Terracon

March 30, 2017

New Mexico Enegy, Minerals and Natural Resources Department
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
Attn: Dr. Tomas Oberding

Re: 2016 Annual Groundwater Monitoring Report
West Lovington Strawn Unit #8
U/L "L", Sec. 34, T15S, R35E
Lea County, New Mexico
NMOCD Reference No. 1R–2457
Terracon Project No. AR157026

Dear Dr. Oberding:

On behalf of Energen Resources Corporation, Terracon is pleased to submit the *2016 Annual Groundwater Monitoring Report* prepared for the West Lovington Strawn Unit #8 site. Within the report, you will find details of field activities and the results of quarterly groundwater monitoring activities conducted during the 2016 reporting period, along with the following proposed changes anticipated to occur during the 2017 reporting period:

- **Energen proposes to install an additional monitor well (MW-7) to further evaluate the status of groundwater at the site and to delineate the horizontal extent of the dissolved-phase plume.**

If you have any questions or need any additional information, please feel free to contact either of the undersigned at (806) 300-0140

Sincerely,
Terracon

Prepared by:
Joel Lowry
Project Geologist
Lubbock

Reviewed by:
Erin Loyd, P.G.
Senior Associate
Office Manager – Lubbock

2016 Annual Groundwater Monitoring Report

West Lovington Strawn Unit #8
Lea County, New Mexico

March 29, 2017
Terracon Project No. AR157026
NMOCD Reference No. 1RP-2457

Prepared for:
Energen Resources Corporation
Midland, Texas

Prepared by:
Terracon Consultants, Inc.
Lubbock, Texas

Terracon

March 29, 2017

Energen Resources Corporation
3510 North "A" Street
Building A & B
Midland, Texas 79705

Attn: Mr. Andrew Cobb
P: (432) 557 3145
E: Andy.Cobb@energen.com

Re: 2016 Annual Groundwater Monitoring Report
West Lovington Strawn Unit #8
U/L "L", Sec. 34, T15S, R35E
Lea County, New Mexico
NMOCD Reference No. 1RP–2457
Terracon Project No. AR157026

Dear Mr. Cobb:

Terracon is pleased to submit four copies of the 2016 Annual Groundwater Monitoring Report for the above-referenced site.

We appreciate the opportunity to perform these services for Energen Resources Corporation (Energen). Please contact either of the undersigned at (806) 300-0140 if you have questions regarding the information provided in the report.

Sincerely,
Terracon

Prepared by:

for Joel Lowry
Project Geologist
Lubbock

Reviewed by:

Erin Loyd, P.G.
Senior Associate
Office Manager – Lubbock

TABLE OF CONTENTS

Page No.

LIST OF APPENDICES

2016 ANNUAL GROUNDWATER MONITORING REPORT

West Lovington Strawn Unit #8
Unit Letter "L", Section 34, Township 15 South, Range 35 East
Lea County, New Mexico
NMOCD Reference No. 1R – 2457
Terracon Project No. AR157026

1.0 INTRODUCTION

1.1 Site Description

The West Lovington Strawn Unit #8 (WLSU #8) site is located in Unit Letter "L", Section 34, Township 15 South, Range 35 East in Lea County, New Mexico. The geographic coordinates of the site are 32.971362° North latitude and 103.401210° West longitude. The site is located on property owned by Mr. Dan Field. A "Site Location Map" is provided as Figure 1 in Appendix A.

Site Name	West Lovington Strawn Unit #8
Site Location	Latitude 32.971362° North, Longitude 103.401210° West
General Site Description	The site consists of an approximate 2-acre well pad improved with 8 above-ground storage tanks (ASTs), the WLSU #8-R injection well, a plugged unregistered water well approximately 120 feet (ft.) to the east of the injection well and six groundwater monitoring wells.
Landowner	Mr. Dan Field

1.2 Background Information

The WLSU #8 producing well was drilled in 1994 by an operator that is no longer affiliated with the site. In 2001, Energen Resources Corporation (Energen) became the unit operator of the West Lovington Strawn Unit, including the WLSU #8. In 2009, the well was recompleted before being converted into a water injection well in 2010. Review of historical documents suggests the unregistered water well on the eastern portion of the well pad may have been installed to supply fresh water during drilling operations for the Snyder F Com well drilled by Charles Gillaspie Jr. in 1995. Available records with the New Mexico Office of the State Engineer's (NMOSE) do not provide conclusive well completion or owner details.

On March 18, 2009, Energen collected groundwater samples (Battery "A" Water Well, WLSU #11 Windmill, WLSU #20 Water Well and WLSU #8 Water Well) from existing water wells in the vicinity of the WLSU #8 as required by the NMOCD to convert the WLSU #8 producing well into an injection well. Collected groundwater samples were submitted to Martin Water Labs of Midland,

submitted to Martin Water Labs of Midland, Texas, for analysis of pH, bicarbonate, calcium, magnesium, sodium and/or potassium, sulfate, chloride, iron, barium, total solids, hydrogen sulfide and resistivity.

Laboratory analytical results indicated the detected chloride concentrations were less than the applicable New Mexico Water Quality Control Commission (NMWQCC) Human Health Standard of 250 milligrams per liter (mg/L) in each of the submitted groundwater samples with the exception of the groundwater sample collected from the WLSU #8 water well (298 mg/L). Laboratory analytical results are provided in Appendix C.

On October 26, 2009, Energen filed a Release Notification and Corrective Action (Form C-141) with the NMOCD, indicating that elevated chloride concentrations were detected in the unregistered water well on the eastern portion of the WLSU #8 well pad. A copy of the Release Notification and Corrective Action (Form C-141) is provided as Appendix E.

On September 11, 2012, Energen proposed to install five groundwater monitoring wells around the affected, unregistered water well in an effort to further characterize chloride impacts to groundwater. The proposal was subsequently approved by the NMOCD.

On December 13, 2012, Energen installed five groundwater monitoring wells (MW-1 through MW-5) in the vicinity of the unregistered water well in an effort to further characterize impacts to groundwater. Groundwater samples were collected from each of the monitoring wells and submitted to Hall Environmental Analysis Laboratory, Inc. of Albuquerque, New Mexico, for analysis of chloride in accordance with EPA Method 300.0, volatile organic compounds (VOCs) in accordance with EPA SW-846 Method 8260B and polycyclic aromatic hydrocarbons (PAHs) in accordance with EPA SW-846 Method 8310.

Chloride was detected at concentrations above applicable laboratory reporting limits (RLs) in the groundwater samples collected from monitoring wells MW-1 through MW-5. Chloride concentrations detected in the groundwater samples collected from the on-site monitoring were less than the applicable NMWQCC Human Health Standard of 250 mg/L in each of the submitted groundwater samples with the exception of the groundwater sample collected from MW-4. The groundwater sample collected from monitor well MW-4 exhibited a chloride concentration of 390 mg/L. VOCs were not detected at concentrations above their applicable laboratory RLs in the groundwater samples collected from monitoring wells MW-1 though MW-5. Select PAHs; including phenanthrene, flouranthene and pyrene, were detected at concentrations above their applicable laboratory RLs in the groundwater samples collected from monitoring wells MW-1 through MW-5. The maximum detected concentrations of phenanthrene (0.94 mg/L), flouranthene (0.56 mg/L), and pyrene (0.33 mg/L) were detected in the groundwater sample collected from monitoring well MW-2. The PAH constituents detected in the analyzed groundwater samples are not defined in the NMWQCC Human Health Standards.

On August 3, 2015, a *Limited Groundwater Investigation Proposal* was prepared and submitted to the NMOCD proposing investigation and remedial activities in support of achieving NMOCD and landowner-approved closure at the site. The proposal included plugging the unregistered water-well, installing an additional groundwater monitoring well proximate to the unregistered water well's former location, and collecting groundwater samples from each of the on-site monitoring wells. The *Limited Groundwater Investigation Proposal* was subsequently approved.

On September 24, 2015, as per the NMOCD-approved *Limited Groundwater Investigation Proposal*, the unregistered water well on the eastern portion of the well pad was plugged in accordance with the NMOSE-approved *Well Plugging Plan*.

On September 24, 2015, groundwater monitoring well MW-6 was installed approximately 10 feet to the east of the unregistered water well's former location. The groundwater monitoring well was installed to a total depth of approximately 70 ft. bgs. During the installation of monitoring well MW-6, soil samples were collected from the 4.5 to 5 ft., 9.5 to 10 ft., 19.5 to 20 ft., 29.5 to 30 ft., 39.5 to 40 ft. and 49.5 to 50 ft. drilling intervals and submitted to Xenco Laboratories, Inc. of Midland, Texas, for analysis of chloride concentrations utilizing EPA Method 300.0.

Laboratory analytical results indicate chloride concentrations ranged from 14.5 milligrams per kilogram (mg/kg) for the soil sample collected from the 4.5 to 5 ft. drilling interval to 3.50 mg/kg for the soil sample collected from the 29.5 to 30 ft. drilling interval. Soil samples collected from the 4.5 to 5 ft. and 49.5 to 50 ft. drilling intervals were also analyzed for concentrations of BTEX utilizing EPA SW-846 Method 8260B and TPH utilizing EPA SW-846 Method 8015M. Analytical results indicate BTEX and TPH concentrations were less than the applicable laboratory RL in each of the analyzed soil samples.

On October 8, 2015, groundwater monitoring wells MW-1 through MW-6 were gauged and sampled using EPA Standard Methods. Groundwater monitoring wells were purged until consistent values (i.e., less than 10% variance between consecutive readings) were obtained for pH, temperature and conductivity. Subsequent to sufficient recharge, one groundwater sample was collected from each of the groundwater monitoring wells utilizing low-flow sampling equipment. Collected groundwater samples were placed in laboratory-supplied containers appropriate to the analyses requested and placed on ice in a cooler. Sample coolers and completed chain-of-custody forms were submitted to Xenco Laboratories, Inc. of Midland, Texas, for analysis of anions (chloride, fluoride, nitrate and sulfate) in accordance with EPA Method 300.0; VOCs in accordance with EPA SW-846 Method 8260B; PAHs in accordance with EPA Method 8270c; arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, selenium and silver in accordance with EPA SW-846 6020; and mercury in accordance with EPA 7470A.

Laboratory analytical results from groundwater samples collected from monitoring wells MW-1

though MW-6 indicated VOCs and PAHs were below the applicable laboratory RLs in each of the submitted groundwater samples. Detected anion concentrations; including chloride fluoride, nitrate and sulfate, were below applicable NMWQCC Human Health Standards in each of the submitted groundwater samples with the exception of the chloride concentrations in samples collected from monitor wells MW-2 (821 mg/L) and MW-6 (544 mg/L). Metal concentrations; including arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, selenium, silver and mercury were below applicable NMWQCC Human Health Standards in each of the submitted groundwater samples with the exception of the iron concentrations in samples collected from monitor wells MW-1 (2.96 mg/L), MW-3 (1.23 mg/L), MW-4 (9.15 mg/L) and MW-6 (1.88 mg/L). Please refer to Tables 3 through 6 in Appendix D for a complete summary of historical groundwater chemistry data.

1.3 Scope of Work

Terracon's scope of work includes oversight of groundwater monitoring activities and preparation and submission of an *Annual Groundwater Monitoring Report* in accordance with the NMOCD letter, dated May 1998, by April 1st of each year. Groundwater monitoring activities include conducting quarterly groundwater monitoring events at the site. Quarterly groundwater monitoring events include measuring the static water levels in the monitor wells, checking for the presence of PSH, and the collection of groundwater samples from each of the on-site monitor wells not exhibiting a measurable thickness of PSH. In accordance with the approved scope of work, Terracon conducted quarterly groundwater monitoring events on March 18, June 16, August 23, and Decemeber 30, 2016.

1.4 Standard of Care

Activities conducted prior to Terracon assuming oversight of the project (beginning on April 10, 2015) were performed by previous consultants hired by Energen. As such, Terracon makes no assumptions or warranties regarding the previous consultants services being performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time period. Terracon makes no warranties, either express or implied, regarding the findings, conclusions or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies or other third parties supplying information used in the preparation of the report.

1.5 Additional Scope Limitations

Findings, conclusions and recommendations resulting from these services are based upon information derived from the on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent,

inaccessible, unobservable, non-detectable or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic materials, petroleum products, or other latent conditions beyond those identified during this remediation activities. Subsurface conditions may vary from those encountered at specific borings or wells or during other surveys, tests, assessments, investigations or exploratory services; the data, interpretations, findings, and our recommendations are based solely upon data obtained at the time and within the scope of these services.

1.6 Reliance

This report has been prepared for the exclusive use of Energen and any authorization for use or reliance by any other party (except a governmental entity having jurisdiction over the site) is prohibited without the express written authorization of Energen and Terracon. Any unauthorized distribution or reuse is at the client's sole risk. Notwithstanding the foregoing, reliance by authorized parties will be subject to the terms, conditions and limitations stated in this report, and Terracon's Terms and Conditions. The limitation of liability defined in the terms and conditions is the aggregate limit of Terracon's liability to the client and all relying parties unless otherwise agreed in writing.

