--70							

Comments:

Technician Signature:

BBC INTERNATIONAL

RECORD OF SUBSURFACE EXPLORATION

Project Name: Marbob Energy / Scratch State Com #1 **Project No.:**

Borehold Number: MW2 **Logged by:**

Drilled by: Eco/Enviro Drilling **Drilling/Rig Method(s):** Hollow Stem Auger

Date/Time Started: 9/27/07 **Date/Time Completed:** 9/27/07

Air Monitoring Type: **GWL Depth:**

Depth (feet)	Sample Number	Sample Interval	Sample Type	Sample Description	PID Readings (ppm)	USCS Symbol	Comments
--0		0' – 1'		Tan Sand w/ Caliche			
-- 10		1' – 30'		Caliche w/ Tan Sand			
--20							
--30		30' – 45'		Reddish sandy clay w/ caliche			
--40		45' – 55'		Red Bed Clay			
--50							
--60							
--70							

Comments:

Technician Signature:

BBC INTERNATIONAL

RECORD OF SUBSURFACE EXPLORATION

Project Name: Marbob Energy / Scratch State Com #1 **Project No.:**

Borehold Number: MW3 **Logged by:**

Drilled by: Eco/Enviro Drilling **Drilling/Rig Method(s):** Hollow Stem Auger

Date/Time Started: 9/28/07 **Date/Time Completed:** 9/28/07

Air Monitoring Type: **GWL Depth:**

Depth (feet)	Sample Number	Sample Interval	Sample Type	Sample Description	PID Readings (ppm)	USCS Symbol	Comments
--0		0' – 1'		Tan Sand w/ Caliche			
-- 10		1' – 30'		Caliche w/ Tan Sand			
--20							
--30		30' – 45'		Reddish sandy clay w/ caliche			
--40		45' – 55'		Red Bed Clay			
--50							
--60							
--70							

Comments:

Technician Signature:

APPENDIX IV

INVENTORY OF WATER WELLS WITHIN ONE MILE RADIUS

SCRATCH STATE COM NO. 1

October 2008

Marbob Energy Corporation
Artesia, NM

Prepared by:
BBC International, Inc.

New Mexico Office of the State Engineer
POD Reports and Downloads

Township: 18S Range: 33E Sections: 24,13,14,23,26,25

NAD27 X: Y: Zone: Search Radius:

County: Basin: Number: Suffix:

Owner Name: (First) (Last) Non-Domestic Domestic All

POD / Surface Data Report | Avg Depth to Water Report | Water Column Report

Clear Form | iWATERS Menu | Help

AVERAGE DEPTH OF WATER REPORT 09/29/2008

							(Depth Water in Feet)		
Bsn	Tws	Rng	Sec	Zone	X	Y	Wells	Min	Max	Avg
CP	18S	33E	13				1	60	60	60
CP	18S	33E	24				1	195	195	195

Record Count: 2

New Mexico Office of the State Engineer
POD Reports and Downloads

Township: 18S Range: 34E Sections: 18,19,30

NAD27 X: Y: Zone: Search Radius:

County: Basin: Number: Suffix:

Owner Name: (First) (Last) Non-Domestic Domestic All

POD / Surface Data Report | Avg Depth to Water Report | Water Column Report

Clear Form | iWATERS Menu | Help

AVERAGE DEPTH OF WATER REPORT 09/29/2008

							(Depth Water in Feet)		
Bsn	Tws	Rng	Sec	Zone	X	Y	Wells	Min	Max	Avg
L	18S	34E	18				2	125	125	125
L	18S	34E	19				1	105	105	105

Record Count: 3

AP094

District I
1625 N. French Dr., Hobbs, NM 88240
District II
1301 W. Grand Avenue, Artesia, NM 88210
District III
1000 Rio Brazos Road, Aztec, NM 87410
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy Minerals and Natural Resources

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-144
June 1, 2004

For drilling and production facilities, submit to appropriate NMOCD District Office.
For downstream facilities, submit to Santa Fe office

Pit or Below-Grade Tank Registration or Closure

Is pit or below-grade tank covered by a "general plan"? Yes ☐ No ☐
Type of action: Registration of a pit or below-grade tank ☐ Closure of a pit or below-grade tank ☐

Operator: Marbob Energy Corp Telephone: 505-748-3303 e-mail address: wildlife@marbob.com
Address: P.O Box 227 Artesia, NM 88211-0227
Facility or well name: Scratch State Com #1 API #: 30-025-36996 U/L or Qtr/Qtr SE/NW Sec 24 T 18S R 33E
County: Lea Latitude _____ Longitude _____ NAD: 1927 ☐ 1983 ☐
Surface Owner: Federal ☐ State ☒ Private ☐ Indian ☐

Pit	**Below-grade tank**	
Type: Drilling ☒ Production ☐ Disposal ☐ Workover ☐ Emergency ☐ Lined ☒ Unlined ☐ Liner type: Synthetic ☐ Thickness 12 mil Clay ☐ Pit Volume _____ bbl	Volume: _____ bbl Type of fluid: _____ Construction material: _____ Double-walled, with leak detection? Yes ☐ If not, explain why not.	
Depth to ground water (vertical distance from bottom of pit to seasonal high water elevation of ground water.)	(Less than 50 feet) 50 feet or more, but less than 100 feet 100 feet or more	(20 points) (10 points) (0 points) 20
Wellhead protection area: (Less than 200 feet from a private domestic water source, or less than 1000 feet from all other water sources.)	Yes (No)	(20 points) (0 points)
Distance to surface water: (horizontal distance to all wetlands, playas, irrigation canals, ditches, and perennial and ephemeral watercourses.)	Less than 200 feet 200 feet or more, but less than 1000 feet (1000 feet or more)	(20 points) (10 points) (0 points)
	Ranking Score (Total Points)	20

If this is a pit closure: (1) Attach a diagram of the facility showing the pit's relationship to other equipment and tanks. (2) Indicate disposal location: (check the onsite box if your are burying in place) onsite ☒ offsite ☐ If offsite, name of facility_____. (3) Attach a general description of remedial action taken including remediation start date and end date. (4) Groundwater encountered: No ☐ Yes ☐ If yes, show depth below ground surface_____ft. and attach sample results.
(5) Attach soil sample results and a diagram of sample locations and excavations.

Additional Comments: As per Chris Williams. Pit Sampling, delineation of chlorides and compl
removed Pit material. Liner has been placed in bottom of reserve Pit for backfilling.

I hereby certify that the information above is true and complete to the best of my knowledge and belief. **I further certify that the above-described pit or below-grade tank has been/will be constructed or closed according to NMOCD guidelines ☐, a general permit ☐, or an (attached) alternative OCD-approved plan ☐.**

Date: 9-21-07
Printed Name/Title Rand French / Biologist Signature Rand French

Your certification and NMOCD approval of this application/closure does not relieve the operator of liability should the contents of the pit or tank contaminate ground water or otherwise endanger public health or the environment. Nor does it relieve the operator of its responsibility for compliance with any other federal, state, or local laws and/or regulations.

Approval:
Printed Name/Title CHRIS WILLIAMS / DIST. SUPV Signature Chris Williams Date: 9/28/07

APPENDIX B

Water Well Data
Average Depth to Groundwater (ft)
COG - Scratch

17 South 32 East

6	5	4 82 Maljamar	3 175	2 60	1 225
7	8	9	10 132	11 70 88	12 120
18	17	16	15	14	13
19	20	21	22	23	24
30 180 dry	29	28	27	26	25
31	32	33	34	35	36

17 South 33 East

6 90	5	4	3 155	2 158	1 150
7 167	8 173	9 161	10	11	12
18 188	17 180	16	15	14	13 165
19	20 190	21	22	23 115	24
30 69	29 60	28	27	26	25
31	32	33 120	34	35 155	36

17 South 34 East

6 120 157	5	4 65	3 95	2 80	1 77
7 140	8 140	9	10 95	11 92	12 115
18 160	17 113	16 60	15 114 60	14 79	13 84
19 78	20 140	21 153	22 109	23	24
30	29	28	27	26	25 82
31	32	33	34	35	36

18 South 32 East

6	5	4 65	3	2	1
7 460 82	8	9	10	11	12
18	17	16 84	15	14	13
19	20 164	21	22 429	23	24
30	29	28	27	26	25
31	32	33	34 117	35	36

18 South 33 East

6	5	4	3 60	2	1
7	8 100	9	10 44 62	11 46 46	12 143 140
18	17 85	16	15	14 36 36	13 32 60
19 >140	20	21	22	23	24 195
30 35	29	28	27	26	25
31	32	33 177	34	35	36

18 South 34 East

6 130	5 105	4	3 87	2 102	1 107
7 83	8 148	9	10 148	11 108 110	12 115 92
18 145 125	17	16 108	15 114 110	14 103	13 96
19 105	20 125	21	22	23	24
30	29 45	28	27 112	26	25 117
31	32	33	34	35 118	36

19 South 32 East

6	5	4	3	2	1
7	8 365	9	10	11	12
18	17	16	15	14	13 135 dry
19 102	20 345	21	22	23	24
30	29	28	27	26	25
31	32	33	34 250	35	36

19 South 33 East

6	5	4	3	2	1
7	8	9	10	11	12
18 340	17 116	16	15	14	13
19	20	21	22	23	24
30	29	28 130 dry	27	26 92 85	25
31	32 185	33	34	35	36

19 South 34 East

6 244	5	4	3	2 100	1
7	8	9 29 28.6	10	11 123	12 60
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25 28
31 65	32	33	34	35	36

88 New Mexico State Engineers Well Reports

105 USGS Well Reports

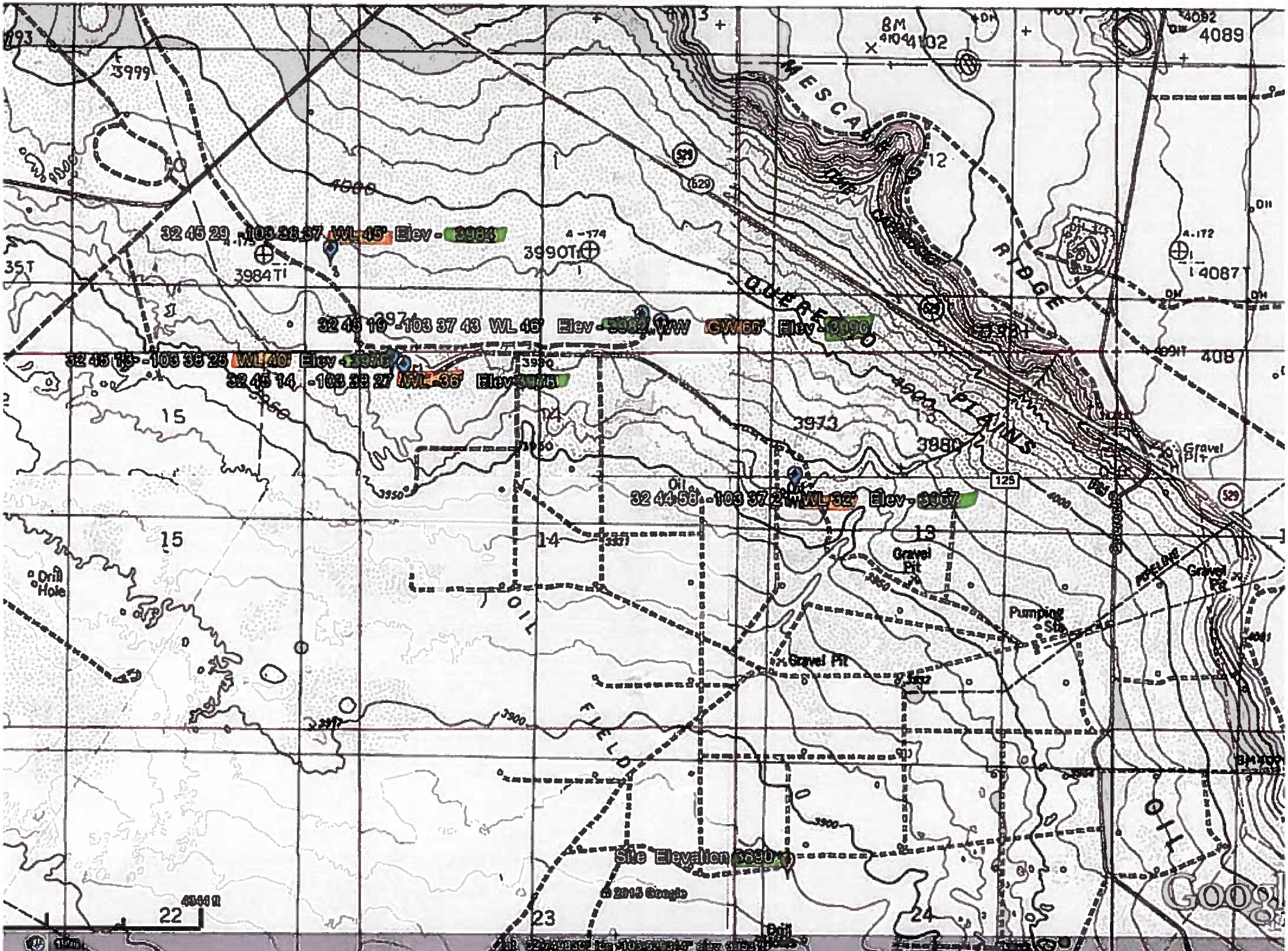
90 Geology and Groundwater Conditions in Southern Lea, County, NM (Report 6)