2.0 FIELD ACTIVITIES

2.1 Groundwater Monitoring

Quarterly groundwater monitoring events were conducted on March 18 (1Q2016), June 16 (2Q2016), August 23 (3Q2016) and December 30, 2016 (4Q2016). Quarterly groundwater monitoring events included measuring the static water level in the on-site monitor wells, checking for the presence of phase separated hydrocarbons (PSH), and the collection of groundwater samples from each of the on-site monitor wells. Prior to sample collection, the monitor wells were purged a minimum of three (3) well volumes utilizing disposable Teflon bailers then allowed to recharge. Upon allowing the wells to recharge, groundwater samples were collected utilizing a clean, disposable Teflon bailer and placed in laboratory-supplied containers appropriate to the analyses requested and placed on ice in a cooler. The sample coolers and completed chain-of-custody forms were delivered to Xenco Laboratories in Midland, Texas for analysis of Chloride using EPA Method 300.0.

Groundwater elevation gauging data collected during the respective quarterly sampling events were used to construct groundwater gradient maps, which are included as Figures 2a through 2d in Appendix A. Groundwater flow direction was relatively consistent during each quarter of 2016 at gradient ranges from 0.003 foot per foot (ft/ft) to 0.004 ft/ft in the southeasterly direction. Groundwater elevation data is summarized in Table 1 in Appendix B.

3.0 LABORATORY ANALYTICAL METHODS

The groundwater samples collected from the on-site monitor wells were analyzed for chloride using EPA Method 300.0. Laboratory results from the analysis of groundwater samples collected from the monitor wells are summarized in Table 2 in Appendix B and presented on Figures 3a through 3d in Appendix A. The executed chain-of-custody forms and laboratory data sheets are provided in Appendix C.

4.0 DATA EVALUATION

4.1 Groundwater Samples

Laboratory analytical results from groundwater samples collected on March 18 (1Q2016), June 16 (2Q2016), August 23 (3Q2016) and December 30, 2016 (4Q2016) were compared to NMOCD regulatory standards based on New Mexico Water Quality Control Commission (NMWQCC) Drinking Water Standards.

Monitor Well MW-1

- Laboratory analytical results indicated chloride concentrations were below the NMOCD regulatory standard during each quarter of 2016. The detected chloride concentrations ranged from 19.5 mg/L during the 2nd Quarter of 2016 to 29.8 mg/L during the 3rd Quarter of 2016.

Monitor Well MW-2

- Laboratory analytical results indicated chloride concentrations exceeded the NMOCD regulatory standard during each quarter of 2016. The detected chloride concentrations ranged from 493 mg/L during the 1st Quarter of 2016 to 1,450 mg/L during the 3rd Quarter of 2016.

Monitor Well MW-3

- Laboratory analytical results indicated chloride concentrations were below the NMOCD regulatory standard during each quarter of 2016. The detected chloride concentrations ranged from 21.4 mg/L during the 2nd Quarter of 2016 to 29.7 mg/L during the 3rd Quarter of 2016.

Monitor Well MW-4

- Laboratory analytical results indicated chloride concentrations exceeded the NMOCD regulatory standard during the 3rd Quarter of 2016. The detected chloride concentrations ranged from 123 mg/L during the 2nd Quarter of 2016 to 255 mg/L during the 3rd Quarter of 2016.

Monitor Well MW-5

- Laboratory analytical results indicated chloride concentrations were below the NMOCD regulatory standard during each quarter of 2016. The detected chloride concentrations ranged from 20.2 mg/L during the 2nd Quarter of 2016 to 28.2 mg/L during the 4th Quarter of 2016.

Monitor Well MW-6

- Laboratory analytical results indicated chloride concentrations exceeded the NMOCD regulatory standard during each quarter of 2016. The detected chloride concentrations ranged from 1,360 mg/L during the 1st Quarter of 2016 to 1,570 mg/L during the 2nd Quarter of 2016.

5.0 SUMMARY

- Currently, there are six groundwater monitor wells (MW-1 through MW-6) located at the site.
- Monitor wells MW-1 through MW-6 were sampled during each quarter of 2016.
- Chloride concentrations in groundwater samples collected from monitor wells MW-1, MW-3 and MW-5 were below the NMOCD regulatory standard during each quarter of 2016.
- The detected chloride concentrations in monitor wells MW-2, MW-4 and MW-6 exceeded the NMOCD regulatory standards during one or more quarters of the 2016 reporting period.
- The groundwater flow direction was relatively consistent during the 2016 reporting period, ranging from 0.003 ft/ft to 0.004 ft/ft in the southeasterly direction.

6.0 ANTICIPATED ACTIONS

- Monitor wells MW-1 through MW-6 will be monitored and sampled quarterly for the presence of chloride during the 2017 reporting period.
- Based on laboratory analytical results from groundwater samples collected during the 2016 monitoring period, Energen proposes to install an additional monitor well (MW-7) to further evaluate the status of groundwater at the site and to delineate the horizontal extent of the plume. The proposed monitor wells will be installed during calendar year 2017, pending NMOCD and landowner approval and receipt of the proper drilling permit from the NMOSE. A “Proposed Monitor Well Location Map” is provided as Figure 4.
- An *Annual Groundwater Monitoring Report* will be prepared detailing field activities and the results of groundwater monitoring activities conducted during the 2017 reporting period.

7.0 DISTRIBUTION

Copy 1: Dr. Tomas Oberding, Hydrologist
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Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

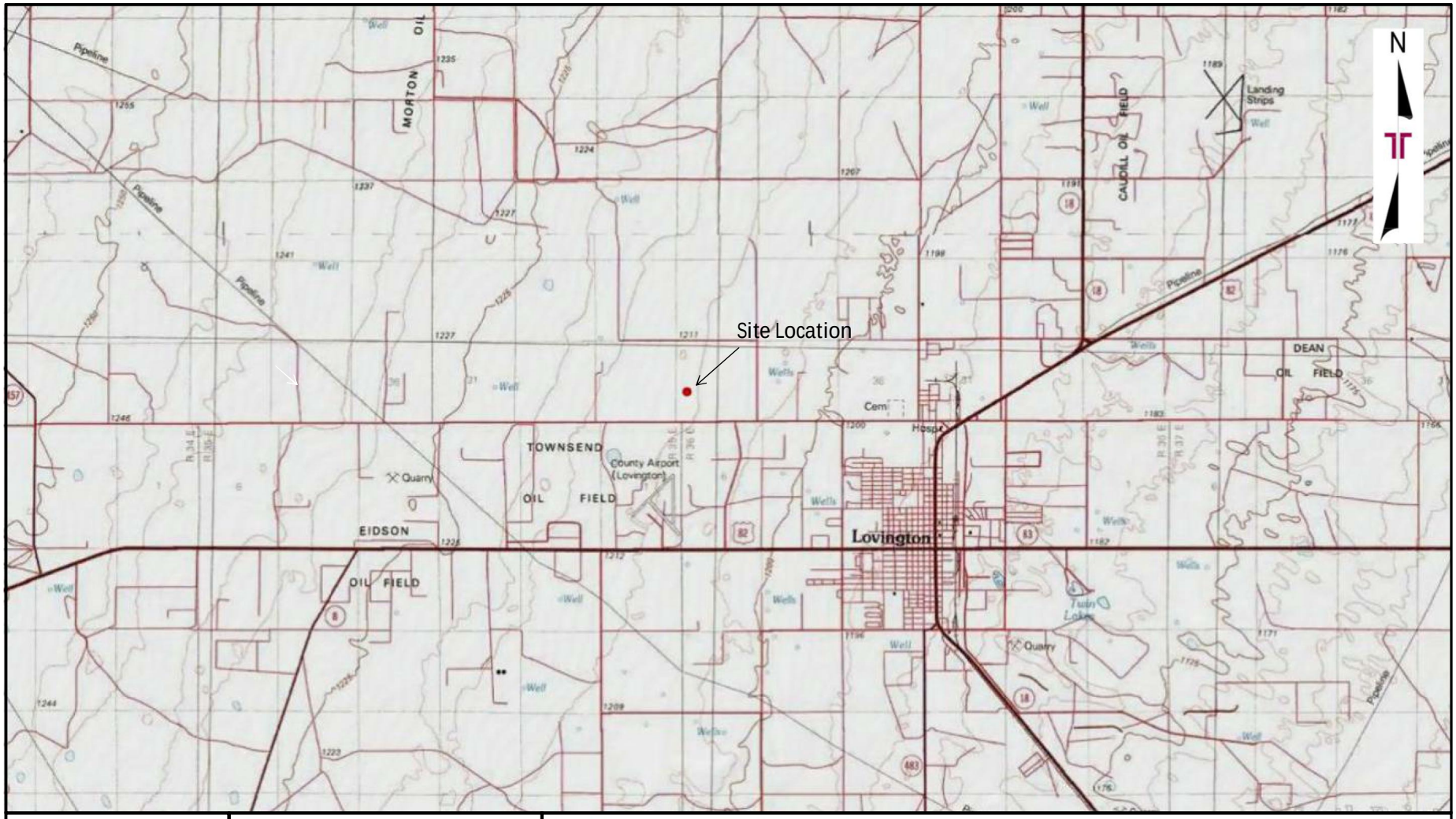
Copy 2: Ms. Olivia Yu
New Mexico Oil Conservation Division
District 1
1625 N. French Drive
Hobbs, New Mexico 88240

Copy 3: Mr. Andrew Cobb
Energen Resources Corporation
3510 North “A” Street
Midland, Texas 79705
Andy.Cobb@energen.com

Copy 4: Mr. Joel Lowry
Terracon Consultants
5827 50th Street, Suite 1
Lubbock, Texas 79424
joel.lowry@terracon.com

APPENDIX A

Figure 1– Site Location Map
Figure 2a – Groundwater Gradient Map (1Q2016)
Figure 2b – Groundwater Gradient Map (2Q2016)
Figure 2c – Groundwater Gradient Map (3Q2016)
Figure 2d – Groundwater Gradient Map (4Q2016)
Figure 3a – Groundwater Concentration Map (1Q2016)
Figure 3b – Groundwater Concentration Map (2Q2016)
Figure 3c – Groundwater Concentration Map (3Q2016)
Figure 3d – Groundwater Concentration Map (4Q2016)



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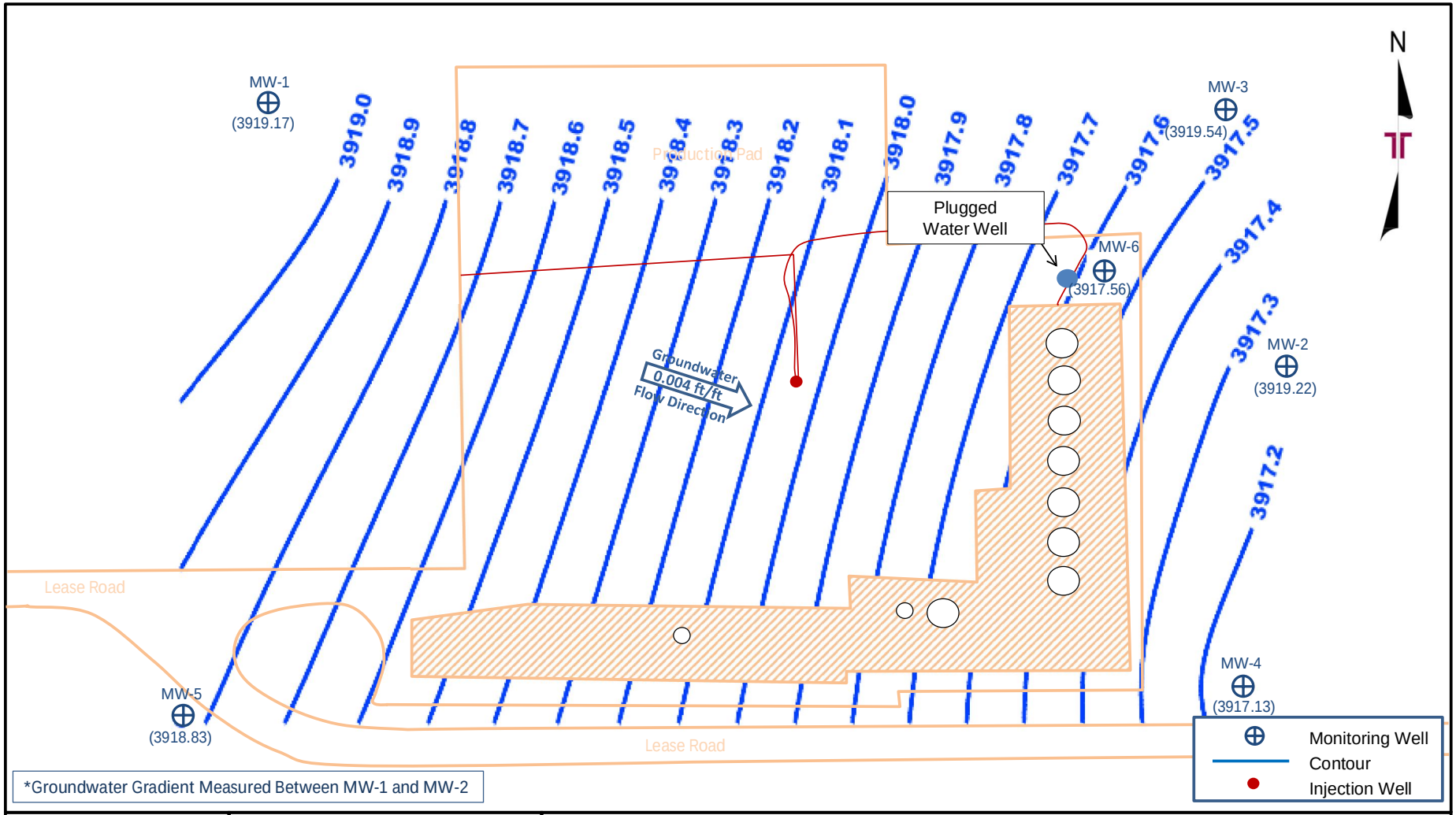
Source:	Google Earth
Date:	2014