Geology and Groundwater Resources of Eddy County, NM (Report 3)

34 NMOCD - Groundwater Data

123 Tetra Tech installed temporary wells and field water level

143 NMOCD Groundwater map well location


MESCALERO RIDGE
QUERECHO PLAINS
32 45 29 -103 38 37 WL 45' Elev - 3984
3984T
3990T
32 45 19 -103 37 43 WL 46' Elev
GW 65' Elev 3990
WL 40' Elev
WL 36'
32 44 58 -103 37 2 WL 32' Elev - 3967
3973
3880
OIL FIELD
Gravel Pit
Pumping Sta
Drill Hole
Site Elevation 3890
© 2015 Google
4089
4087
4102
3999
15
14
13
22
23
24
529
125

New Mexico Office of the State Engineer
Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)

(quarters are smallest to largest)

(NAD83 UTM in meters)

(In feet)

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Twns	Rng	X	Y	Depth Well	Depth Water	Water Column
CP 00623			LE	1	1	1	13	18S	33E	628895	3624852*	82	60	22
CP 00689			LE		2	1	13	18S	33E	629243	3624542	100		
CP 00691			LE	4	4	2	24	18S	33E	630327	3622662*	215	195	20
CP 00701			LE		1	3	11	18S	33E	627373	3625534*	100		
CP 00701 POD2			LE	4	1	3	11	18S	33E	627472	3625433*	100		
CP 00758			LE			3	04	18S	33E	624345	3626886*	250		
CP 01417 POD1			LE	4	3	2	10	18S	33E	626613	3625732	120	54	66
CP 01417 POD2			LE	2	1	4	11	18S	33E	628219	3625574	100	64	36
CP 01417 POD3			LE	2	4	4	11	18S	33E	628603	3625179	100	61	39
L 02878	R	L	LE		4	4	12	18S	33E	628946	3736195	205	150	55
L 02878 POD2		L	LE		4	4	12	18S	33E	630196	3625175	220	220	0
L 03454		L	LE		2	2	30	18S	33E	622200	3621422*	100	35	65
L 04649		L	LE	1	1	3	03	18S	33E	625644	3627213*	100	45	55
L 06131		L	LE	3	1	2	08	18S	33E	623241	3626167*	194	100	94
L 06347		L	LE		4	4	12	18S	33E	630196	3625175*	170	130	40
L 08288		L	LE	3	3	3	12	18S	33E	628890	3625054*	79	60	19
L 13406 POD1		L	LE	4	4	4	12	18S	33E	630279	3625061	220		

Average Depth to Water: **97 feet**

Minimum Depth: **35 feet**

Maximum Depth: **220 feet**

Record Count: 17

PLSS Search:

Township: 18S **Range:** 33E

***UTM location was derived from PLSS - see Help**

USGS
science for a changing world

National Water Information System: Web Interface

USGS Water Resources

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- Full News

Groundwater levels for New Mexico

Click to hide state-specific text
NM

Search Results -- 1 sites found

Agency code = usgs
site_no list =
- 324432103354401

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

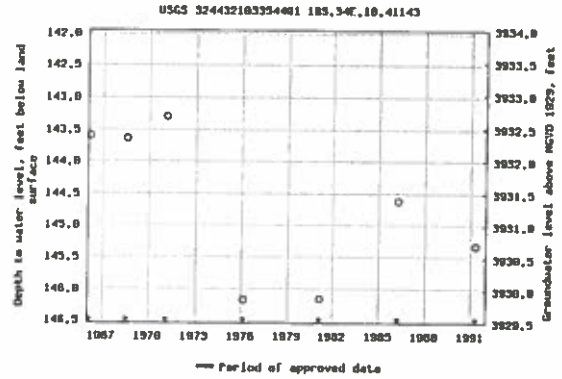
USGS 324432103354401 18S.34E.18.41143

Available data for this site Groundwater: Field measurements GO

Lea County, New Mexico
Hydrologic Unit Code 13070007
Latitude 32°44'46", Longitude 103°35'52" NAD27
Land-surface elevation 4,076.00 feet above NGVD29
The depth of the well is 170 feet below land surface.
This well is completed in the Ogallala Formation (121OGLL) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



Breaks in the plot represent a gap of at least one year between field measurements.
Download a presentation-quality graph

Questions about sites/data?
Feedback on this web site
Automated retrievals
Help
Data Tips
Explanation of terms
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National Water Information System: Web Interface

USGS Water Resources

Data Category: Groundwater | Geographic Area: New Mexico | GO

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Groundwater levels for New Mexico

Click to hide state-specific text
NM

Search Results -- 1 sites found

Agency code = usgs
site_no list =
- 324316103351101

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

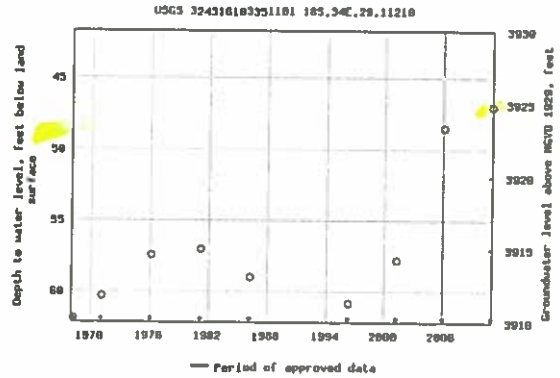
USGS 324316103351101 18S.34E.29.11210

Available data for this site: Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°43'32", Longitude 103°35'18" NAD27
Land-surface elevation 3,972.00 feet above NGVD29
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



Breaks in the plot represent a gap of at least one year between field measurements.
Download a presentation-quality graph

Questions about sites/data?
Feedback on this web site
Automated retrievals
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Data Tips
Explanation of terms
Subscribe for system changes
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National Water Information System: Web Interface

USGS Water Resources

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- **January 5, 2015** - The system upgrade is completed. Please refer to News
- Try our new Mobile-friendly water data site from your mobile device!
- Full News

Groundwater levels for New Mexico

Click to hide state-specific text
NM

Search Results -- 1 sites found

Agency code = usgs
site_no list =
- 324519103383002

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

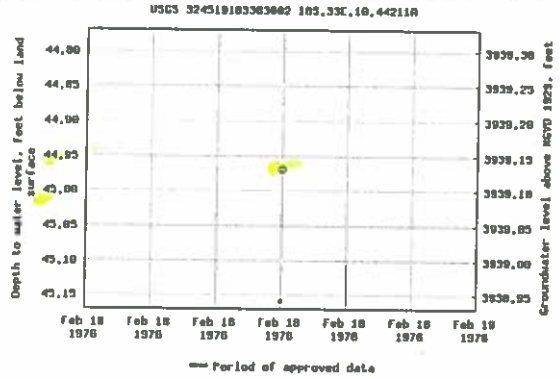
USGS 324519103383002 18S.33E.10.44211A

Available data for this site: Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°45'29", Longitude 103°38'37" NAD27
Land-surface elevation 3,984.10 feet above NGVD29
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



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Agency code = usgs
site_no list =
- 324502103381801

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

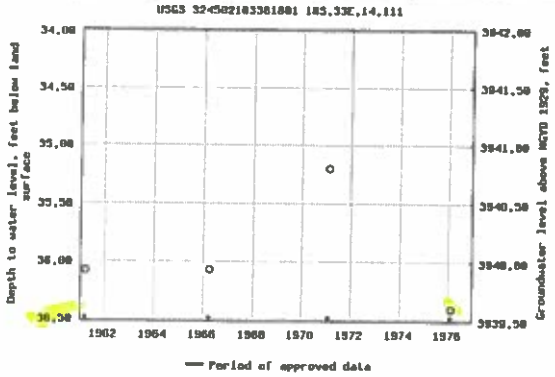
USGS 324502103381801 18S.33E.14.111

Available data for this site: Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°45'14", Longitude 103°38'27" NAD27
Land-surface elevation 3,976.00 feet above NGVD29

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



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Agency code = usgs
site_no list =
- 324447103371501

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

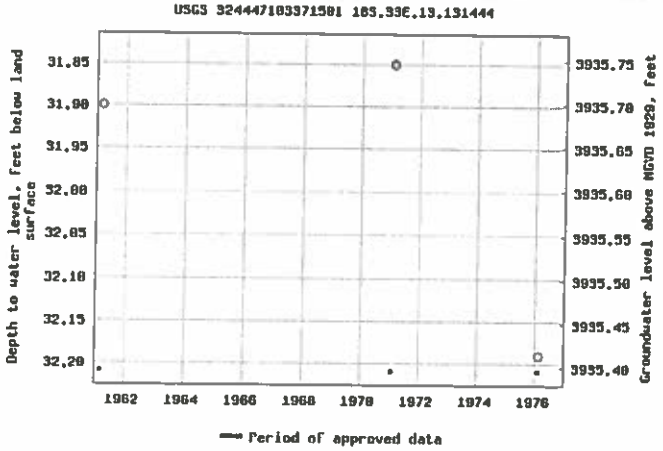
USGS 324447103371501 18S.33E.13.131444

Available data for this site: Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°44'58", Longitude 103°37'21" NAD27
Land-surface elevation 3,967.60 feet above NGVD29
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



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Agency code = usgs
site_no list =
- 324508103373501

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

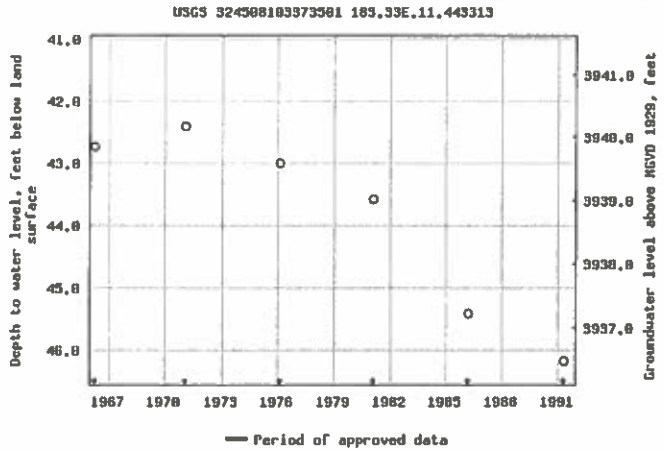
USGS 324508103373501 18S.33E.11.443313

Available data for this site: Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°45'19", Longitude 103°37'43" NAD27
Land-surface elevation 3,982.60 feet above NGVD29
The depth of the well is 90 feet below land surface.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



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Agency code = usgs
site_no list =
- 324502103381802

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

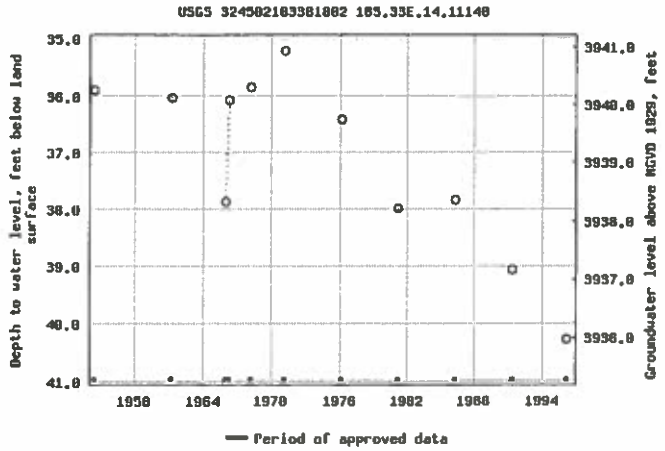
USGS 324502103381802 18S.33E.14.11140

Available data for this site Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°45'13", Longitude 103°38'25" NAD27
Land-surface elevation 3,976.20 feet above NGVD29
The depth of the well is 46 feet below land surface.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



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Agency code = usgs
site_no list =
- 324518103313101

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

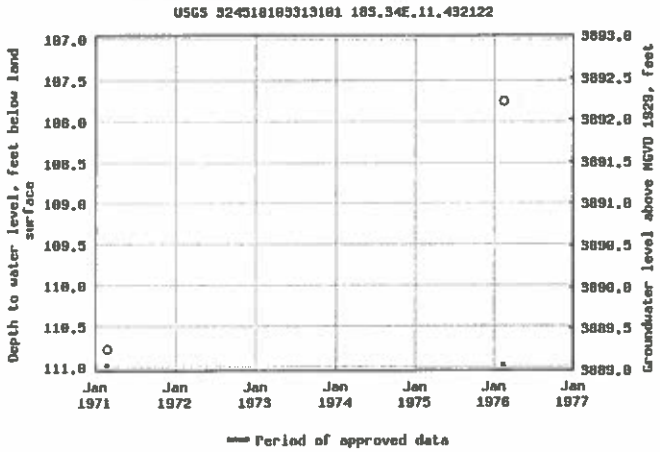
USGS 324518103313101 18S.34E.11.432122

Available data for this site Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13070007
Latitude 32°45'30", Longitude 103°31'39" NAD27
Land-surface elevation 4,000.00 feet above NGVD29
The depth of the well is 211 feet below land surface.
This well is completed in the Ogallala Formation (121OGLL) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



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Agency code = usgs
site_no list =
- 323737103373001

Minimum number of levels = 1
Save file of selected sites to local disk for future upload

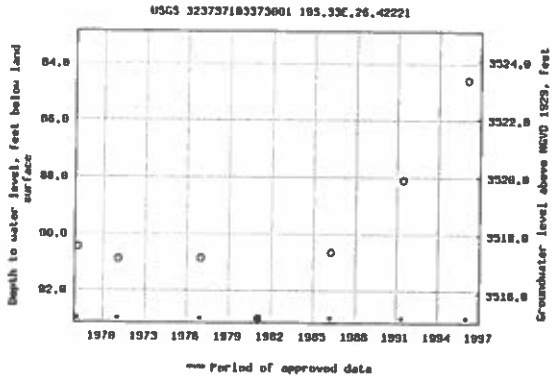
USGS 323737103373001 19S.33E.26.42221

Available data for this site: Groundwater: Field measurements | GO

Lea County, New Mexico
Hydrologic Unit Code 13060011
Latitude 32°37'51", Longitude 103°37'33" NAD27
Land-surface elevation 3,608.00 feet above NGVD29
The depth of the well is 100 feet below land surface.
This well is completed in the Alluvium, Bolson Deposits and Other Surface Deposits (110AVMB) local aquifer.

Output formats

Table of data
Tab-separated data
Graph of data
Reselect period



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U.S. Department of the Interior | U.S. Geological Survey
Title: Groundwater for New Mexico: Water Levels
URL: http://nwis.waterdata.usgs.gov/nm/nwis/gwlevels?

USA.gov

Page Contact Information: New Mexico Water Data Maintainer
Page Last Modified: 2015-01-22 15:53:58 EST
0.58 0.52 nadww02

New Mexico Office of the State Engineer
Point of Diversion Summary

POD Number	(quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are smallest to largest) Q64	Q16	Q4	Sec	Twp	Rng	(NAD83 UTM in meters) X	Y
CP 00623	1	1	1	13	18S	33E	628895	3624852*

Driller License: 882
Driller Name: FELKINS, LARRY

Drill Start Date:	05/10/1982	**Drill Finish Date:**	05/10/1982	**Plug Date:**	
Log File Date:	09/24/1982	**PCW Rcv Date:**	12/06/1984	**Source:**	Shallow
Pump Type:	SUBMER	**Pipe Discharge Size:**	2	**Estimated Yield:**	40 GPM
Casing Size:	6.63	**Depth Well:**	82 feet	**Depth Water:**	60 feet

Water Bearing Stratifications:	Top	Bottom	Description
	70	80	Sandstone/Gravel/Conglomerate

Casing Perforations:	Top	Bottom
	70	80

Meter Number:	50	**Meter Make:**	MASTER
Meter Serial Number:	330350	**Meter Multiplier:**	100.0000
Number of Dials:	6	**Meter Type:**	Diversion
Unit of Measure:	Gallons	**Return Flow Percent:**	
Usage Multiplier:		**Reading Frequency:**	Quarterly

Meter Readings (in Acre-Feet)

Read Date	Year	Mtr Reading	Flag	Rdr	Comment	Mtr Amount
01/08/1999	1999	519945	A	fm		0
04/02/1999	1999	578070	A	fm		17.838
06/30/1999	1999	653285	A	fm		23.083
05/25/2002	2002	805123	A	jw		46.597
10/02/2002	2002	805123	A	jw		0
01/10/2003	2003	805123	A	jw		0
01/03/2005	2005	805123	A	jw		0
04/02/2005	2005	805123	A	jw		0
07/07/2005	2005	805123	A	jw		0
10/04/2005	2005	805123	A	jw		0
01/06/2006	2005	805123	A	RPT		0
03/31/2006	2006	811571	A	RPT		1.979
07/05/2006	2006	816706	A	RPT		1.576
10/02/2006	2006	843588	A	RPT		8.250

*UTM location was derived from PLSS - see Help

**YTD Meter Amounts:	Year	Amount
	1999	40.921
	2002	46.597
	2003	0
	2005	0
	2006	11.805

Meter Number:	7923	**Meter Make:**	MASTER
Meter Serial Number:	330350	**Meter Multiplier:**	100.0000
Number of Dials:	6	**Meter Type:**	Diversion
Unit of Measure:	Gallons	**Return Flow Percent:**	
Usage Multiplier:	2.00	**Reading Frequency:**	Quarterly

Meter Readings (in Acre-Feet)

Read Date	Year	Mtr Reading	Flag	Rdr	Comment	Mtr Amount
07/04/2004	2004	805123	A	jw		0

**YTD Meter Amounts:	Year	Amount
	2004	0

APPENDIX C

Summary Report

Todd Wells
Tetra Tech
1901 N. Big Spring St.
Midland, TX 79705

Report Date: January 8, 2015

Work Order: 15010634

Project Location: Lea Co., NM
Project Name: COG/Scratch
Project Number: 112MC06989

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
383743	MW-1	water	2015-01-05	12:51	2015-01-06
383744	MW-2	water	2015-01-05	12:26	2015-01-06
383745	MW-3	water	2015-01-05	12:55	2015-01-06
383746	MW-5	water	2015-01-05	13:00	2015-01-06
383747	Dup	water	2015-01-05	00:00	2015-01-06

	BTEX			
Sample - Field Code	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylene (mg/L)
383743 - MW-1	<0.00100	<0.00100	<0.00100	<0.00100
383744 - MW-2	**0.00220**	<0.00100	<0.00100	<0.00100
383745 - MW-3	<0.00100	<0.00100	<0.00100	<0.00100
383746 - MW-5	<0.00100	<0.00100	<0.00100	<0.00100
383747 - Dup	<0.00100	<0.00100	<0.00100	<0.00100

Sample: 383743 - MW-1

Param	Flag	Result	Units	RL
Chloride		**32700**	mg/L	2.5

Sample: 383744 - MW-2

Param	Flag	Result	Units	RL
Chloride		**55900**	mg/L	2.5

Sample: 383745 - MW-3

Param	Flag	Result	Units	RL
Chloride		**2170**	mg/L	2.5

Sample: 383746 - MW-5

Param	Flag	Result	Units	RL
Chloride		**22800**	mg/L	2.5

Sample: 383747 - Dup

Param	Flag	Result	Units	RL
Chloride		**22800**	mg/L	2.5

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

Todd Wells
Tetra Tech
1901 N. Big Spring St.
Midland, TX, 79705

Report Date: January 8, 2015

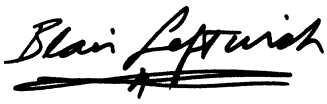
Work Order: 15010634

Project Location: Lea Co., NM
Project Name: COG/Scratch
Project Number: 112MC06989

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
383743	MW-1	water	2015-01-05	12:51	2015-01-06
383744	MW-2	water	2015-01-05	12:26	2015-01-06
383745	MW-3	water	2015-01-05	12:55	2015-01-06
383746	MW-5	water	2015-01-05	13:00	2015-01-06
383747	Dup	water	2015-01-05	00:00	2015-01-06

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



Dr. Blair Leftwich, Director
James Taylor, Assistant Director
Brian Pellam, Operations Manager

Report Contents

Case Narrative

Samples for project COG/Scratch were received by TraceAnalysis, Inc. on 2015-01-06 and assigned to work order 15010634. Samples for work order 15010634 were received intact at a temperature of 2.4 C.

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

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
BTEX	S 8021B	100149	2015-01-06 at 16:00	118478	2015-01-08 at 07:28
Chloride (IC)	E 300.0	100182	2015-01-07 at 13:26	118477	2015-01-07 at 13:26

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 15010634 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: 383743 - MW-1

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	118478	Date Analyzed:	2015-01-08	Analyzed By:	AK
Prep Batch:	100149	Sample Preparation:	2015-01-06	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene	U	4	<0.00100	mg/L	1	0.00100
Toluene	U	4	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	4	<0.00100	mg/L	1	0.00100
Xylene	U	4	<0.00100	mg/L	1	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0872	mg/L	1	0.100	87	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0852	mg/L	1	0.100	85	70 - 130

Sample: 383743 - MW-1

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	118477	Date Analyzed:	2015-01-07	Analyzed By:	JR
Prep Batch:	100182	Sample Preparation:	2015-01-07	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Chloride		1,2,3	**32700**	mg/L	1000	2.50

Sample: 383744 - MW-2

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	118478	Date Analyzed:	2015-01-08	Analyzed By:	AK
Prep Batch:	100149	Sample Preparation:	2015-01-06	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene		4	**0.00220**	mg/L	1	0.00100
Toluene	U	4	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	4	<0.00100	mg/L	1	0.00100
Xylene	U	4	<0.00100	mg/L	1	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0847	mg/L	1	0.100	85	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0775	mg/L	1	0.100	78	70 - 130

Sample: 383744 - MW-2

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	118477	Date Analyzed:	2015-01-07	Analyzed By:	JR
Prep Batch:	100182	Sample Preparation:	2015-01-07	Prepared By:	JR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride		1,2,3	**55900**	mg/L	5000	2.50

Sample: 383745 - MW-3

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	118478	Date Analyzed:	2015-01-08	Analyzed By:	AK
Prep Batch:	100149	Sample Preparation:	2015-01-06	Prepared By:	AK

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	4	<0.00100	mg/L	1	0.00100
Toluene	U	4	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	4	<0.00100	mg/L	1	0.00100
Xylene	U	4	<0.00100	mg/L	1	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0889	mg/L	1	0.100	89	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0918	mg/L	1	0.100	92	70 - 130

Sample: 383745 - MW-3

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	118477	Date Analyzed:	2015-01-07	Analyzed By:	JR
Prep Batch:	100182	Sample Preparation:	2015-01-07	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Chloride		1,2,3	**2170**	mg/L	50	2.50

Sample: 383746 - MW-5

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	118478	Date Analyzed:	2015-01-08	Analyzed By:	AK
Prep Batch:	100149	Sample Preparation:	2015-01-06	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene	U	4	<0.00100	mg/L	1	0.00100
Toluene	U	4	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	4	<0.00100	mg/L	1	0.00100
Xylene	U	4	<0.00100	mg/L	1	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0866	mg/L	1	0.100	87	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0874	mg/L	1	0.100	87	70 - 130

Sample: 383746 - MW-5

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	118477	Date Analyzed:	2015-01-07	Analyzed By:	JR
Prep Batch:	100182	Sample Preparation:	2015-01-07	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Chloride		1,2,3	**22800**	mg/L	500	2.50

Sample: 383747 - Dup

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	118478	Date Analyzed:	2015-01-08	Analyzed By:	AK
Prep Batch:	100149	Sample Preparation:	2015-01-06	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene	U	4	<0.00100	mg/L	1	0.00100
Toluene	U	4	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	4	<0.00100	mg/L	1	0.00100
Xylene	U	4	<0.00100	mg/L	1	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0846	mg/L	1	0.100	85	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0851	mg/L	1	0.100	85	70 - 130

Sample: 383747 - Dup

Laboratory:	El Paso				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	118477	Date Analyzed:	2015-01-07	Analyzed By:	JR
Prep Batch:	100182	Sample Preparation:	2015-01-07	Prepared By:	JR

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Chloride		1,2,3	**22800**	mg/L	500	2.50

Method Blanks

Method Blank (1) QC Batch: 118477

QC Batch:	118477	Date Analyzed:	2015-01-07	Analyzed By:	JR
Prep Batch:	100182	QC Preparation:	2015-01-07	Prepared By:	JR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3	<0.00680	mg/L	2.5

Method Blank (1) QC Batch: 118478

QC Batch:	118478	Date Analyzed:	2015-01-08	Analyzed By:	AK
Prep Batch:	100149	QC Preparation:	2015-01-06	Prepared By:	AK

Parameter	Flag	Cert	MDL Result	Units	RL
Benzene		4	<0.000299	mg/L	0.001
Toluene		4	<0.000247	mg/L	0.001
Ethylbenzene		4	<0.000423	mg/L	0.001
Xylene		4	<0.000552	mg/L	0.001

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0903	mg/L	1	0.100	90	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0924	mg/L	1	0.100	92	70 - 130

Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

QC Batch: 118477 | Date Analyzed: 2015-01-07 | Analyzed By: JR
Prep Batch: 100182 | QC Preparation: 2015-01-07 | Prepared By: JR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3	22.7	mg/L	1	25.0	<0.00680	91	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		1,2,3	22.7	mg/L	1	25.0	<0.00680	91	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: 118478 | Date Analyzed: 2015-01-08 | Analyzed By: AK
Prep Batch: 100149 | QC Preparation: 2015-01-06 | Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		4	0.0971	mg/L	1	0.100	<0.000299	97	70 - 130
Toluene		4	0.0969	mg/L	1	0.100	<0.000247	97	70 - 130
Ethylbenzene		4	0.101	mg/L	1	0.100	<0.000423	101	70 - 130
Xylene		4	0.291	mg/L	1	0.300	<0.000552	97	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		4	0.0950	mg/L	1	0.100	<0.000299	95	70 - 130	2	20
Toluene		4	0.0958	mg/L	1	0.100	<0.000247	96	70 - 130	1	20
Ethylbenzene		4	0.0959	mg/L	1	0.100	<0.000423	96	70 - 130	5	20
Xylene		4	0.285	mg/L	1	0.300	<0.000552	95	70 - 130	2	20

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

continued ...

control spikes continued ...