Terracon
Consulting Engineers & Scientists
5827 50th St. Suite 1 Lubbock, Texas 79424
PH. (806) 300-0104 FAX. (806) 797 0947

Figure 1– Topographic Map

West Lovington Strawn Unit #8
32.971362° N, -103.401210 ° W
Lea County, New Mexico



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Source:	Google Earth
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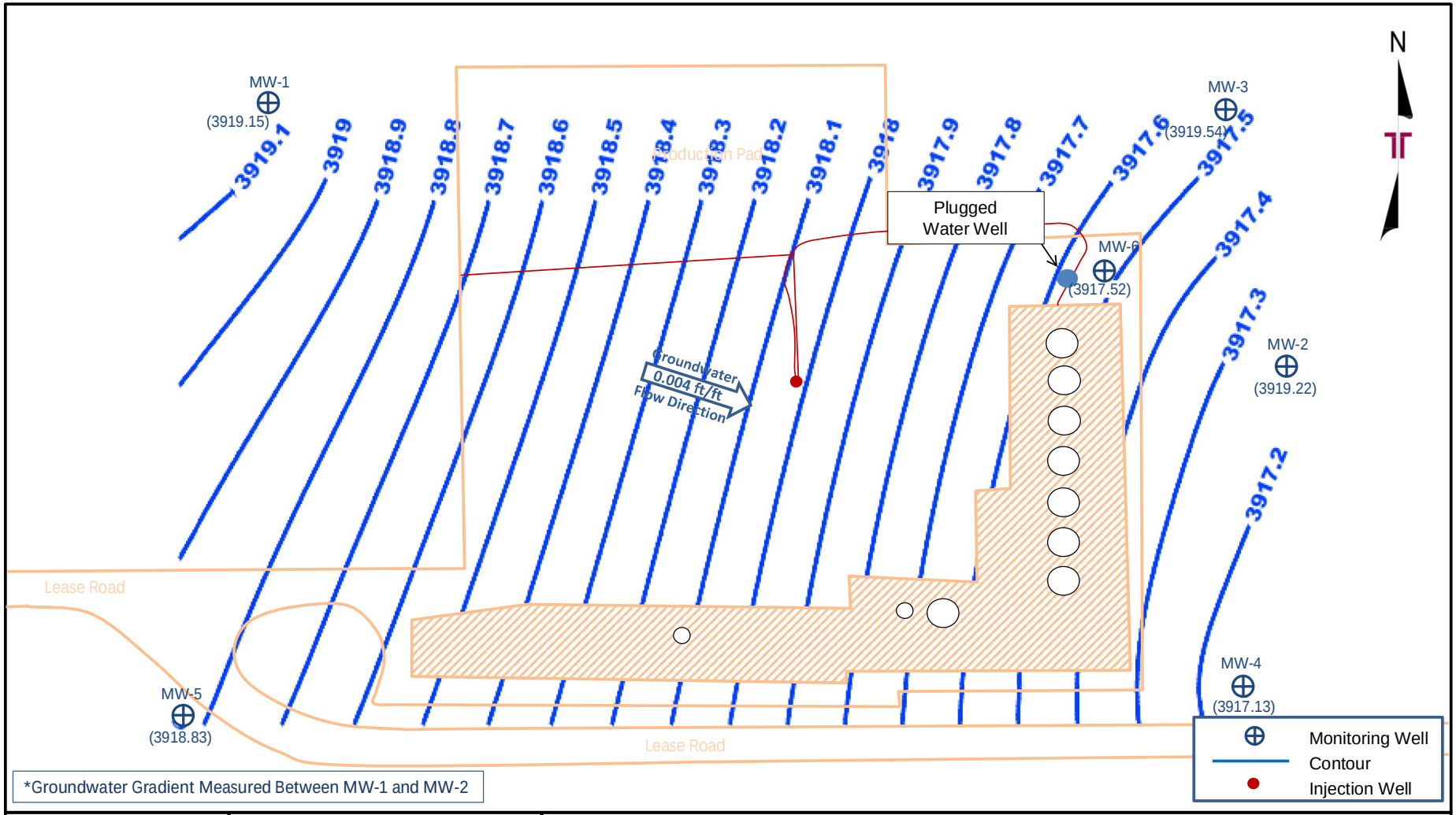
Figure 2a –Groundwater Gradient Map – 1Q2016

West Lovington Strawn Unit #8
32.971362° N, -103.401210° W
Lea County, New Mexico



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Date:	2014

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Figure 2b –Groundwater Gradient Map – 2Q2016

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico

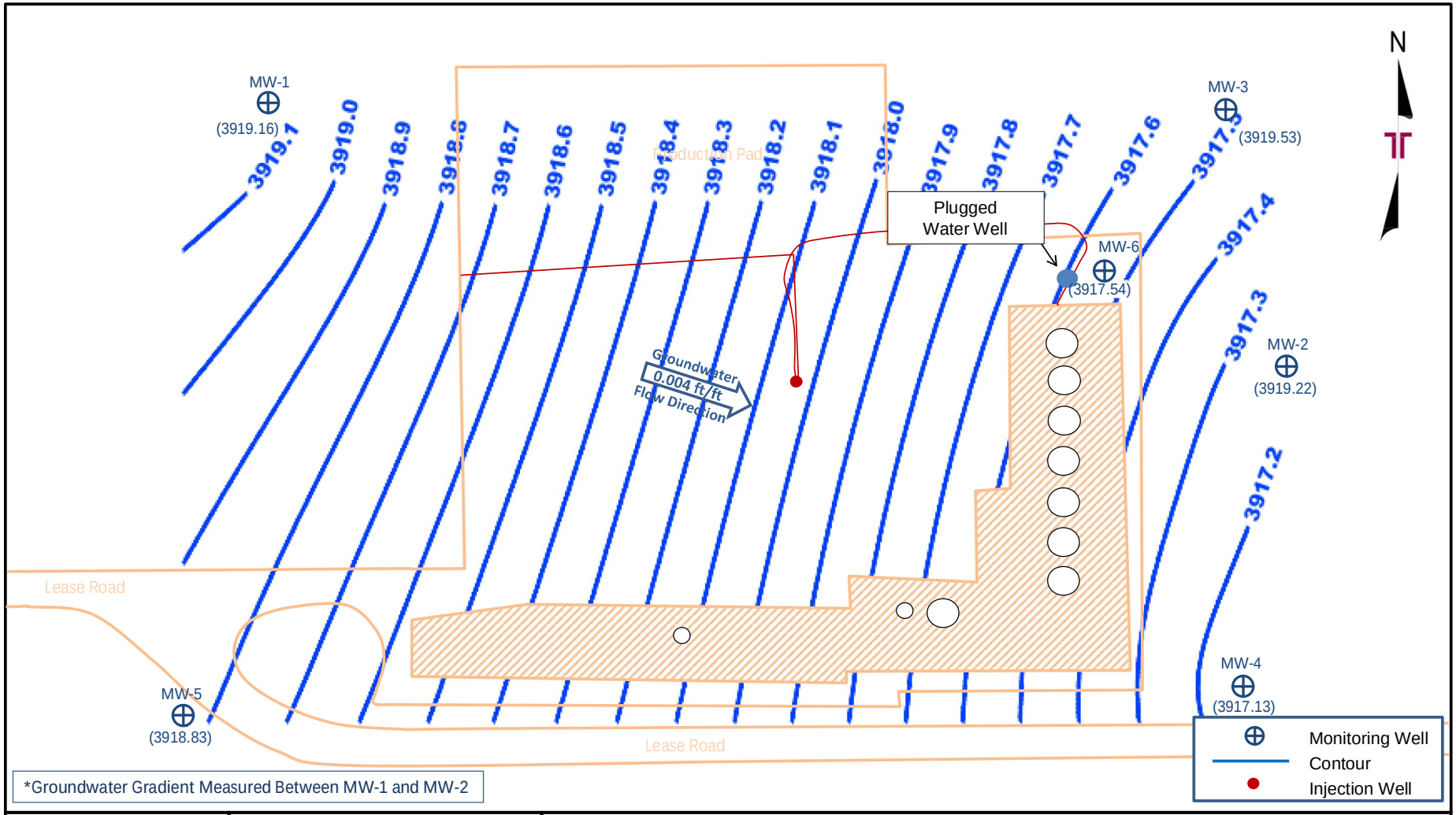

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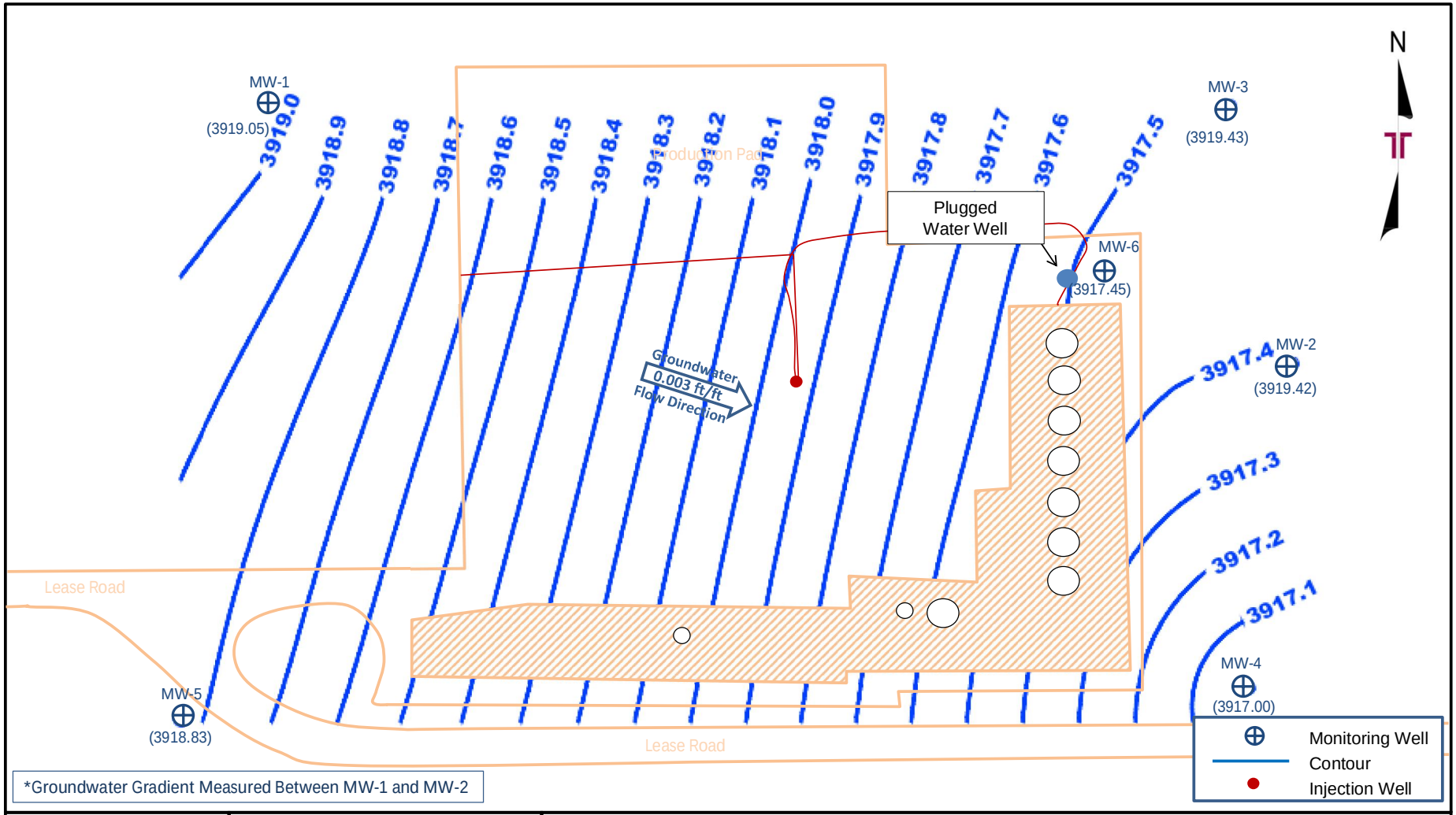
Figure 2c –Groundwater Gradient Map – 3Q2016