Surrogate	LCS Result	LCSD Result	Units	Dil.	Spike Amount	LCS Rec.	LCSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	0.0903	0.0876	mg/L	1	0.100	90	88	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0980	0.0940	mg/L	1	0.100	98	94	70 - 130

Matrix Spikes

Matrix Spike (MS-1) Spiked Sample: 383745

QC Batch: 118477 | Date Analyzed: 2015-01-07 | Analyzed By: JR
Prep Batch: 100182 | QC Preparation: 2015-01-07 | Prepared By: JR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		[1,2,3]	4920	mg/L	111	2780	2170	99	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		[1,2,3]	4910	mg/L	111	2780	2170	98	80 - 120	0	20

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

Matrix Spike (MS-1) Spiked Sample: 383650

QC Batch: 118478 | Date Analyzed: 2015-01-08 | Analyzed By: AK
Prep Batch: 100149 | QC Preparation: 2015-01-06 | Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		[4]	0.0945	mg/L	1	0.100	<0.000299	94	70 - 130
Toluene		[4]	0.0946	mg/L	1	0.100	<0.000247	95	70 - 130
Ethylbenzene		[4]	0.0941	mg/L	1	0.100	<0.000423	94	70 - 130
Xylene		[4]	0.284	mg/L	1	0.300	<0.000552	95	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		[4]	0.0929	mg/L	1	0.100	<0.000299	93	70 - 130	2	20
Toluene		[4]	0.0943	mg/L	1	0.100	<0.000247	94	70 - 130	0	20
Ethylbenzene		[4]	0.0939	mg/L	1	0.100	<0.000423	94	70 - 130	0	20
Xylene		[4]	0.284	mg/L	1	0.300	<0.000552	95	70 - 130	0	20

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

continued ...

matrix spikes continued ...

Surrogate	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	0.0923	0.0868	mg/L	1	0.1	92	87	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0938	0.0918	mg/L	1	0.1	94	92	70 - 130

Calibration Standards

Standard (CCV-1)

QC Batch: 118477 | Date Analyzed: 2015-01-07 | Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3	mg/L	25.0	22.6	90	90 - 110	2015-01-07

Standard (CCV-2)

QC Batch: 118477 | Date Analyzed: 2015-01-07 | Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3	mg/L	25.0	23.1	92	90 - 110	2015-01-07

Standard (CCV-3)

QC Batch: 118477 | Date Analyzed: 2015-01-07 | Analyzed By: JR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3	mg/L	25.0	23.3	93	90 - 110	2015-01-07

Standard (CCV-2)

QC Batch: 118478 | Date Analyzed: 2015-01-08 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		4	mg/L	0.100	0.0912	91	80 - 120	2015-01-08
Toluene		4	mg/L	0.100	0.0911	91	80 - 120	2015-01-08

continued . . .

standard continued . . .

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Ethylbenzene		4	mg/L	0.100	0.0900	90	80 - 120	2015-01-08
Xylene		4	mg/L	0.300	0.272	91	80 - 120	2015-01-08

Standard (CCV-3)

QC Batch: 118478 Date Analyzed: 2015-01-08 Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		4	mg/L	0.100	0.0954	95	80 - 120	2015-01-08
Toluene		4	mg/L	0.100	0.0956	96	80 - 120	2015-01-08
Ethylbenzene		4	mg/L	0.100	0.0944	94	80 - 120	2015-01-08
Xylene		4	mg/L	0.300	0.287	96	80 - 120	2015-01-08

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	PJLA	L14-103	El Paso
2	LELAP	LELAP-02002	El Paso
3	NELAP	T104704221-12-3	El Paso
4	NELAP	T104704392-14-8	Midland

Standard Flags

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

Attachments

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

150106634

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: COG

SITE MANAGER: Todd Wells

PROJECT NO.: 112MC06989

PROJECT NAME: COG - Scratch

LAB I.D. NUMBER	DATE 2015	TIME	MATRIX	COMP.	GRAB	SAMPLE IDENTIFICATION (Lea Co, NM)	NUMBER OF CONTAINERS	FILTERED (Y/N)	PRESERVATIVE METHOD: HCL	HNO3	ICE	NONE	ANALYSIS REQUEST (Circle or Specify Method No.): BTEX 8021B	TPH 8015 MOD. TX1005 (Ext. to C35)	PAH 8270	RCRA Metals Ag As Ba Cd Cr Pb Hg Se	TCLP Metals Ag As Ba Cd Vr Pd Hg Se	TCLP Volatiles	TCLP Semi Volatiles	RCI	GC.MS Vol. 8240/8260/624	GC.MS Semi. Vol. 8270/625	PCB's 8080/608	Pest. 808/608	Chloride	Gamma Spec.	Alpha Beta (Air)	PLM (Asbestos)	Major Anions/Cations, pH, TDS
380374	1/5	12:51	W			MW-1	4	N	X		X		X											X				
744	1/5	1226	W			MW-2	4	N	X		X		X											X				
745	1/5	1255	W			MW-3	4	N	X		X		X											X				
746	1/5	1300	W			MW-5	4	N	X		X		X											X				
747	1/5	-	W			Dup	4	N	X		X		X											X				

RELINQUISHED BY: (Signature) Adrian Garcia — Date: 1-6-15 Time: 11:23
RECEIVED BY: (Signature) AM TA — Date: 1-6-15 Time: 11:23
SAMPLED BY: (Print & Initial) Adrian Garcia / AG — Date: Time:

RELINQUISHED BY: (Signature) — Date: Time:
RECEIVED BY: (Signature) — Date: Time:
SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS — AIRBILL #: Carryon
OTHER:

RELINQUISHED BY: (Signature) — Date: Time:
RECEIVED BY: (Signature) — Date: Time:
TETRA TECH CONTACT PERSON: Todd Wells
Adrian.garcia@tetratech.com
Results by:

RECEIVING LABORATORY: Trace
ADDRESS:
CITY: Midland STATE: TX ZIP:
CONTACT: PHONE:
RECEIVED BY: (Signature)
DATE: TIME:
RUSH Charges Authorized: (Yes) No

SAMPLE CONDITION WHEN RECEIVED: 2.4

REMARKS: RUSH - 24 TAT

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

Summary Report

Todd Wells
Tetra Tech
1901 N. Big Spring St.
Midland, TX 79705

Report Date: April 15, 2015

Work Order: 15040132

Project Location: Lea Co., NM
Project Name: COG - Scratch State #1
Project Number: 112MC06989

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
390214	MW-1	water	2015-03-31	15:15	2015-04-01
390215	MW-2	water	2015-03-31	13:55	2015-04-01
390216	MW-3	water	2015-03-31	16:05	2015-04-01
390217	MW-5	water	2015-03-31	16:40	2015-04-01
390218	DUP	water	2015-03-31	00:00	2015-04-01

	BTEX			
Sample - Field Code	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylene (mg/L)
390214 - MW-1	<0.00500 [1]	<0.00500	<0.00500	<0.00500
390215 - MW-2	<0.00500 [2]	<0.00500	<0.00500	<0.00500
390216 - MW-3	<0.00100	<0.00100	<0.00100	<0.00300
390217 - MW-5	<0.00500 [3]	<0.00500	<0.00500	<0.00500
390218 - DUP	<0.00500 [4]	<0.00500	<0.00500	<0.00500

Sample: 390214 - MW-1

Param	Flag	Result	Units	RL
Chloride		**31500**	mg/L	2.5

Sample: 390215 - MW-2

[1] Dilution due to surfactants.
[2] Dilution due to surfactants.
[3] Dilution due to surfactants.
[4] Dilution due to surfactants.

Param	Flag	Result	Units	RL
Chloride		**59400**	mg/L	2.5

Sample: 390216 - MW-3

Param	Flag	Result	Units	RL
Chloride		**1530**	mg/L	2.5

Sample: 390217 - MW-5

Param	Flag	Result	Units	RL
Chloride		**24800**	mg/L	2.5

Sample: 390218 - DUP

Param	Flag	Result	Units	RL
Chloride		**24700**	mg/L	2.5

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

Todd Wells
Tetra Tech
1901 N. Big Spring St.
Midland, TX, 79705

Report Date: April 15, 2015

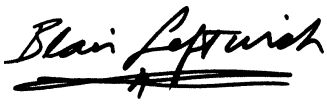
Work Order: 15040132

Project Location: Lea Co., NM
Project Name: COG - Scratch State #1
Project Number: 112MC06989

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
390214	MW-1	water	2015-03-31	15:15	2015-04-01
390215	MW-2	water	2015-03-31	13:55	2015-04-01
390216	MW-3	water	2015-03-31	16:05	2015-04-01
390217	MW-5	water	2015-03-31	16:40	2015-04-01
390218	DUP	water	2015-03-31	00:00	2015-04-01

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



Dr. Blair Leftwich, Director
James Taylor, Assistant Director
Brian Pellam, Operations Manager

Report Contents

Case Narrative

Samples for project COG - Scratch State #1 were received by TraceAnalysis, Inc. on 2015-04-01 and assigned to work order 15040132. Samples for work order 15040132 were received intact at a temperature of 4.2 C.

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

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
BTEX	S 8021B	101971	2015-04-03 at 12:37	120573	2015-04-07 at 07:52
BTEX	S 8021B	102071	2015-04-09 at 07:32	120644	2015-04-10 at 07:56
Chloride (IC)	E 300.0	102194	2015-04-14 at 12:00	120764	2015-04-14 at 13:07

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 15040132 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: 390214 - MW-1

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	120644	Date Analyzed:	2015-04-10	Analyzed By:	AK
Prep Batch:	102071	Sample Preparation:	2015-04-09	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene [1]	U	5	<0.00500	mg/L	5	0.00100
Toluene	U	5	<0.00500	mg/L	5	0.00100
Ethylbenzene	U	5	<0.00500	mg/L	5	0.00100
Xylene	U	5	<0.00500	mg/L	5	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.411	mg/L	5	0.500	82	70 - 130
4-Bromofluorobenzene (4-BFB)			0.436	mg/L	5	0.500	87	70 - 130

Sample: 390214 - MW-1

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	120764	Date Analyzed:	2015-04-14	Analyzed By:	RL
Prep Batch:	102194	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Chloride		1,2,3,4,6	**31500**	mg/L	1000	2.50

Sample: 390215 - MW-2

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	120644	Date Analyzed:	2015-04-10	Analyzed By:	AK
Prep Batch:	102071	Sample Preparation:	2015-04-09	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene [2]	U	5	<0.00500	mg/L	5	0.00100
Toluene	U	5	<0.00500	mg/L	5	0.00100
Ethylbenzene	U	5	<0.00500	mg/L	5	0.00100
Xylene	U	5	<0.00500	mg/L	5	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.440	mg/L	5	0.500	88	70 - 130
4-Bromofluorobenzene (4-BFB)			0.459	mg/L	5	0.500	92	70 - 130

Sample: 390215 - MW-2

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	120764	Date Analyzed:	2015-04-14	Analyzed By:	RL
Prep Batch:	102194	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Chloride		1,2,3,4,6	**59400**	mg/L	5000	2.50

Sample: 390216 - MW-3

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	120573	Date Analyzed:	2015-04-07	Analyzed By:	AK
Prep Batch:	101971	Sample Preparation:	2015-04-03	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene	U	5	<0.00100	mg/L	1	0.00100
Toluene	U	5	<0.00100	mg/L	1	0.00100
Ethylbenzene	U	5	<0.00100	mg/L	1	0.00100
Xylene	U	5	<0.00300	mg/L	1	0.00300

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0779	mg/L	1	0.100	78	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0980	mg/L	1	0.100	98	70 - 130

Sample: 390216 - MW-3

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	120764	Date Analyzed:	2015-04-14	Analyzed By:	RL
Prep Batch:	102194	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	Result	Units	Dilution	RL
Chloride		1,2,3,4,6	**1530**	mg/L	100	2.50

Sample: 390217 - MW-5

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	120644	Date Analyzed:	2015-04-10	Analyzed By:	AK
Prep Batch:	102071	Sample Preparation:	2015-04-09	Prepared By:	AK

Parameter	Flag	Cert	Result	Units	Dilution	RL
Benzene [3]	U	5	<0.00500	mg/L	5	0.00100
Toluene	U	5	<0.00500	mg/L	5	0.00100
Ethylbenzene	U	5	<0.00500	mg/L	5	0.00100
Xylene	U	5	<0.00500	mg/L	5	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.431	mg/L	5	0.500	86	70 - 130
4-Bromofluorobenzene (4-BFB)			0.438	mg/L	5	0.500	88	70 - 130

Sample: 390217 - MW-5

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	120764	Date Analyzed:	2015-04-14	Analyzed By:	RL
Prep Batch:	102194	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	Result	Units	Dilution	RL
Chloride		1,2,3,4,6	**24800**	mg/L	1000	2.50

Sample: 390218 - DUP

Laboratory:	Midland				
Analysis:	BTEX	Analytical Method:	S 8021B	Prep Method:	S 5030B
QC Batch:	120644	Date Analyzed:	2015-04-10	Analyzed By:	AK
Prep Batch:	102071	Sample Preparation:	2015-04-09	Prepared By:	AK

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Benzene [4]	U	5	<0.00500	mg/L	5	0.00100
Toluene	U	5	<0.00500	mg/L	5	0.00100
Ethylbenzene	U	5	<0.00500	mg/L	5	0.00100
Xylene	U	5	<0.00500	mg/L	5	0.00100

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.416	mg/L	5	0.500	83	70 - 130
4-Bromofluorobenzene (4-BFB)			0.443	mg/L	5	0.500	89	70 - 130

Sample: 390218 - DUP

Laboratory:	Lubbock				
Analysis:	Chloride (IC)	Analytical Method:	E 300.0	Prep Method:	N/A
QC Batch:	120764	Date Analyzed:	2015-04-14	Analyzed By:	RL
Prep Batch:	102194	Sample Preparation:		Prepared By:	RL

Parameter	Flag	Cert	Result	RL Units	Dilution	RL
Chloride		1,2,3,4,6	**24700**	mg/L	1000	2.50

Method Blanks

Method Blank (1) QC Batch: 120573

QC Batch:	120573	Date Analyzed:	2015-04-07	Analyzed By:	AK
Prep Batch:	101971	QC Preparation:	2015-04-03	Prepared By:	AK

Parameter	Flag	Cert	MDL Result	Units	RL
Benzene		5	<0.000238	mg/L	0.001
Toluene		5	<0.000181	mg/L	0.001
Ethylbenzene		5	<0.000247	mg/L	0.001
Xylene		5	<0.000189	mg/L	0.003

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			0.0819	mg/L	1	0.100	82	70 - 130
4-Bromofluorobenzene (4-BFB)			0.0953	mg/L	1	0.100	95	70 - 130

Method Blank (1) QC Batch: 120644

QC Batch:	120644	Date Analyzed:	2015-04-10	Analyzed By:	AK
Prep Batch:	102071	QC Preparation:	2015-04-09	Prepared By:	AK

Parameter	Flag	Cert	MDL Result	Units	RL
Benzene		5	<0.000299	mg/L	0.001
Toluene		5	<0.000247	mg/L	0.001
Ethylbenzene		5	<0.000423	mg/L	0.001
Xylene		5	<0.000552	mg/L	0.001

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)			0.0954	mg/L	1	0.100	95	70 - 130

Method Blank (1) QC Batch: 120764

QC Batch:	120764	Date Analyzed:	2015-04-14	Analyzed By:	RL
Prep Batch:	102194	QC Preparation:	2015-04-14	Prepared By:	RL

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride		1,2,3,4,6	0.963	mg/L	2.5

Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

QC Batch: 120573 | Date Analyzed: 2015-04-07 | Analyzed By: AK
Prep Batch: 101971 | QC Preparation: 2015-04-03 | Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		5	0.0906	mg/L	1	0.100	<0.000238	91	70 - 130
Toluene		5	0.0872	mg/L	1	0.100	<0.000181	87	70 - 130
Ethylbenzene		5	0.0865	mg/L	1	0.100	<0.000247	86	70 - 130
Xylene		5	0.262	mg/L	1	0.300	<0.000189	87	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		5	0.0951	mg/L	1	0.100	<0.000238	95	70 - 130	5	20
Toluene		5	0.0909	mg/L	1	0.100	<0.000181	91	70 - 130	4	20
Ethylbenzene		5	0.0921	mg/L	1	0.100	<0.000247	92	70 - 130	6	20
Xylene		5	0.276	mg/L	1	0.300	<0.000189	92	70 - 130	5	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)	0.0778	0.0824	mg/L	1	0.100	78	82	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0970	0.0972	mg/L	1	0.100	97	97	70 - 130

Laboratory Control Spike (LCS-1)

QC Batch: 120644 | Date Analyzed: 2015-04-10 | Analyzed By: AK
Prep Batch: 102071 | QC Preparation: 2015-04-09 | Prepared By: AK

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		5	0.0940	mg/L	1	0.100	<0.000299	94	70 - 130
Toluene		5	0.0941	mg/L	1	0.100	<0.000247	94	70 - 130
Ethylbenzene		5	0.0933	mg/L	1	0.100	<0.000423	93	70 - 130
Xylene		5	0.275	mg/L	1	0.300	<0.000552	92	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		5	0.0909	mg/L	1	0.100	<0.000299	91	70 - 130	3	20
Toluene		5	0.0905	mg/L	1	0.100	<0.000247	90	70 - 130	4	20
Ethylbenzene		5	0.0916	mg/L	1	0.100	<0.000423	92	70 - 130	2	20
Xylene		5	0.271	mg/L	1	0.300	<0.000552	90	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)	0.0925	0.0895	mg/L	1	0.100	92	90	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0960	0.0981	mg/L	1	0.100	96	98	70 - 130

Laboratory Control Spike (LCS-1)

QC Batch: 120764 | Date Analyzed: 2015-04-14 | Analyzed By: RL
Prep Batch: 102194 | QC Preparation: 2015-04-14 | Prepared By: RL

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	23.5	mg/L	1	25.0	0.963	90	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		1,2,3,4,6	23.6	mg/L	1	25.0	0.963	90	90 - 110	0	20

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

Matrix Spikes

Matrix Spike (MS-1) Spiked Sample: 390303

QC Batch: 120573 | Date Analyzed: 2015-04-07 | Analyzed By: AK
Prep Batch: 101971 | QC Preparation: 2015-04-03 | Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		5	0.0936	mg/L	1	0.100	<0.000238	94	70 - 130
Toluene		5	0.0906	mg/L	1	0.100	<0.000181	91	70 - 130
Ethylbenzene		5	0.0880	mg/L	1	0.100	<0.000247	88	70 - 130
Xylene		5	0.269	mg/L	1	0.300	<0.000189	90	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		5	0.0959	mg/L	1	0.100	<0.000238	96	70 - 130	2	20
Toluene		5	0.0933	mg/L	1	0.100	<0.000181	93	70 - 130	3	20
Ethylbenzene		5	0.0907	mg/L	1	0.100	<0.000247	91	70 - 130	3	20
Xylene		5	0.276	mg/L	1	0.300	<0.000189	92	70 - 130	3	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)	0.0755	0.0783	mg/L	1	0.1	76	78	70 - 130
4-Bromofluorobenzene (4-BFB)	0.0943	0.0958	mg/L	1	0.1	94	96	70 - 130

Matrix Spike (MS-1) Spiked Sample: 390215

QC Batch: 120644 | Date Analyzed: 2015-04-10 | Analyzed By: AK
Prep Batch: 102071 | QC Preparation: 2015-04-09 | Prepared By: AK

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		5	0.471	mg/L	5	0.500	<0.00150	94	70 - 130
Toluene		5	0.466	mg/L	5	0.500	<0.00124	93	70 - 130
Ethylbenzene		5	0.447	mg/L	5	0.500	<0.00212	89	70 - 130
Xylene		5	1.33	mg/L	5	1.50	<0.00276	89	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		5	0.479	mg/L	5	0.500	<0.00150	96	70 - 130	2	20
Toluene		5	0.471	mg/L	5	0.500	<0.00124	94	70 - 130	1	20
Ethylbenzene		5	0.466	mg/L	5	0.500	<0.00212	93	70 - 130	4	20
Xylene		5	1.38	mg/L	5	1.50	<0.00276	92	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)	0.440	0.437	mg/L	5	0.5	88	87	70 - 130
4-Bromofluorobenzene (4-BFB)	0.457	0.461	mg/L	5	0.5	91	92	70 - 130

Matrix Spike (MS-1) Spiked Sample: 390218

QC Batch: 120764 | Date Analyzed: 2015-04-14 | Analyzed By: RL
Prep Batch: 102194 | QC Preparation: 2015-04-14 | Prepared By: RL

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride		1,2,3,4,6	52800	mg/L	1000	25000	24700	112	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		1,2,3,4,6	53000	mg/L	1000	25000	24700	113	80 - 120	0	20

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

Calibration Standards

Standard (CCV-2)

QC Batch: 120573 | Date Analyzed: 2015-04-07 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		5	mg/L	0.100	0.0932	93	80 - 120	2015-04-07
Toluene		5	mg/L	0.100	0.0882	88	80 - 120	2015-04-07
Ethylbenzene		5	mg/L	0.100	0.0870	87	80 - 120	2015-04-07
Xylene		5	mg/L	0.300	0.264	88	80 - 120	2015-04-07

Standard (CCV-3)

QC Batch: 120573 | Date Analyzed: 2015-04-07 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		5	mg/L	0.100	0.0915	92	80 - 120	2015-04-07
Toluene		5	mg/L	0.100	0.0881	88	80 - 120	2015-04-07
Ethylbenzene		5	mg/L	0.100	0.0853	85	80 - 120	2015-04-07
Xylene		5	mg/L	0.300	0.261	87	80 - 120	2015-04-07

Standard (CCV-1)

QC Batch: 120644 | Date Analyzed: 2015-04-10 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		5	mg/L	0.100	0.0903	90	80 - 120	2015-04-10
Toluene		5	mg/L	0.100	0.0914	91	80 - 120	2015-04-10
Ethylbenzene		5	mg/L	0.100	0.0918	92	80 - 120	2015-04-10
Xylene		5	mg/L	0.300	0.265	88	80 - 120	2015-04-10

Standard (CCV-2)

QC Batch: 120644 | Date Analyzed: 2015-04-10 | Analyzed By: AK

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		5	mg/L	0.100	0.0825	82	80 - 120	2015-04-10
Toluene		5	mg/L	0.100	0.0813	81	80 - 120	2015-04-10
Ethylbenzene		5	mg/L	0.100	0.0802	80	80 - 120	2015-04-10
Xylene		5	mg/L	0.300	0.240	80	80 - 120	2015-04-10

Standard (CCV-1)

QC Batch: 120764 | Date Analyzed: 2015-04-14 | Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	22.9	92	90 - 110	2015-04-14

Standard (CCV-2)

QC Batch: 120764 | Date Analyzed: 2015-04-14 | Analyzed By: RL

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride		1,2,3,4,6	mg/L	25.0	23.5	94	90 - 110	2015-04-14

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	PJLA	L14-93	Lubbock
2	Kansas	Kansas E-10317	Lubbock
3	LELAP	LELAP-02003	Lubbock
4	NELAP	T104704219-15-11	Lubbock
5	NELAP	T104704392-14-8	Midland
6		2014-018	Lubbock

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.

F	Description
Qsr	Surrogate recovery outside of laboratory limits.
U	The analyte is not detected above the SDL

Result Comments

1 Dilution due to surfactants.
2 Dilution due to surfactants.
3 Dilution due to surfactants.
4 Dilution due to surfactants.