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico



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Source:	Google Earth
Date:	2014

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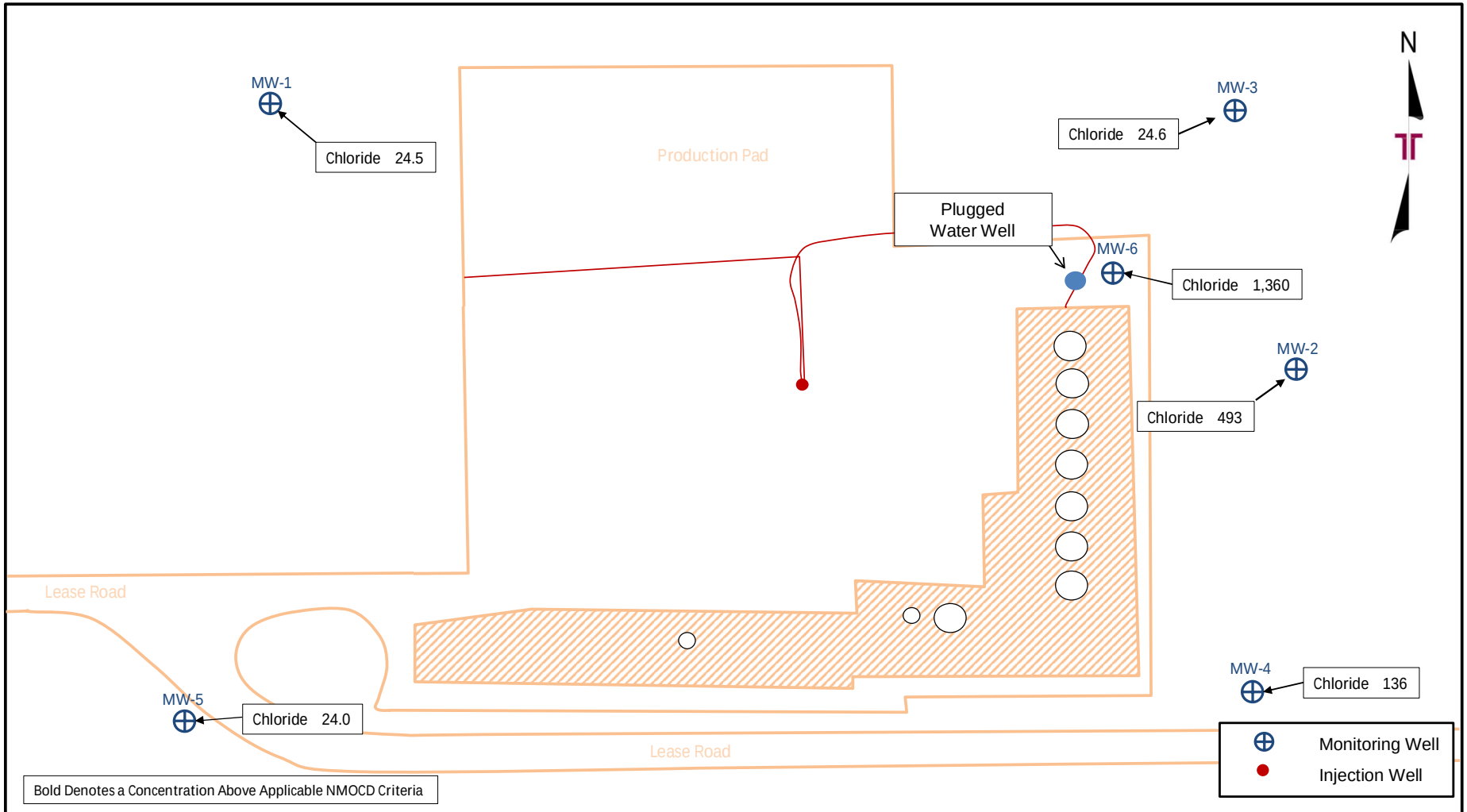
Figure 2d –Groundwater Gradient Map – 4Q2016

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico



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Source:	Google Earth
Date:	2014

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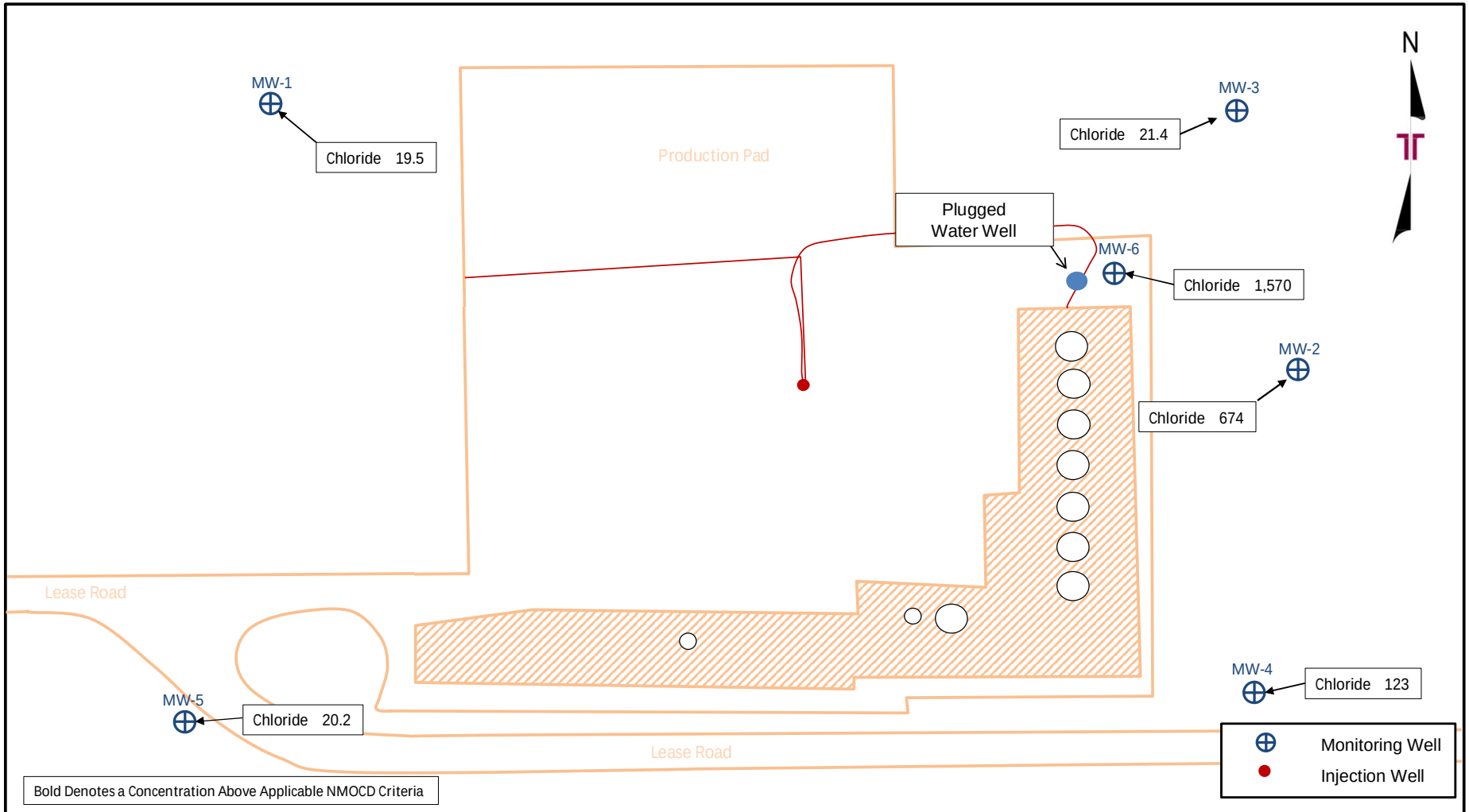
Figure 3a –Groundwater Concentration Map – 1Q2016

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico



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Source:	Google Earth
Date:	2014

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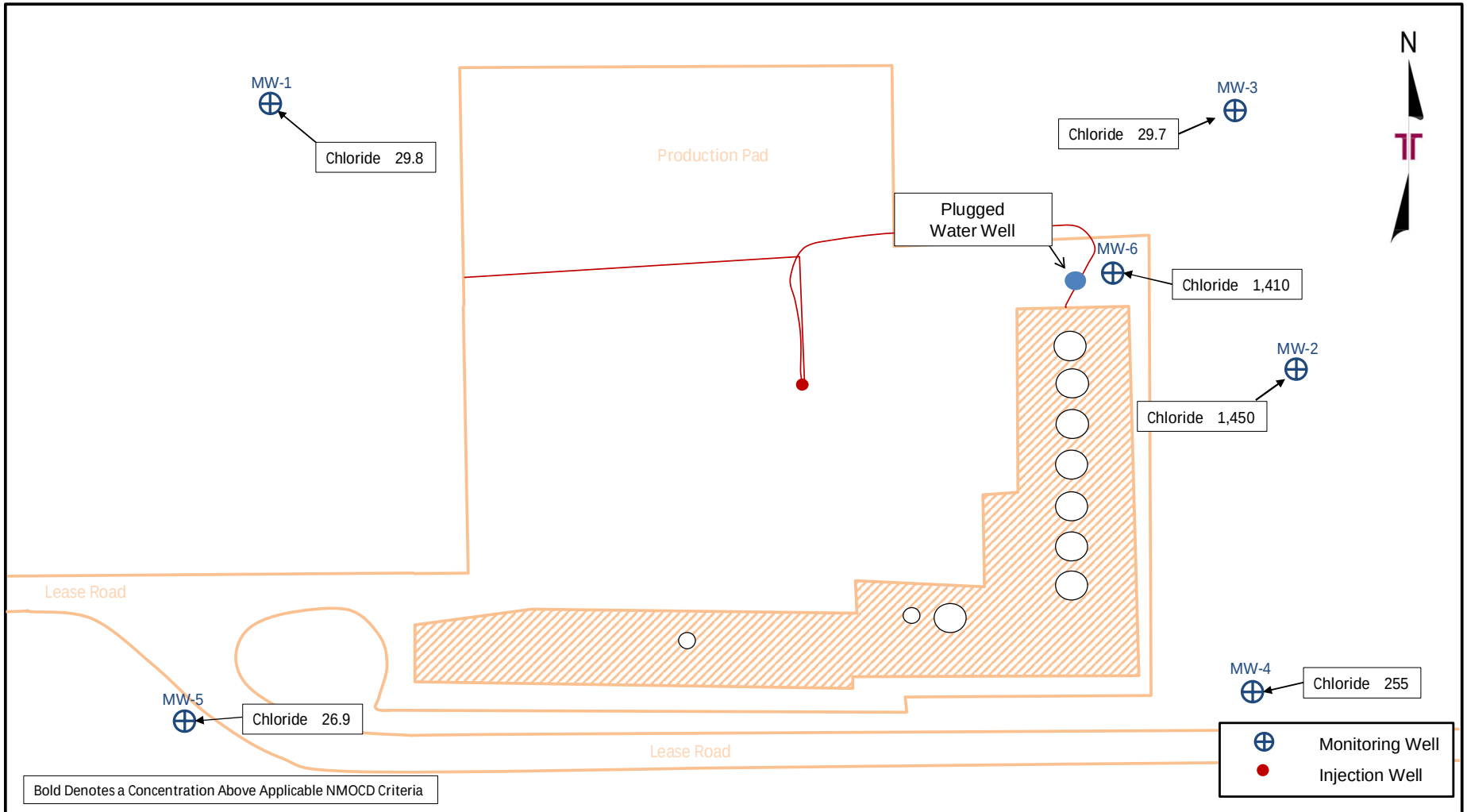
Figure 3b –Groundwater Concentration Map – 2Q2016

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico



Project No.	AR157026
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Source:	Google Earth
Date:	2014