Attachments

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

WO#: 15040132

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: COG

SITE MANAGER: Todd Wells

PROJECT NO.: 112MC06989

PROJECT NAME: Scratch State #1

Lea County, NM

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
390214	3/31/15	1515	W			MW-1	4	N	X		X		X											X				
390215	3/31/15	1355	W			MW-2	4	N	X		X		X											X				
390216	3/31/15	1605	W			MW-3	4	N	X		X		X											X				
390217	3/31/15	1640	W			MW-5	4	N	X		X		X											X				
390218	3/31/15	—	W			DUP	4	N	X		X		X											X				

RELINQUISHED BY: (Signature) — Date: 4/1/15 Time: 14:10
RECEIVED BY: (Signature) — Date: 4/1/15 Time: 14:10
SAMPLED BY: (Print & Initial) Todd Wells TW — Date: 3/31/15 Time:

RELINQUISHED BY: (Signature) — Date: Time:
RECEIVED BY: (Signature) — Date: Time:
SAMPLE SHIPPED BY: (Circle) FEDEX BUS HAND DELIVERED UPS — AIRBILL #: OTHER:

RELINQUISHED BY: (Signature) — Date: Time:
RECEIVED BY: (Signature) — Date: Time:
TETRA TECH CONTACT PERSON: Todd Wells — Results by:

RECEIVING LABORATORY:
ADDRESS:
CITY: STATE: ZIP:
CONTACT: PHONE:
RECEIVED BY: (Signature) IR3 6.3/6.5
DATE: 4-2-15 TIME: 930
RUSH Charges Authorized: Yes (No)

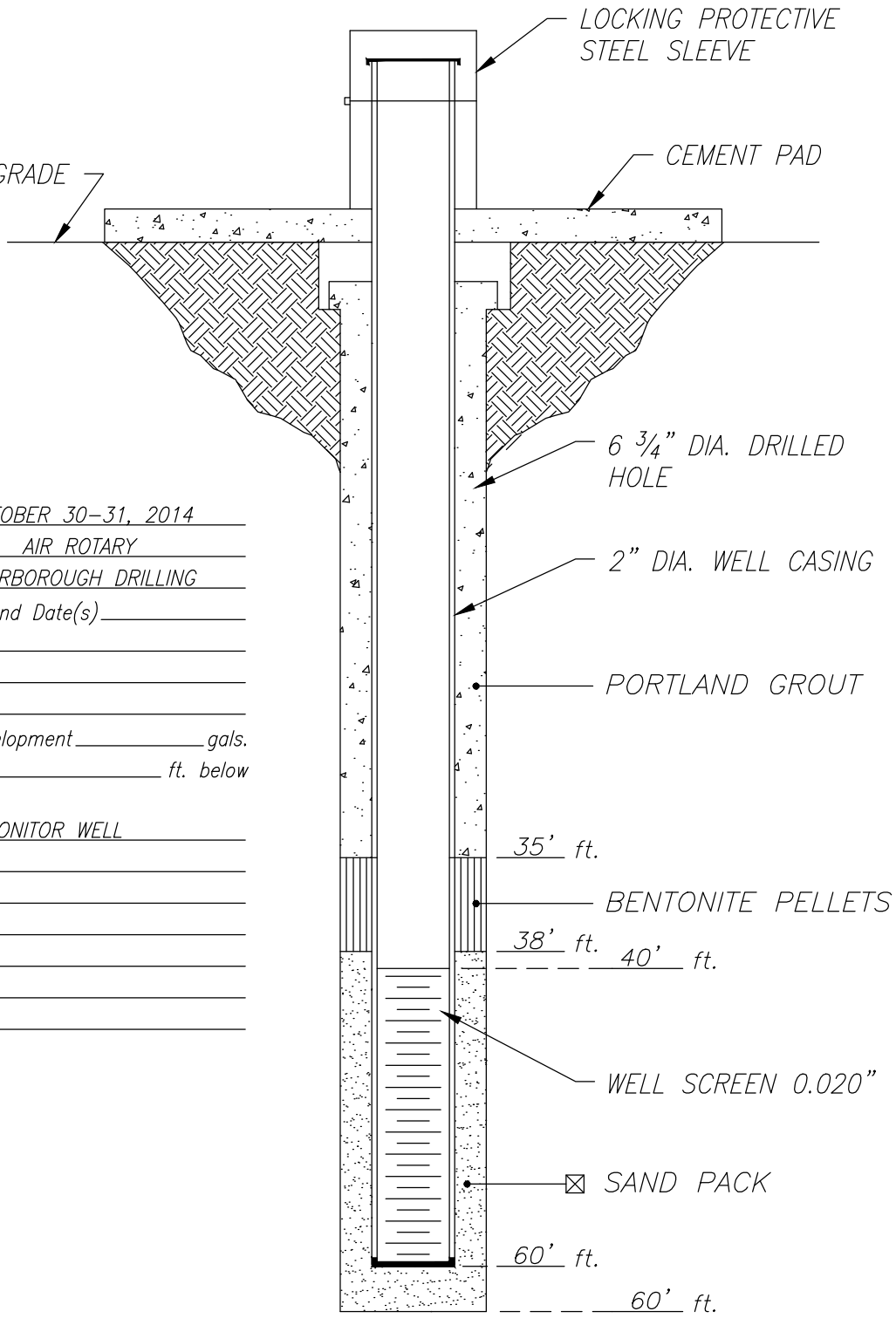
SAMPLE CONDITION WHEN RECEIVED: 4.2

REMARKS: CS 2S 339162 AT

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

APPENDIX D

WELL CONSTRUCTION LOG



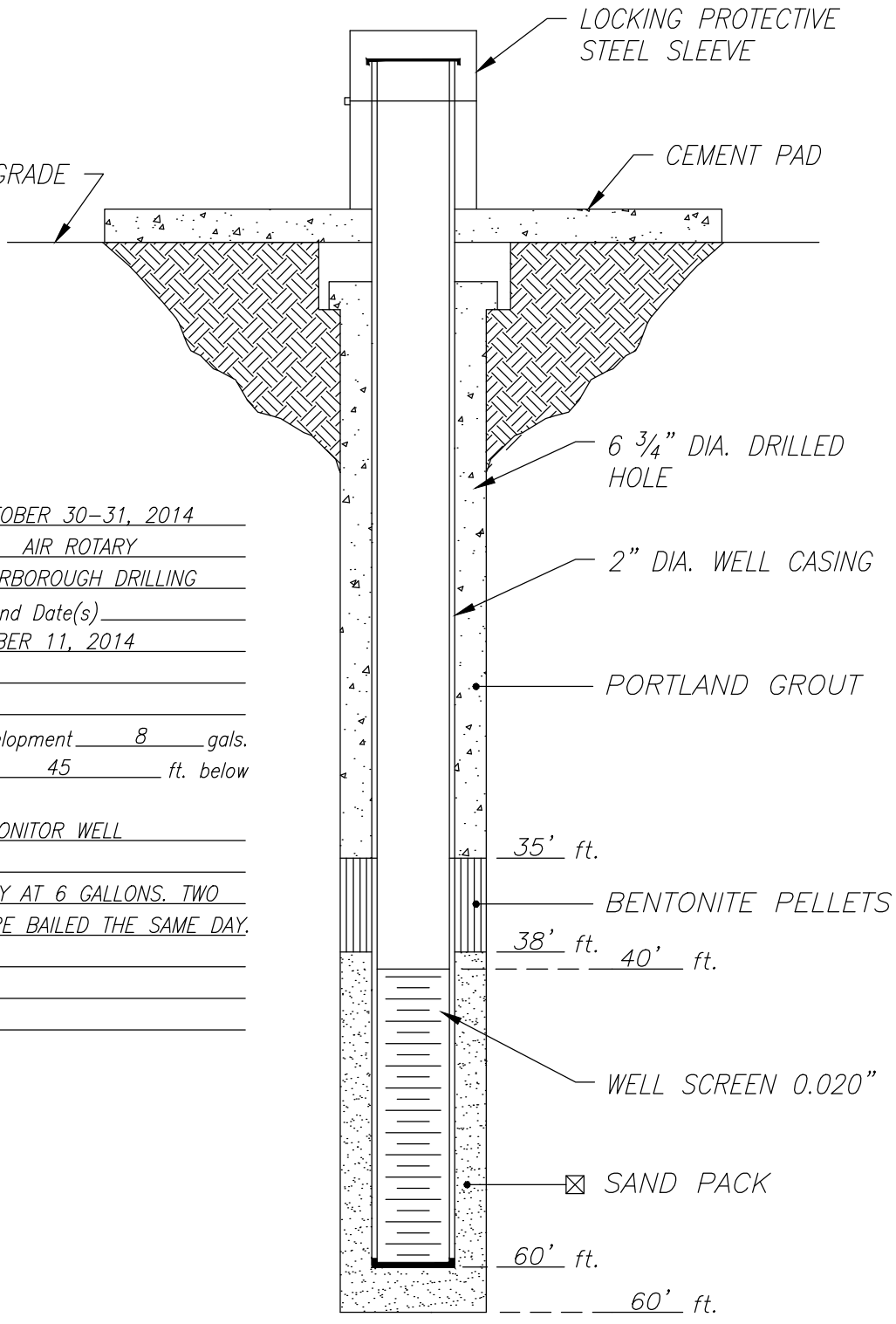
Installation Date(s) OCTOBER 30–31, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) _____

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

Remarks WELL DRY

DATE: 11/18/14	CLIENT: COG OPERATING, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: SCRATCH STATE COM #1	MW-4
	LOCATION: LEA COUNTY, NEW MEXICO	
	112MC06989	

WELL CONSTRUCTION LOG



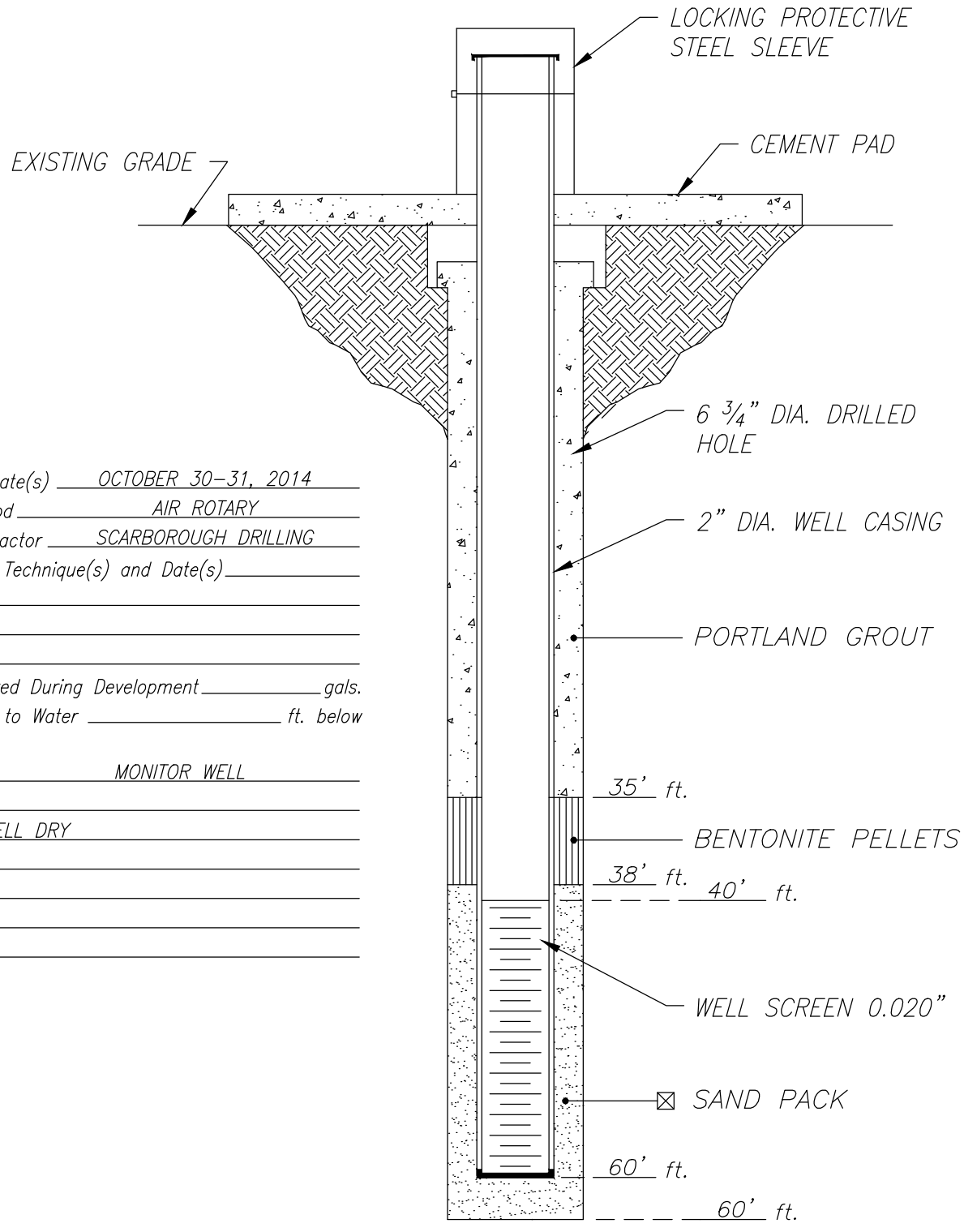
Installation Date(s) OCTOBER 30–31, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s)
BAILER, NOVEMBER 11, 2014

Water Removed During Development 8 gals.
Static Depth to Water 45 ft. below Ground Level
Well Purpose MONITOR WELL

Remarks WELL BAILED DRY AT 6 GALLONS. TWO ADDITIONAL GALLONS WERE BAILED THE SAME DAY.