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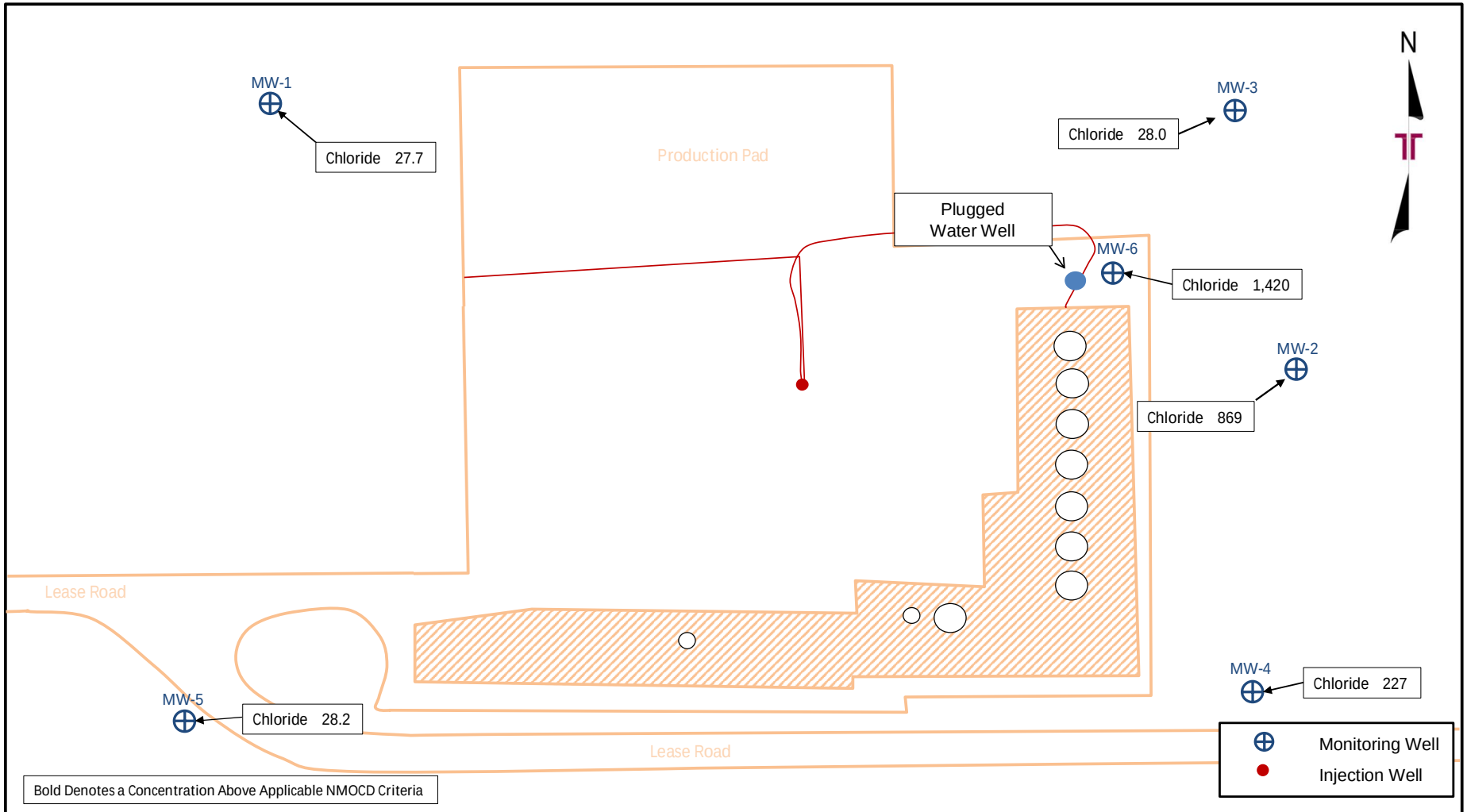
Figure 3c –Groundwater Concentration Map – 3Q2016

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico



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Source:	Google Earth
Date:	2014

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Figure 3d –Groundwater Concentration Map – 4Q2016

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico

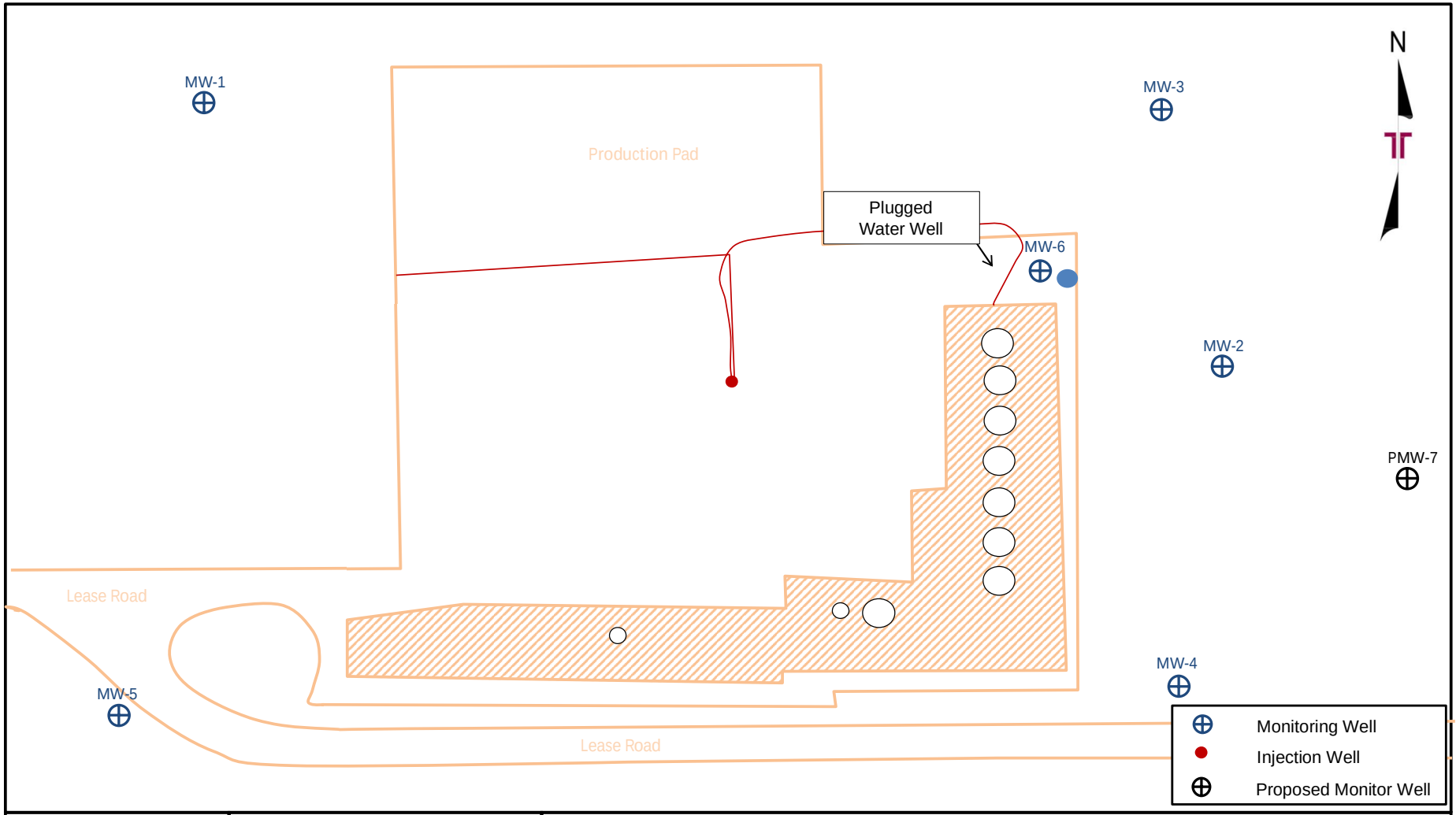

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Figure 4 –Proposed Monitor Well Location Map

West Lovington Strawn Unit #8
32.971362°, -103.401210°
Lea County, New Mexico

APPENDIX B

Table 1 – Groundwater Elevation Data
Table 2 – Groundwater Analytical Summary - Chloride

TABLE 1
2016 ANNUAL REPORT

GROUNDWATER ELEVATION DATA
WEST LOVINGTON STRAWN UNIT #8
LEA COUNTY, NEW MEXICO
TERRACON PROJECT #: AR157026

WELL NUMBER	DATE MEASURED	CASING WELL ELEVATION	DEPTH TO WATER	CORRECTED GROUNDWATER ELEVATION
MW-1	03/18/2016	3,975.66	56.49	3,919.17
	06/16/2016	3,975.66	56.51	3,919.15
	08/23/2016	3,975.66	56.50	3,919.16
	12/30/2016	3,975.66	56.61	3,919.05
MW-2	03/18/2016	3,974.82	57.60	3,917.22
	06/16/2016	3,974.82	57.60	3,917.22
	08/23/2016	3,974.82	57.60	3,917.22
	12/30/2016	3,974.82	57.40	3,917.42
MW-3	03/18/2016	3,976.73	59.19	3,917.54
	06/16/2016	3,976.73	59.19	3,917.54
	08/23/2016	3,976.73	59.20	3,917.53
	12/30/2016	3,976.73	59.30	3,917.43
MW-4	03/18/2016	3,974.49	57.36	3,917.13
	06/16/2016	3,974.49	57.36	3,917.13
	08/23/2016	3,974.49	57.36	3,917.13
	12/30/2016	3,974.49	57.49	3,917.00
MW-5	03/18/2016	3,974.39	55.56	3,918.83
	06/16/2016	3,974.39	55.56	3,918.83
	08/23/2016	3,974.39	55.56	3,918.83
	12/30/2016	3,974.39	55.56	3,918.83
MW-6	03/18/2016	3,976.16	58.60	3,917.56
	06/16/2016	3,976.16	58.64	3,917.52
	08/23/2016	3,976.16	58.62	3,917.54
	12/30/2016	3,976.16	58.71	3,917.45

Elevations based on the North American Vertical Datum of 1988

TABLE 2
2016 ANNUAL REPORT

GROUNDWATER ANALYTICAL SUMMARY - CHLORIDE[1]
WEST LOVINGTON STRAWN UNIT #8
LEA COUNTY, NEW MEXICO
TERRACON PROJECT #: AR157026

SAMPLE LOCATION	SAMPLE DATE	CHLORIDE (mg/L)
MW-1	03/18/2016	24.5
	06/16/2016	19.5
	08/25/2016	29.8
	12/30/2016	27.7
MW-2	03/18/2016	**493**
	06/16/2016	**674**
	08/25/2016	**1,450**
	12/30/2016	**869**
MW-3	03/18/2016	24.6
	06/16/2016	21.4
	08/25/2016	29.7
	12/30/2016	28.0
MW-4	03/18/2016	136
	06/16/2016	123
	08/25/2016	**255**
	12/30/2016	227
MW-5	03/18/2016	24.0
	06/16/2016	20.2
	08/25/2016	26.9
	12/30/2016	28.2
MW-6	03/18/2016	**1,360**
	06/16/2016	**1,570**
	08/25/2016	**1,410**
	12/30/2016	**1,420**
NMOCD CRITERIA		**250**

Chloride[1]=Chloride concentrations analyzed in accordance with EPA Method 300.0

APPENDIX C

Laboratory Data Sheets

Analytical Report 527204

for

Terracon Consulting-Lubbock

Project Manager: Joel Lowry

WLSU #8

25-MAR-16

Collected By: Client

1211 W. Florida Ave, Midland TX 79701

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215-15-19), Arizona (AZ0765), Florida (E871002), Louisiana (03054)
Oklahoma (9218)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400)
Xenco-San Antonio: Texas (T104704534-15-1)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)
Xenco-Atlanta (EPA Lab Code: GA00046):
Florida (E87429), North Carolina (483), South Carolina (98015), Kentucky (85), DoD (L10-135)
Texas (T104704477), Louisiana (04176), USDA (P330-07-00105)

Xenco-Lakeland: Florida (E84098)

25-MAR-16

Project Manager: **Joel Lowry**
Terracon Consulting-Lubbock
5827 50th st, Suite 1
Lubbock, TX 79424

Reference: XENCO Report No(s): **527204**
WLSU #8
Project Address: NM

Joel Lowry:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 527204. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 527204 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Kelsey Brooks
Project Manager

Sample Cross Reference 527204

Terracon Consulting-Lubbock, Lubbock, TX

WLSU #8

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
MW-1	W	03-18-16 11:00		527204-001
MW-2	W	03-18-16 11:20		527204-002
MW-3	W	03-18-16 11:40		527204-003
MW-4	W	03-18-16 11:55		527204-004
MW-5	W	03-18-16 12:15		527204-005
MW-6	W	03-18-16 13:00		527204-006

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Certificate of Analysis Summary 527204

Terracon Consulting-Lubbock, Lubbock, TX

Project Name: WLSU #8

Project Id:
Contact: Joel Lowry
Project Location: NM

Date Received in Lab: Tue Mar-22-16 10:45 am
Report Date: 25-MAR-16
Project Manager: Kelsey Brooks

Analysis Requested													
	Lab Id:	527204-001		527204-002		527204-003		527204-004		527204-005		527204-006	
	Field Id:	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6	
	Depth:												
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	Sampled:	Mar-18-16 11:00		Mar-18-16 11:20		Mar-18-16 11:40		Mar-18-16 11:55		Mar-18-16 12:15		Mar-18-16 13:00	
Inorganic Anions by EPA 300/300.1	***Extracted:***	Mar-25-16 03:14		Mar-25-16 03:34		Mar-25-16 03:54		Mar-25-16 04:14		Mar-25-16 04:35		Mar-25-16 05:15	
	Analyzed:	Mar-25-16 03:14		Mar-25-16 03:34		Mar-25-16 03:54		Mar-25-16 04:14		Mar-25-16 04:35		Mar-25-16 05:15	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Chloride		24.5	5.00	493	20.0	24.6	5.00	136	10.0	24.0	5.00	1360	100

Kelsey Brooks
Project Manager

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

\+ NELAC certification not offered for this compound.

* (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

BS / BSD Recoveries

Project Name: WLSU #8

Work Order #: 527204 **Project ID:**

Analyst: MNR **Date Prepared:** 03/24/2016 **Date Analyzed:** 03/24/2016

Lab Batch ID: 991049 **Sample:** 706718-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Inorganic Anions by EPA 300/300.1 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	<1.00	25.0	23.3	93	25.0	23.2	93	0	90-110	20	

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS Recoveries

Project Name: WLSU #8

Work Order #: 527204

Lab Batch #: 991049 **Project ID:**

Date Analyzed: 03/25/2016 **Date Prepared:** 03/25/2016 **Analyst:** MNR

QC- Sample ID: 526975-001 S **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

Inorganic Anions by EPA 300 Analytes	MATRIX / MATRIX SPIKE RECOVERY STUDY					
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Chloride	182	250	431	100	80-120	

Lab Batch #: 991049

Date Analyzed: 03/25/2016 **Date Prepared:** 03/25/2016 **Analyst:** MNR

QC- Sample ID: 527204-005 S **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

Inorganic Anions by EPA 300 Analytes	MATRIX / MATRIX SPIKE RECOVERY STUDY					
	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Chloride	24.0	125	146	98	80-120	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference [E] = 200*(C-A)/(C+B)
All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit

ANALYSIS REQUEST & CHAIN OF CUSTODY RECORD

XENCO Laboratories

☐ 4143 Greenbriar Drive, Stafford, TX 77477 **281-240-4200**
☐ 5332, Blackberry Drive, San Antonio, TX 78238 **210-509-3334**
☐ 9701 Harry Hines Blvd., Dallas, TX 75220 **214-902-0300**
☐ 12600 Wes[illegible] **-1800**

Serial #: 330841 Page of

Lab Only: Temp: 3.2°C IR ID:R-8 C/F:0 Corrected Temp: 3.2°C

527204

Company-City Energen Resources - Midland	**Phone**
Project Name-Location WLSU #8	☑ Previously done at XENCO **Project ID**
Proj. State: TX, AL, FL, GA, LA, MS, NC, NJ, PA, SC, TN, UT Other NM	**Proj. Manager (PM)** Joel Lowry
E-mail Results to ☑ PM and joel.lowry@tervacon.com	**Fax No:**
Invoice to ☐ Accounting ☐ Inc. Invoice with Final Report ☐ Invoice must have a P.O. Bill to: Energen Resources. C/O Andy Cobb	
Quote/Pricing:	**P.O. No:** ☐ Call for P.O.

TAT: ASAP 5h 12h 24h 48h 3d 5d 7d 10d 21d Standard TAT is project specific.
It is typically 5-7 Working Days for level II and 10+ Working days for level III and IV data.

Reg Program: UST DRY-CLEAN Land-Fill Waste-Disp NPDES DW TRRP

QAPP Per-Contract CLP AGCEE NAVY DOE DOD USACE OTHER: 01b

Special DLs (GW DW QAPP MDLs RLs See Lab PM Included Call PM)

Sampler Name Joel Lowry **Signature**

	Sample ID	Sampling Date	Time	Depth ft' In" m	Matrix	Composite	Grab	# Containers	Container Size	Container Type	Preservatives	VOA: Full-List BTEX-MTBE EtOH Oxyg VOHs VOAs	VOA: PP TCL DW Appdx-1 Appdx-2 CALL Other:	PAHs SIM 8310 8270	TX-1005 DRO GRO MA EPH MA VPH	SVOCs: Full-List DW BN&AE TCLP PP Appdx-2 CALL	OC Pesticides PCBs Herbicides OP Pesticides	Metals: RCRA-8 RCRA-4 Pb 13PP 23TAL Appdx 1 Appdx2	SPLP - TCLP (Metals VOCs SVOCs Pest. Herb. PCBs)	EDB / DBCP	Chloride E300	TAT ASAP 5h 12h 24h 48h 3d 5d (7d) 10d 21d	Addn: PAH above mg/L W, mg/Kg S Highest Hit	Hold Samples (Surcharges will apply and are pre-approved)	Sample Clean-ups are pre-approved as needed	Remarks
1	MW-1	3/18/16	11:00				✓	1	4oz		1										X					
2	MW-2		11:20				✓	1													X					
3	MW-3		11:40				✓	1													X					
4	MW-4		11:55				✓	1													X					
5	MW-5		12:15				✓	1													X					
6	MW-6		13:00				✓	1													X					
7																										
8																										
9																										
10																										

Relinquished by (Initials and Sign)	Date & Time	Relinquished to (Initials and Sign)	Date & Time
1) Joel Lowry	3/21/16 2:40	2) Fed Ex Ground Courier	3/21/16 2:40
3)		4) Courier	3/22/16 10:45
5)		6)	

Total Containers per COC: Cooler Temp: 9 °C

Otherwise agreed on writing. Reports are the Intellectual Property of XENCO until paid. Samples will be held 30 days after final report is e-mailed unless hereby requested. Rush Charges and Collection Fees are pre-approved if needed.

Preservatives: Various (**V**), HCl pH<2 (**H**), H2SO4 pH<2 (**S**), HNO3 pH<2 (**N**), Asbc Acid&NaOH (**A**), ZnAc&NaOH (**Z**), (Cool, <4C) (**C**), None (**NA**),See Label (**L**), Other (**O**) _____
Cont. Size: 4oz (**4**), 8oz (**8**), 32oz (**32**), 40ml VOA (**40**), 1L (**1**), 500ml (**5**), Tedlar Bag (**B**), Various (**V**), Other _____ **Cont. Type:** Glass Amb (**A**), Glass Clear (**C**), Plastic (**P**), Various (**V**)

Matrix: Air (**A**), Product (**P**), Solid (**S**), Water (**W**), Liquid (**L**)

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ORIGIN ID:HOBA
**
MAIL SERVICES ETC, LLC
4008 N GRIMES
HOBBS, NM 88240
UNITED STATES US
21MAR16
ACTWGT: 11.0 LB MAN
CAD: 0909328/CAFE2915
DIMS: 12x11x9 IN
BILL RECIPIENT
TO XENCO LABORATORIES
XENCO LABORATORIES
1211 W. FLORIDA AVE
ODESSA TX 79701
(432) 563-1800
REF:
INV:
PO:
DEPT:
538C1/CF34/329B
FedEx
Express
J151315081301uv
TUE - 22 MAR 10:30A
PRIORITY OVERNIGHT
TRK#
0201
6606 3911 2597
41 MAFA
79701
TX-US LBB
Part # 156148-434 RIT2 02/14

XENCO Laboratories
Prelogin/Nonconformance Report- Sample Log-In

Client: Terracon Consulting-Lubbock

Date/ Time Received: 03/22/2016 10:45:00 AM

Work Order #: 527204

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : r8

Sample Receipt Checklist	Comments
#1 *Temperature of cooler(s)?	3.2
#2 *Shipping container in good condition?	**Yes**
#3 *Samples received on ice?	**Yes**
#4 *Custody Seals intact on shipping container/ cooler?	**N/A**
#5 Custody Seals intact on sample bottles?	**N/A**
#6 *Custody Seals Signed and dated?	**N/A**
#7 *Chain of Custody present?	**Yes**
#8 Sample instructions complete on Chain of Custody?	**Yes**
#9 Any missing/extra samples?	**No**
#10 Chain of Custody signed when relinquished/ received?	**Yes**
#11 Chain of Custody agrees with sample label(s)?	**Yes**
#12 Container label(s) legible and intact?	**Yes**
#13 Sample matrix/ properties agree with Chain of Custody?	**Yes**
#14 Samples in proper container/ bottle?	**Yes**
#15 Samples properly preserved?	**Yes**
#16 Sample container(s) intact?	**Yes**
#17 Sufficient sample amount for indicated test(s)?	**Yes**
#18 All samples received within hold time?	**Yes**
#19 Subcontract of sample(s)?	**No**
#20 VOC samples have zero headspace (less than 1/4 inch bubble)?	**N/A**
#21 <2 for all samples preserved with HNO3,HCL, H2SO4? Except for samples for the analysis of HEM or HEM-SGT which are verified by the analysts.	**N/A**
#22 >10 for all samples preserved with NaAsO2+NaOH, ZnAc+NaOH?	**N/A**

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst:

PH Device/Lot#: 10 FOX 4831 A032690

Checklist completed by: Carley Owens Date: 03/22/2016

Carley Owens

Checklist reviewed by: Kelsey Brooks Date: 03/22/2016

Kelsey Brooks

Analytical Report 531934

for

Terracon Consulting-Lubbock

Project Manager: Joel Lowry

WLSU #8 (Energen)

AR157026

22-JUN-16

Collected By: Client

1211 W. Florida Ave, Midland TX 79701

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215-15-19), Arizona (AZ0765), Florida (E871002), Louisiana (03054)
Oklahoma (9218)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400)
Xenco-San Antonio: Texas (T104704534-15-1)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)
Xenco-Atlanta (EPA Lab Code: GA00046):
Florida (E87429), North Carolina (483), South Carolina (98015), Kentucky (85), DoD (L10-135)
Texas (T104704477), Louisiana (04176), USDA (P330-07-00105)

Xenco-Lakeland: Florida (E84098)

22-JUN-16

Project Manager: **Joel Lowry**
Terracon Consulting-Lubbock
5827 50th st, Suite 1
Lubbock, TX 79424

Reference: XENCO Report No(s): **531934**
WLSU #8 (Energen)
Project Address:

Joel Lowry:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 531934. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 531934 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Kelsey Brooks
Project Manager

Sample Cross Reference 531934

Terracon Consulting-Lubbock, Lubbock, TX

WLSU #8 (Energen)

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
MW-1	W	06-16-16 11:10	0	531934-001
MW-2	W	06-16-16 12:08	0	531934-002
MW-3	W	06-16-16 11:40	0	531934-003
MW-4	W	06-16-16 11:55	0	531934-004
MW-5	W	06-16-16 11:20	0	531934-005
MW-6	W	06-16-16 17:30	0	531934-006

Sample receipt non conformances and comments:

Joel called and asked to only put the third sample on hold for chloride

Sample receipt non conformances and comments per sample:

None

Certificate of Analysis Summary 531934

Terracon Consulting-Lubbock, Lubbock, TX

Project Name: WLSU #8 (Energen)

Project Id: AR157026
Contact: Joel Lowry
Project Location:

Date Received in Lab: Fri Jun-17-16 01:00 pm
Report Date: 22-JUN-16
Project Manager: Kelsey Brooks

Analysis Requested	*Lab Id:*	531934-001		531934-002		531934-003		531934-004		531934-005		531934-006	
	Field Id:	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6	
	Depth:	0		0		0		0		0		0	
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	Sampled:	Jun-16-16 11:10		Jun-16-16 12:08		Jun-16-16 11:40		Jun-16-16 11:55		Jun-16-16 11:20		Jun-16-16 17:30	
Inorganic Anions by EPA 300/300.1	*Extracted:*	Jun-21-16 17:43		Jun-21-16 18:06		Jun-21-16 18:14		Jun-21-16 18:22		Jun-21-16 18:30		Jun-21-16 18:53	
	Analyzed:	Jun-21-16 17:43		Jun-21-16 18:06		Jun-21-16 18:14		Jun-21-16 18:22		Jun-21-16 18:30		Jun-21-16 18:53	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Chloride		19.5	5.00	674	50.0	21.4	5.00	123	10.0	20.2	5.00	1570	100

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

\+ NELAC certification not offered for this compound.