DATE: 11/18/14	CLIENT: COG OPERATING, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: SCRATCH STATE COM #1	MW-5
	LOCATION: LEA COUNTY, NEW MEXICO	
	112MC06989	

WELL CONSTRUCTION LOG



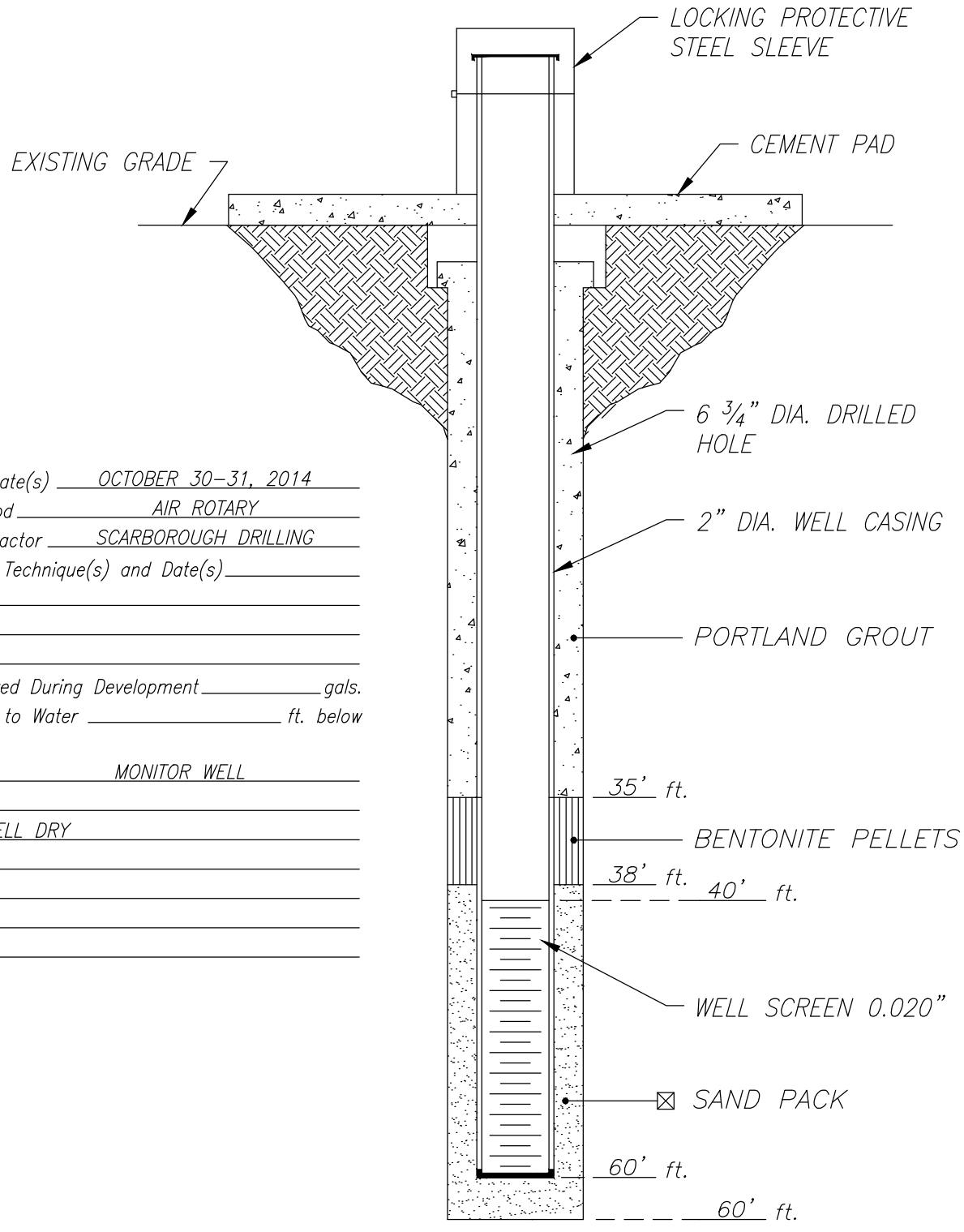
Installation Date(s) OCTOBER 30–31, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) _____

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

Remarks WELL DRY

DATE: 11/18/14	CLIENT: COG OPERATING, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: SCRATCH STATE COM #1	MW-6
	LOCATION: LEA COUNTY, NEW MEXICO	
	112MC06989	

WELL CONSTRUCTION LOG



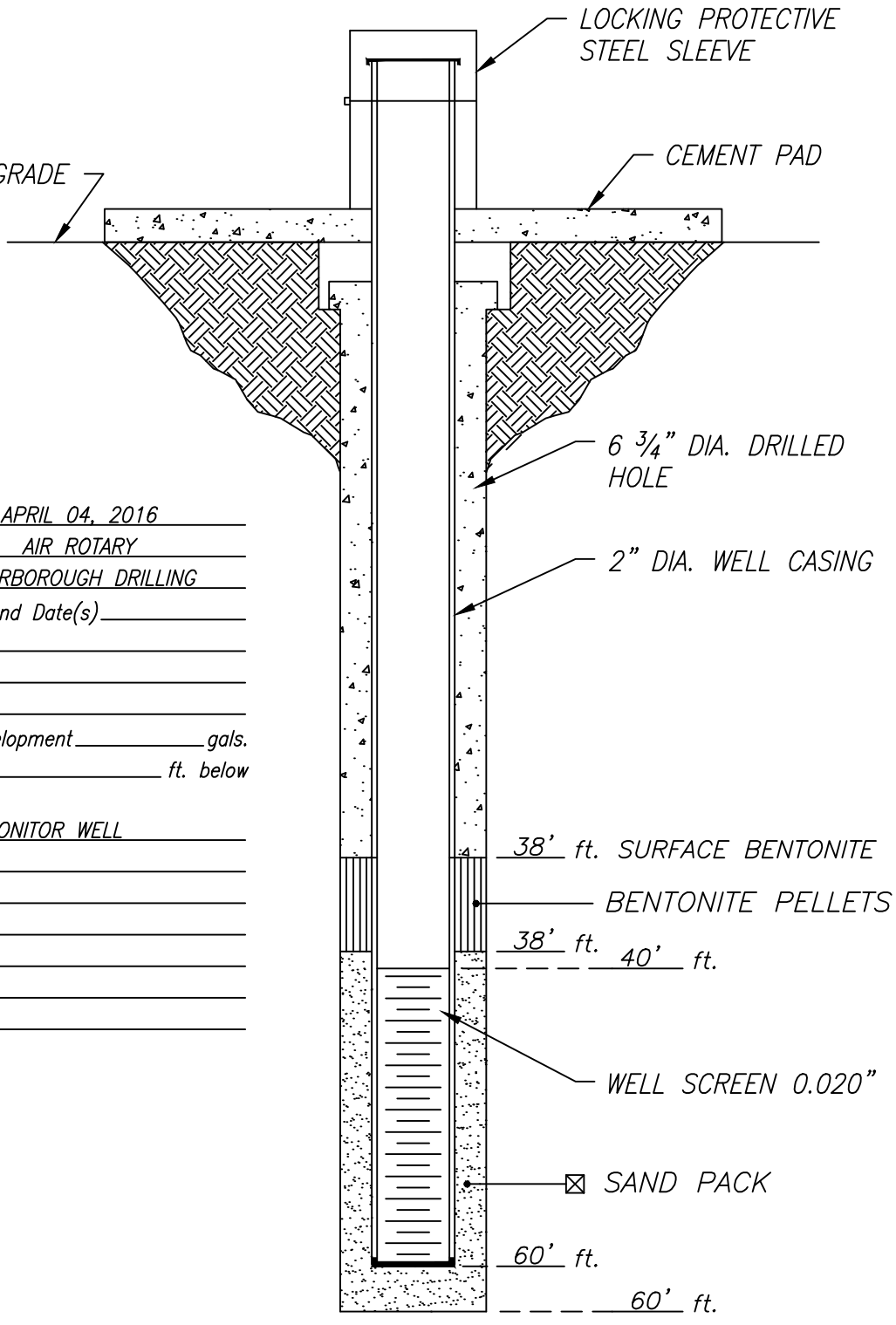
Installation Date(s) OCTOBER 30–31, 2014
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) _____

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

Remarks WELL DRY

DATE: 11/18/14	CLIENT: COG OPERATING, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: SCRATCH STATE COM #1	MW-7
	LOCATION: LEA COUNTY, NEW MEXICO	
	112MC06989	

WELL CONSTRUCTION LOG



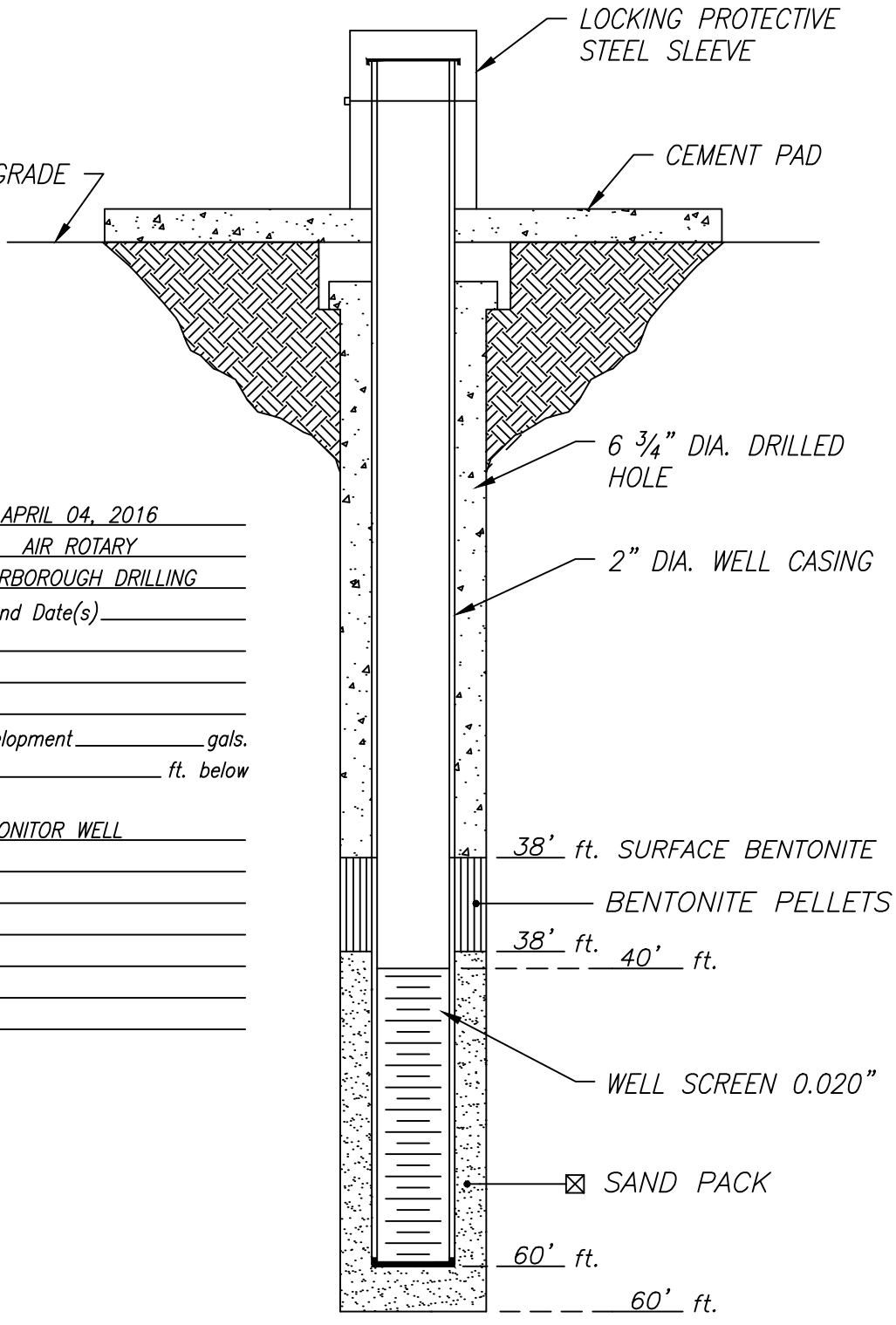
Installation Date(s) APRIL 04, 2016
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) _____

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

Remarks WELL DRY

DATE: 04/04/2016	CLIENT: COG OPERATING, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: SCRATCH STATE COM #1	MW-8
	LOCATION: LEA COUNTY, NEW MEXICO	
	112MC06989	

WELL CONSTRUCTION LOG



Installation Date(s) APRIL 04, 2016
Drilling Method AIR ROTARY
Drilling Contractor SCARBOROUGH DRILLING
Development Technique(s) and Date(s) _____

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

Remarks WELL DRY

DATE: 04/04/2016	CLIENT: COG OPERATING, LLC	WELL NO.
TETRA TECH, INC. MIDLAND, TEXAS	PROJECT: SCRATCH STATE COM #1	MW-9
	LOCATION: LEA COUNTY, NEW MEXICO	
	212C-MD-00415	

APPENDIX E

SAMPLE LOG

Boring/Well: **MW-4**
Project Number: **112MC06989**
Client: **COG Operating, LLC**
Site Location: **Scratch State Com #1**
Location: **Lea County, New Mexico**
Total Depth **60-feet**
Date Installed: **10/30/14**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	--	Tan buff calcareous sand
5-10	--	Tan buff calcareous sand
10-15	--	Tan buff calcareous sand
15-20	--	Tan buff calcareous sand
20-25	--	Buff sandy limestone
25-30	--	Tan fine grain sand
30-35	--	Tan fine grain sand
35-40	--	Tan fine grain sand
40-45	--	Red Clay
45-50	--	Red Clay
50-55	--	Red Clay
55-60	--	Red Clay

Total Depth is 60 feet Groundwater not encountered.

SAMPLE LOG

Boring/Well: **MW-5**
Project Number: **112MC06989**
Client: **COG Operating, LLC**
Site Location: **Scratch State Com #1**
Location: **Lea County, New Mexico**
Total Depth **60-feet**
Date Installed: **10/30/14**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	--	Tan/buff fine grain calcaneus sand
5-10	--	Buff/Tan fine grain sandy limestone
10-15	--	Buff fine grain sandy limestone
15-20	--	Buff fine grain sandy limestone
20-25	--	Tan fine grain calcareous sand
25-30	--	Tan fine grain calcareous sand
30-35	--	Tan fine grain
35-40	--	Reddish tan sandy clay (dry)
40-45	--	Red Clay with granual
45-50	--	Red Clay
50-55	--	Red Clay
55-60	--	Red Clay

Total Depth is 60 feet

Groundwater not encountered during drilling. Groundwater encountered at 44 feet below ground surface the next day.