* (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

BS / BSD Recoveries

Project Name: WLSU #8 (Energen)

Work Order #: 531934 **Project ID:** AR157026

Analyst: MNR **Date Prepared:** 06/21/2016 **Date Analyzed:** 06/21/2016

Lab Batch ID: 996703 **Sample:** 710196-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Inorganic Anions by EPA 300/300.1 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	<1.00	25.0	25.7	103	25.0	25.2	101	2	90-110	20	

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Version: 1.%

Form 3 - MS Recoveries

Project Name: WLSU #8 (Energen)

Work Order #: 531934

Lab Batch #: 996703 **Project ID:** AR157026

Date Analyzed: 06/21/2016 **Date Prepared:** 06/21/2016 **Analyst:** MNR

QC- Sample ID: 531907-001 S **Batch #:** 1 **Matrix:** Ground Water

Reporting Units: mg/L

Inorganic Anions by EPA 300	MATRIX / MATRIX SPIKE RECOVERY STUDY					
Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Chloride	13.3	125	142	103	80-120	

Lab Batch #: 996703

Date Analyzed: 06/21/2016 **Date Prepared:** 06/21/2016 **Analyst:** MNR

QC- Sample ID: 531934-001 S **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

Inorganic Anions by EPA 300	MATRIX / MATRIX SPIKE RECOVERY STUDY					
Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Chloride	19.5	125	133	91	80-120	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference [E] = 200*(C-A)/(C+B)
All Results are based on MDL and Validated for QC Purposes

BRL - Below Reporting Limit

Version: 1.%

Sample Duplicate Recovery

Project Name: WLSU #8 (Energen)

Work Order #: 531934

Lab Batch #: 996703 **Project ID:** AR157026

Date Analyzed: 06/21/2016 19:40 **Date Prepared:** 06/21/2016 **Analyst:** MNR

QC- Sample ID: 531907-001 D **Batch #:** 1 **Matrix:** Ground Water

Reporting Units: mg/L

Inorganic Anions by EPA 300/300.1	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Chloride	13.3	11.2	17	20	

Lab Batch #: 996703

Date Analyzed: 06/21/2016 17:51 **Date Prepared:** 06/21/2016 **Analyst:** MNR

QC- Sample ID: 531934-001 D **Batch #:** 1 **Matrix:** Water

Reporting Units: mg/L

Inorganic Anions by EPA 300/300.1	SAMPLE / SAMPLE DUPLICATE RECOVERY				
Analyte	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Chloride	19.5	20.9	7	20	

Spike Relative Difference RPD 200 * | (B-A)/(B+A) |
All Results are based on MDL and validated for QC purposes.
BRL - Below Reporting Limit

Version: 1.%

531934

CHAIN OF CUSTODY RECORD

Terracon

Office Location: Lubbock

Project Manager: Joel Lowry

Sampler's Name: Joel Lowry

Laboratory: Xenco Laboratories
Address: 1211 W. Florida Ave.
Midland, TX 79701
432-563-1800
Phone:
Contact: Joel Lowry
PO/SO #: Bill Energen Resources, A. Cobb
Sampler's Signature

Project Number: AR157026

Project Name: WLSU #8 (Energen)

ANALYSIS REQUESTED

LAB USE ONLY
DUE DATE:

TEMP OF COOLER WHEN RECEIVED (°C)

Matrix	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	Start Depth	End Depth	No. Type of Containers: 125mL	Chloride (EPA Method 300)	Lab Sample ID
	6/16/2016	11:10		x	MW-1			1	x	
	6/16/2016	12:08		x	MW-2			1	x	
	6/16/2016	11:40		x	MW-3			1	x	
	6/16/2016	11:55		x	MW-4			1	x	
	6/16/2016	11:20		x	MW-5			1	x	
	6/16/2016	12:30		x	MW-6			1	x	

TURNAROUND TIME ☐ Normal ☐ 48-Hour Rush ☐ 24-Hour Rush

TRRP Laboratory Review Checklist ☐ Yes ☐ No

Relinquished by (Signature)	Date:	Time:	Received by (Signature)	Date:	Time:
Joel Lowry	6/16/16	1300	[illegible]	6/16/16	1300
Relinquished by (Signature)	Date:	Time:	Received by (Signature)	Date:	Time:
Relinquished by (Signature)	Date:	Time:	Received by (Signature)	Date:	Time:
Relinquished by (Signature)	Date:	Time:	Received by (Signature)	Date:	Time:

NOTES: Please Email Results to
erin.loyd@terracon.com
joel.lowry@terracon.com

Matrix: WW-Wastewater W - Water S - Soil L - Liquid A - Air Bag C - Charcoal tube SL - Sludge
Container: VOA - 40 ml vial A/G - Amber Glass 1L 250 ml = Glass wide mouth P/O - Plastic or other _____

IR ID:R-8
Temp: 5.3°C
C/F:0
Corrected Temp: 5.3°C

XENCO Laboratories
Prelogin/Nonconformance Report- Sample Log-In

Client: Terracon Consulting-Lubbock

Date/ Time Received: 06/17/2016 01:00:00 PM

Work Order #: 531934

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : R8

Sample Receipt Checklist	Comments
#1 *Temperature of cooler(s)?	5.3
#2 *Shipping container in good condition?	**N/A**
#3 *Samples received on ice?	**Yes**
#4 *Custody Seal present on shipping container/ cooler?	**N/A**
#5 *Custody Seals intact on shipping container/ cooler?	**N/A**
#6 Custody Seals intact on sample bottles?	**N/A**
#7 *Custody Seals Signed and dated?	**N/A**
#8 *Chain of Custody present?	**Yes**
#9 Sample instructions complete on Chain of Custody?	**Yes**
#10 Any missing/extra samples?	**No**
#11 Chain of Custody signed when relinquished/ received?	**Yes**
#12 Chain of Custody agrees with sample label(s)?	**Yes**
#13 Container label(s) legible and intact?	**Yes**
#14 Sample matrix/ properties agree with Chain of Custody?	**Yes**
#15 Samples in proper container/ bottle?	**Yes**
#16 Samples properly preserved?	**Yes**
#17 Sample container(s) intact?	**Yes**
#18 Sufficient sample amount for indicated test(s)?	**Yes**
#19 All samples received within hold time?	**Yes**
#20 Subcontract of sample(s)?	**No**
#21 VOC samples have zero headspace (less than 1/4 inch bubble)?	**N/A**
#22 <2 for all samples preserved with HNO3,HCL, H2SO4? Except for samples for the analysis of HEM or HEM-SGT which are verified by the analysts.	**N/A**
#23 >10 for all samples preserved with NaAsO2+NaOH, ZnAc+NaOH?	**N/A**

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst: MAN

PH Device/Lot#: 213315

Checklist completed by: Mary Alexis Negron
Mary Negron
Date: 06/17/2016

Checklist reviewed by: Kelsey Brooks
Kelsey Brooks
Date: 06/17/2016

Analytical Report 535681

for

Terracon Consulting-Lubbock

Project Manager: Joel Lowry

West Lovington Strawn Unit #8

AR167180

31-AUG-16

Collected By: Client

1211 W. Florida Ave, Midland TX 79701

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215), Arizona (AZ0765), Florida (E871002), Louisiana (03054)
Oklahoma (9218)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400)
Xenco-San Antonio: Texas (T104704534)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)

Table of Contents

31-AUG-16

Project Manager: **Joel Lowry**
Terracon Consulting-Lubbock
5827 50th st, Suite 1
Lubbock, TX 79424

Reference: XENCO Report No(s): **535681**
West Lovington Strawn Unit #8
Project Address:

Joel Lowry:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 535681. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 535681 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Kelsey Brooks
Project Manager

Sample Cross Reference 535681

Terracon Consulting-Lubbock, Lubbock, TX

West Lovington Strawn Unit #8

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
MW-1	W	08-23-16 11:45		535681-001
MW-2	W	08-23-16 14:05		535681-002
MW-3	W	08-23-16 14:40		535681-003
MW-4	W	08-23-16 13:30		535681-004
MW-5	W	08-23-16 12:48		535681-005
MW-6	W	08-23-16 15:20		535681-006

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Certificate of Analysis Summary 535681

Terracon Consulting-Lubbock, Lubbock, TX

Project Name: West Lovington Strawn Unit #8

Project Id: AR167180
Contact: Joel Lowry
Project Location:

Date Received in Lab: Thu Aug-25-16 11:40 am
Report Date: 31-AUG-16
Project Manager: Kelsey Brooks

Analysis Requested													
	Lab Id:	535681-001		535681-002		535681-003		535681-004		535681-005		535681-006	
	Field Id:	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6	
	Depth:												
	Matrix:	GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
	Sampled:	Aug-23-16 11:45		Aug-23-16 14:05		Aug-23-16 14:40		Aug-23-16 13:30		Aug-23-16 12:48		Aug-23-16 15:20	
Inorganic Anions by EPA 300/300.1	***Extracted:***	Aug-25-16 15:00		Aug-25-16 15:00		Aug-25-16 15:00		Aug-25-16 15:00		Aug-25-16 15:00		Aug-25-16 15:00	
	Analyzed:	Aug-25-16 17:27		Aug-25-16 17:35		Aug-25-16 17:58		Aug-25-16 18:06		Aug-25-16 18:14		Aug-25-16 18:21	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Chloride		29.8	1.00	1450	20.0	29.7	1.00	255	5.00	26.9	1.00	1410	20.0

Kelsey Brooks
Project Manager

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

+ NELAC certification not offered for this compound.

***** (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

BS / BSD Recoveries

Project Name: West Lovington Strawn Unit #8

Work Order #: 535681 **Project ID:** AR167180

Analyst: MNR **Date Prepared:** 08/25/2016 **Date Analyzed:** 08/25/2016

Lab Batch ID: 1000714 **Sample:** 713075-1-BKS **Batch #:** 1 **Matrix:** Water

Units: mg/L

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Inorganic Anions by EPA 300/300.1 Analytes	Blank Sample Result [A]	Spike Added [B]	Blank Spike Result [C]	Blank Spike %R [D]	Spike Added [E]	Blank Spike Duplicate Result [F]	Blk. Spk Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	<1.00	25.0	26.8	107	25.0	26.4	106	2	90-110	20	

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|
Blank Spike Recovery [D] = 100*(C)/[B]
Blank Spike Duplicate Recovery [G] = 100*(F)/[E]
All results are based on MDL and Validated for QC Purposes

Form 3 - MS / MSD Recoveries

Project Name: West Lovington Strawn Unit #8

Work Order # : 535681 **Project ID:** AR167180

Lab Batch ID: 1000714 **QC- Sample ID:** 535658-001 S **Batch #:** 1 **Matrix:** Drinking Water

Date Analyzed: 08/25/2016 **Date Prepared:** 08/25/2016 **Analyst:** MNR

Reporting Units: mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Inorganic Anions by EPA 300/300.1 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	16.1	25.0	41.3	101	25.0	41.5	102	0	90-110	20	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B

Matrix Spike Duplicate Percent Recovery [G] = 100*(F-A)/E

Relative Percent Difference RPD = 200*|(C-F)/(C+F)|

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable

N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.

5356981

Terracon

Office Location: Lubbock

Project Manager: Joel Lowry

Sampler's Name: Chris Straub

Sampler's Signature: Chris Straub

Laboratory: Xenco Laboratories
Address: 1211 W. Florida Ave.
Midland, TX 79701

Phone: (432) 563-1800
Contact:
PO/SO #: Direct Bill Energen. C/O Andy Cobb

Project Number: AR157026

Project Name: West Lovington Strawn Unit #8

ANALYSIS REQUESTED

LAB USE ONLY
DUE DATE:

TEMP OF COOLER WHEN RECEIVED (°C)

Page ____ of ____

Matrix	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	Start Depth	End Depth	No. Type of Containers: 125 ml Poly				Chlorides 300							Lab Sample ID
GW	8/23/2016	11:45		X	MW-1			1				X							
GW	8/23/2016	14:05		X	MW-2			1				X							
GW	8/23/2016	14:40		X	MW-3			1				X							
GW	8/23/2016	13:30		X	MW-4			1				X							
GW	8/23/2016	12:48		X	MW-5			1				X							
GW	8/23/2016	15:20		X	MW-6			1				X							

TURNAROUND TIME ■ Normal ☐ 48-Hour Rush ☐ 24-Hour Rush

Relinquished by (Signature)	Date:	Time:	Received by (Signature)	Date:	Time:
Chris Straub	8/25/16	1140	JKRAMER	1140	

NOTES:

Email Results to:

Joel.Lowry@terracon.com
Erin.Loyd@terracon.com

Matrix: WW-Wastewater; W - Water; S - Soil; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge
Container: VOA - 40 ml vial; A/G - Amber Glass 1L; 250 ml = Glass wide mouth; P/O - Plastic or other _____

Temp: IR ID:R-8
C/F:0 4.6
Corrected Temp: 4.6

Final 1.000

Page 10 of 11

XENCO Laboratories
Prelogin/Nonconformance Report- Sample Log-In

Client: Terracon Consulting-Lubbock

Date/ Time Received: 08/25/2016 11:40:00 AM

Work Order #: 535681

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : r8

Sample Receipt Checklist	Comments
#1 *Temperature of cooler(s)?	4.6
#2 *Shipping container in good condition?	**N/A**
#3 *Samples received on ice?	**Yes**
#4 *Custody Seal present on shipping container/ cooler?	**N/A**
#5 *Custody Seals intact on shipping container/ cooler?	**N/A**
#6 Custody Seals intact on sample bottles?	**N/A**
#7 *Custody Seals Signed and dated?	**N/A**
#8 *Chain of Custody present?	**Yes**
#9 Sample instructions complete on Chain of Custody?	**Yes**
#10 Any missing/extra samples?	**No**
#11 Chain of Custody signed when relinquished/ received?	**Yes**
#12 Chain of Custody agrees with sample label(s)?	**Yes**
#13 Container label(s) legible and intact?	**Yes**
#14 Sample matrix/ properties agree with Chain of Custody?	**Yes**
#15 Samples in proper container/ bottle?	**Yes**
#16 Samples properly preserved?	**Yes**
#17 Sample container(s) intact?	**Yes**
#18 Sufficient sample amount for indicated test(s)?	**Yes**
#19 All samples received within hold time?	**Yes**
#20 Subcontract of sample(s)?	**N/A**
#21 VOC samples have zero headspace (less than 1/4 inch bubble)?	**N/A**
#22 <2 for all samples preserved with HNO3,HCL, H2SO4? Except for samples for the analysis of HEM or HEM-SGT which are verified by the analysts.	**N/A**
#23 >10 for all samples preserved with NaAsO2+NaOH, ZnAc+NaOH?	**N/A**

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst: PH Device/Lot#:

Checklist completed by: Jessica Kramer Date: 08/25/2016
Jessica Kramer

Checklist reviewed by: Kelsey Brooks Date: 08/25/2016
Kelsey Brooks

TRACEANALYSIS, INC.