SAMPLE LOG

Boring/Well: **MW-6**
Project Number: **112MC06989**
Client: **COG Operating, LLC**
Site Location: **Scratch State Com #1**
Location: **Lea County, New Mexico**
Total Depth **60-feet**
Date Installed: **10/30/14**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	--	Tan well sorted medium grain sand
5-10	--	Buff limestone
10-15	--	Buff limestone
15-20	--	Buff sandy limestone
20-25	--	Tan fine grain calcareous sand
25-30	--	Tan fine grain calcareous sand
30-35	--	Tan/red fine grain sand
35-40	--	Tan/red fine grain sand with clay
40-45	--	Red sandy clay
45-50	--	Red clay dry
50-55	--	Red clay dry
55-60	--	Red clay dry

Total Depth is 60 feet Groundwater not encountered.

SAMPLE LOG

Boring/Well: **MW-7**
Project Number: **112MC06989**
Client: **COG Operating, LLC**
Site Location: **Scratch State Com #1**
Location: **Lea County, New Mexico**
Total Depth **60-feet**
Date Installed: **10/30/14**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	--	Tan well sorted medium grain sand
5-10	--	Tan buff fine grain calcareous sand
10-15	--	Tan buff fine grain calcareous sand
15-20	--	Tan/buff fine grain sandy limestone
20-25	--	Tan/buff fine grain sandy limestone, more cemented
25-30	--	Fine grain tan sand
30-35	--	Fine grain tan sand with sandstone well sorted
35-40	--	Red/Tan fine grain sand well sorted
40-45	--	Red/Tan fine grain sand with calcium quartz nodules
45-50	--	Dry red clay
50-55	--	Dry red clay
55-60	--	Dry red clay

Total Depth is 60 feet Groundwater not encountered.

SAMPLE LOG

Boring/Well: **MW-8**
Project Number: **212C-MD-00415**
Client: **COG Operating, LLC**
Site Location: **Scratch State Com #1**
Location: **Lea County, New Mexico**
Total Depth **60-feet**
Date Installed: **04/04/16**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	0.0	Fine grained light tan silty sand with 20% dense caliche
5-8	--	Fine grained light tan silty sand with 20% dense caliche
8-10	0.0	Fine grained light tan silty sand with 10% friable caliche
10-14	--	Fine grained light tan silty sand with 10% friable caliche
14-15	0.0	Fine grained light tan to brown silty sand with 10% friable caliche
15-18	--	Fine grained light tan to brown silty sand with 10% friable caliche
18-20	0.0	Fine grained light tan silty sand with 20% friable caliche
20-22	--	Fine grained light tan silty sand with 20% friable caliche
22-25	0.0	Fine grained light tan silty sand with 60% friable caliche
25-27	--	Fine grained light tan silty sand with 60% friable caliche
27-29	--	Fine grained light brown silty sand with 5% dense caliche and 10% limestone
30-34	--	Fine grained light brown silty sand with 10% limestone
35-38	0.0	Fine grained light brown silty sand with 20% limestone and 20% dry brown/red clay
38-40	--	Fine grained light brown silty sand with 20% limestone and 20% dry brown/red clay
40-42	0.0	Brown to red silt with 20% clay and 30% limestone
42-50	--	Brown to red silt with 20% clay and 30% limestone
50-52	0.0	Brown to red silt with 20% clay and 30% limestone
52-60	0.0	Red clay with fine red wilty sand (20%)

Total Depth is 60 feet Groundwater not encountered.

SAMPLE LOG

Boring/Well: **MW-9**
Project Number: **212C-MD-00415**
Client: **COG Operating, LLC**
Site Location: **Scratch State Com #1**
Location: **Lea County, New Mexico**
Total Depth **60-feet**
Date Installed: **04/04/16**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	0.0	Light tan loamy silty sand
5-6	--	Light tan loamy silty sand
6-10	--	Light tan loamy silty sand with 10% dense caliche
10-13	0.0	Light tan loamy silty sand with 10% dense caliche
13-14	--	Fine grained tan silty sand
14-15	0.0	Fine grained tan silty sand with 10% friable caliche
15-20	0.0	Fine grained tan silty sand with 10% friable sandstone
20-23	--	Fine grained tan silty sand with 10% friable sandstone
23-25	0.0	Fine grained tan silty sand with 25% limestone
25-28	--	Fine grained tan silty sand with 25% limestone
28-30	0.0	Fine grained red to brown silty sand with 30% dense limestone
30-39	--	Fine grained red to brown silty sand with 30% dense limestone
39-40	0.0	Fine grained red to brown silty sand with 30% dense limestone
40-42	--	Fine grained red to brown silty sand with 30% dense limestone
40-42	0.0	Brown to red silt with 20% clay and 30% limestone
42-48	--	Red to brown fine sandy clay with 30% limestone
48-50	0.0	Fine grained sandy red clay (50% clay)
50-53	--	Fine grained sandy red clay (50% clay)
53-56	--	Fine grained sandy red clay (50% clay)
56-60	0.0	Red clay with 20% fine silty sand

Total Depth is 60 feet Groundwater not encountered.

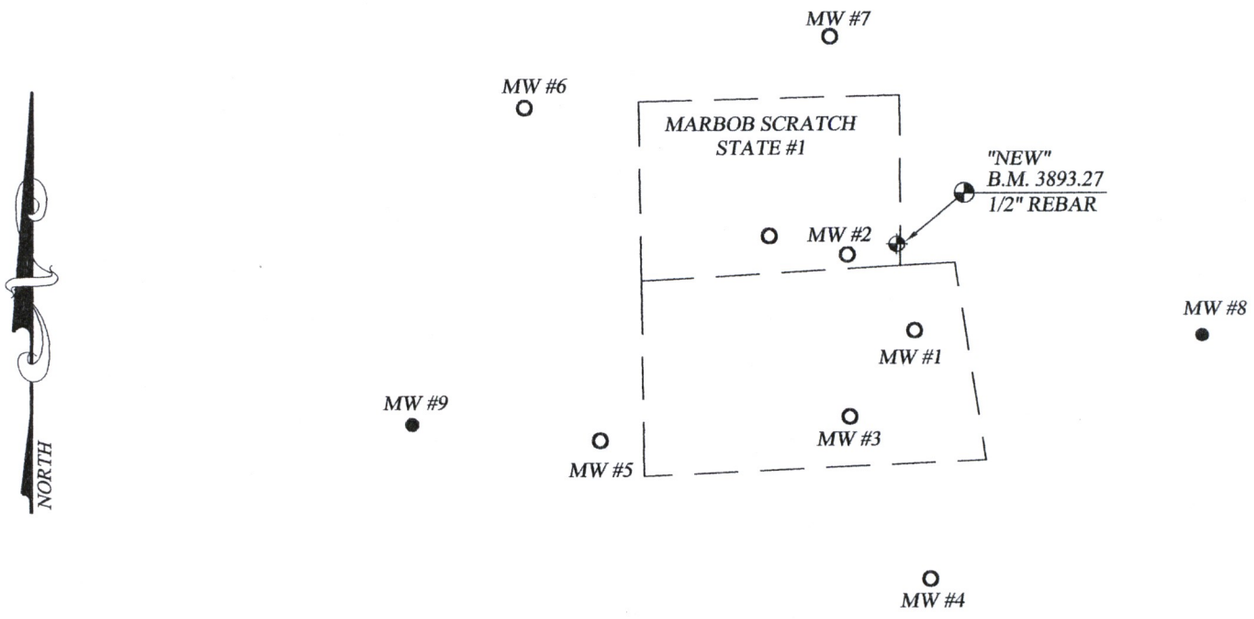
SAMPLE LOG

Boring/Well: **SB-1**
Project Number: **212C-MD-00415**
Client: **COG Operating, LLC**
Site Location: **Scratch State Com #1**
Location: **Lea County, New Mexico**
Total Depth **100-feet**
Date Installed: **04/05/16**

DEPTH (Ft)	OVM	SAMPLE DESCRIPTION
0-5	0.0	Fine grained light brown to tan sand
5-10	0.0	Fine grained tan silty sand with 40% friable caliche
10-12	--	Fine grained tan silty sand with 40% friable caliche
12-20	0.0	Fine grained tan silty sand with 20% friable caliche
20-23	--	Fine grained tan silty sand with 20% friable caliche
23-26	--	Fine grained tan silty sand with 10% limestone
26-30	0.0	Fine grained red to brown silty sand with 20% limestone
30-34	--	Fine grained red to brown silty sand with 20% limestone
34-35	--	Red to brown clay with 30% fine grained sand
35-40	0.0	Red to brown clay with 40% fine grained red to brown silty sand
40-43	--	Red to brown clay with 40% fine grained red to brown silty sand
43-50	0.0	Red clay with 20% red silt
50-60	0.0	Red clay with 20% red silt
60-67	--	Red clay with 20% red silt
67-70	0.0	Red clay with 40% fine grained red sandy silt
70-80	0.0	Red clay with 40% fine grained red sandy silt
80-83	--	Red and blue clay with 10% silt
83-90	0.0	Red clay with 20% red silt
90-100	0.0	Red clay with 20% red silt

Total Depth is 100 feet Groundwater not encountered.

APPENDIX F



COORDINATE TABLE

COORDINATES VALUES SHOWN ARE RELATIVE TO THE NORTH AMERICAN DATUM 1983, "NEW MEXICO EAST ZONE". ELEVATIONS ARE RELATIVE TO THE NORTH AMERICAN VERTICAL DATUM 1988

WELL	COORDINATES	ELEVATIONS
MW #1	631744.7 N 759929.6 E	NATURAL GROUND– 3891.20' TOP OF CONCRETE– 3891.46' TOP OF PVC– 3894.31'
MW #2	631831.0 N 759853.6 E	NATURAL GROUND– 3893.45' TOP OF CONCRETE– 3893.69' TOP OF PVC– 3896.45'
MW #3	631645.9 N 759855.6 E	NATURAL GROUND– 3891.93' TOP OF CONCRETE– 3892.04' TOP OF PVC– 3894.77'
MW #4	631461.4 N 759946.7 E	NATURAL GROUND– 3888.97' TOP OF CONCRETE– 3889.27' TOP OF PVC– 3891.41'
MW #5	631620.0 N 759571.4 E	NATURAL GROUND– 3888.22' TOP OF CONCRETE– 3888.44' TOP OF PVC– 3890.52'
MW #6	631997.0 N 759486.6 E	NATURAL GROUND– 3891.14' TOP OF CONCRETE– 3891.35' TOP OF PVC– 3893.56'
MW #7	632077.3 N 759833.8 E	NATURAL GROUND– 3896.11' TOP OF CONCRETE– 3896.43' TOP OF PVC– 3898.52'
MW #8	631738.1 N 760257.1 E	NATURAL GROUND– 3893.61' TOP OF CONCRETE– 3893.78' TOP OF PVC– 3896.20'
MW #9	631639.1 N 759358.0 E	NATURAL GROUND– 3888.38' TOP OF CONCRETE– 3888.69' TOP OF PVC– 3890.78'

"NEW" BENCHMARK
ELEV=3893.27
N=631843.0
E=759909.6

LEGEND:

- O – DENOTES EXISTING PRODUCTION/OR MONITOR WELL
- ● – DENOTES NEW MONITOR WELL
- ⊕ – DENOTES BENCHMARK 1/2" REBAR

200 0 200 400 Feet

Scale: 1"=200'

I, RONALD J. EIDSON, NEW MEXICO PROFESSIONAL SURVEYOR No. 3239, DO HEREBY CERTIFY THAT THIS SURVEY PLAT AND THE ACTUAL SURVEY ON THE GROUND UPON WHICH IT IS BASED WERE PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION; THAT I AM RESPONSIBLE FOR THIS SURVEY; THAT THIS SURVEY MEETS THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO; AND THAT IT IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

RONALD J. EIDSON Ronald J. Eidson

DATE: 5/03/2016

NEW MEXICO 3239 REGISTERED PROFESSIONAL SURVEYOR

PROVIDING SURVEYING SERVICES
SINCE 1946
JOHN WEST SURVEYING COMPANY
412 N. DAL PASO HOBBS, N.M. 88240
(575) 393-3117 www.jwsc.biz
TBPLS# 10021000

TETRA TECH

MONITOR WELLS LOCATED IN THE SCRATCH STATE COM #1 SITE IN THE NW/4 OF SECTION 24, TOWNSHIP 18 SOUTH, RANGE 33 EAST, N.M.P.M. LEA COUNTY, NEW MEXICO

Survey Date: 4/25/16	CAD Date: 5/2/16		Drawn By: LSL
W.O. No.: 16110309	Rev:	Rel. W.O.: 14111362	Sheet 1 of 1

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