Certificate of Analysis Summary 543192

Terracon Lubbock, Lubbock, TX

Project Name: Energen's WLSU #8

Project Id: AR157026
Contact: Joel Lowry
Project Location:

Date Received in Lab: Fri Dec-30-16 04:40 pm
Report Date: 09-JAN-17
Project Manager: Kelsey Brooks

Analysis Requested													
	Lab Id:	543192-001		543192-002		543192-003		543192-004		543192-005		543192-006	
	Field Id:	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6	
	Depth:												
	Matrix:	WATER		WATER		WATER		WATER		WATER		WATER	
	Sampled:	Dec-30-16 09:10		Dec-30-16 09:50		Dec-30-16 10:45		Dec-30-16 11:30		Dec-30-16 12:45		Dec-30-16 13:20	
Chloride by EPA 300	***Extracted:***	Jan-05-17 08:45		Jan-05-17 08:45		Jan-05-17 08:45		Jan-05-17 08:45		Jan-05-17 08:45		Jan-05-17 08:45	
	Analyzed:	Jan-05-17 11:00		Jan-05-17 12:00		Jan-05-17 12:00		Jan-05-17 12:00		Jan-05-17 13:00		Jan-05-17 13:00	
	Units/RL:	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL	mg/L	RL
Chloride		27.7	12.5	869	125	28.0	12.5	227	25.0	28.2	12.5	1420	250

Kelsey Brooks
Project Manager

Analytical Report 543192

for

Terracon Lubbock

Project Manager: Joel Lowry

Energen's WLSU #8

AR157026

09-JAN-17

Collected By: Client

6701 Aberdeen, Suite 9 Lubbock, TX 79424

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215), Arizona (AZ0765), Florida (E871002), Louisiana (03054)
Oklahoma (9218)

Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400)
Xenco-San Antonio: Texas (T104704534)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)

09-JAN-17

Project Manager: **Joel Lowry**
Terracon Lubbock
5827 50th st, Suite 1
Lubbock, TX 79424

Reference: XENCO Report No(s): **543192**
Energen's WLSU #8
Project Address:

Joel Lowry:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 543192. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 543192 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Kelsey Brooks
Project Manager

TRACEANALYSIS, INC.

Sample Cross Reference 543192

Terracon Lubbock, Lubbock, TX

Energen's WLSU #8

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
MW-1	W	12-30-16 09:10		543192-001
MW-2	W	12-30-16 09:50		543192-002
MW-3	W	12-30-16 10:45		543192-003
MW-4	W	12-30-16 11:30		543192-004
MW-5	W	12-30-16 12:45		543192-005
MW-6	W	12-30-16 13:20		543192-006

Client Name: Terracon Lubbock

Project Name: Energen's WLSU #8

Project ID: *AR157026*
Work Order Number(s): *543192*

Report Date: *09-JAN-17*
Date Received: *12/30/2016*

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Certificate of Analytical Results 543192

Terracon Lubbock, Lubbock, TX

Energen's WLSU #8

Sample Id:	**MW-1**	Matrix:	Water	Date Received:	12.30.16 16.40
Lab Sample Id:	543192-001	Date Collected:	12.30.16 09.10		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	RNL			% Moisture:	
Analyst:	RNL	Date Prep:	01.05.17 08.45		
Seq Number:	3007008				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**27.7**	12.5	mg/L	01.05.17 11.00		5

Certificate of Analytical Results 543192

Terracon Lubbock, Lubbock, TX

Energen's WLSU #8

Sample Id:	**MW-2**	Matrix:	Water	Date Received:	12.30.16 16.40
Lab Sample Id:	543192-002	Date Collected:	12.30.16 09.50		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	RNL			% Moisture:	
Analyst:	RNL	Date Prep:	01.05.17 08.45		
Seq Number:	3007008				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**869**	125	mg/L	01.05.17 12.00		50

TRACEANALYSIS, INC.

Certificate of Analytical Results 543192

Terracon Lubbock, Lubbock, TX

Energen's WLSU #8

Sample Id:	**MW-3**	Matrix:	Water	Date Received:	12.30.16 16.40
Lab Sample Id:	543192-003	Date Collected:	12.30.16 10.45		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	RNL			% Moisture:	
Analyst:	RNL	Date Prep:	01.05.17 08.45		
Seq Number:	3007008				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**28.0**	12.5	mg/L	01.05.17 12.00		5

Final 1.000

Certificate of Analytical Results 543192

Terracon Lubbock, Lubbock, TX

Energen's WLSU #8

Sample Id:	**MW-4**	Matrix:	Water	Date Received:	12.30.16 16.40
Lab Sample Id:	543192-004	Date Collected:	12.30.16 11.30		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	RNL			% Moisture:	
Analyst:	RNL	Date Prep:	01.05.17 08.45		
Seq Number:	3007008				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**227**	25.0	mg/L	01.05.17 12.00		10

Certificate of Analytical Results 543192

Terracon Lubbock, Lubbock, TX

Energen's WLSU #8

Sample Id:	**MW-5**	Matrix:	Water	Date Received:	12.30.16 16.40
Lab Sample Id:	543192-005	Date Collected:	12.30.16 12.45		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	RNL			% Moisture:	
Analyst:	RNL	Date Prep:	01.05.17 08.45		
Seq Number:	3007008				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**28.2**	12.5	mg/L	01.05.17 13.00		5

Certificate of Analytical Results 543192

Terracon Lubbock, Lubbock, TX

Energen's WLSU #8

Sample Id:	**MW-6**	Matrix:	Water	Date Received:	12.30.16 16.40
Lab Sample Id:	543192-006	Date Collected:	12.30.16 13.20		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	RNL			% Moisture:	
Analyst:	RNL	Date Prep:	01.05.17 08.45		
Seq Number:	3007008				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**1420**	250	mg/L	01.05.17 13.00		100

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

+ NELAC certification not offered for this compound.

***** (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

Terracon Lubbock

Energen's WLSU #8

Analytical Method: **Chloride by EPA 300** Prep Method: E300P

Seq Number: 3007008 Matrix: Water Date Prep: 01.05.17

MB Sample Id: 718141-1-BLK LCS Sample Id: 718141-1-BKS LCSD Sample Id: 718141-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<2.50	25.0	26.0	104	25.8	103	90-110	1	20	mg/L	01.05.17 10:00	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P

Seq Number: 3007008 Matrix: Water Date Prep: 01.05.17

Parent Sample Id: 543192-006 MS Sample Id: 543192-006 S MSD Sample Id: 543192-006 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	1420	2500	4100	107	4090	107	80-120	0	20	mg/L	01.05.17 13:00	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P

Seq Number: 3007008 Matrix: Ground Water Date Prep: 01.05.17

Parent Sample Id: 543286-003 MS Sample Id: 543286-003 S MSD Sample Id: 543286-003 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	222	1250	1550	106	1560	107	80-120	1	20	mg/L	01.05.17 17:00	

543192

CHAIN OF CUSTODY RECORD

Terracon

Office Location: Lubbock

Project Manager: Joel Lowry

Sampler's Name: Joel Lowry

Laboratory: Xenco Laboratories
Address: 1211 W. Florida Ave.
Midland, TX 79701
432-563-1800

Phone:

Contact: Joel Lowry

PO/SO #: Bill Energen Resource CO Andy Cobb

Sampler's Signature

LAB USE ONLY
DUE DATE:

TEMP OF COOLER WHEN RECEIVED (°C): 1°C

Project Number: AR157026

Project Name: Energen's WLSU #8

Matrix	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	Start Depth	End Depth	No. Type of Containers: 250 ml Poly	VOCs (EPA Method 8021B)	Chloride (EPA Method 300)	Lab Sample ID
GW	12/30/2016	9:10		x	MW-1			1		x	
GW	12/30/2016	9:50		x	MW-2			1		x	
GW	12/30/2016	10:45		x	MW-3			1		x	
GW	12/30/2016	11:30		x	MW-4			1		x	
GW	12/30/2016	12:45		x	MW-5			1		x	
GW	12/30/2016	1:20		x	MW-6			1		x	

ANALYSIS REQUESTED

TURNAROUND TIME ☐ Normal ☐ 48-Hour Rush ☐ 24-Hour Rush

TRRP Laboratory Review Checklist ☐ Yes ☐ No

Relinquished by (Signature)	Date:	Time:	Received by (Signature)	Date:	Time:
	12/30	4:30		12/30/16	16:40

NOTES: Please Email Results to
erin.loyd@terracon.com
joel.lowry@terracon.com

Matrix: WW-Wastewater; W - Water; S - Soil; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge

Container: VOA - 40 ml vial; A/G - Amber Glass 1L; 250 ml = Glass wide mouth; P/O - Plastic or other _____

TRACEANALYSIS, INC.

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Client: Terracon Lubbock

Date/ Time Received: 12/30/2016 04:40:00 PM

Work Order #: 543192

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : IR3

Sample Receipt Checklist		Comments
#1 *Temperature of cooler(s)?	1	
#2 *Shipping container in good condition?	**Yes**	
#3 *Samples received on ice?	**Yes**	
#4 *Custody Seal present on shipping container/ cooler?	**No**	
#5 *Custody Seals intact on shipping container/ cooler?	**N/A**	
#6 Custody Seals intact on sample bottles?	**N/A**	
#7 *Custody Seals Signed and dated?	**N/A**	
#8 *Chain of Custody present?	**Yes**	
#9 Sample instructions complete on Chain of Custody?	**Yes**	
#10 Any missing/extra samples?	**N/A**	
#11 Chain of Custody signed when relinquished/ received?	**Yes**	
#12 Chain of Custody agrees with sample label(s)?	**Yes**	
#13 Container label(s) legible and intact?	**Yes**	IR3
#14 Sample matrix/ properties agree with Chain of Custody?	**Yes**	
#15 Samples in proper container/ bottle?	**Yes**	
#16 Samples properly preserved?	**Yes**	
#17 Sample container(s) intact?	**Yes**	
#18 Sufficient sample amount for indicated test(s)?	**Yes**	
#19 All samples received within hold time?	**Yes**	
#20 Subcontract of sample(s)?	**No**	
#21 VOC samples have zero headspace (less than 1/4 inch bubble)?	**N/A**	
#22 <2 for all samples preserved with HNO3,HCL, H2SO4? Except for samples for the analysis of HEM or HEM-SGT which are verified by the analysts.	**N/A**	
#23 >10 for all samples preserved with NaAsO2+NaOH, ZnAc+NaOH?	**N/A**	

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst: MPG

PH Device/Lot#: 208515

Checklist completed by: Brenda Ward
Brenda Ward

Date: 01/03/2017

Checklist reviewed by: Liz Givens
Liz Givens

Date: 01/04/2017

APPENDIX D

Table 3 – Historical Groundwater Analytical Summary – Select Metals and Anions
Table 4 – Historical Groundwater Analytical Summary - BTEX
Table 5 – Historical Groundwater Analytical Summary - PAHs

TABLE 3

2016 ANNUAL REPORT

HISTORICAL GROUNDWATER ANALYTICAL SUMMARY - SELECT METALS[1] and ANIONS[2]

WEST LOVINGTON STRAWN UNIT #8

LEA COUNTY, NEW MEXICO

TERRACON PROJECT #: AR157026

All water concentrations are reported in mg/L

SAMPLE LOCATION	SAMPLE DATE	EPA SW846-6020A, EPA 7470A											EPA 300.0			
		Arsenic	Barium	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Selenium	Silver	Mercury	Fluoride	Nitrate	Sulfate	Chloride
MW-1	12/13/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27
MW-2	12/13/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	130
MW-3	12/13/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	28
MW-4	12/13/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	390
MW-5	12/13/12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23
MW-1	10/08/15	ND	0.0951	ND	ND	ND	**2.96**	ND	0.0324	ND	ND	ND	0.583	1.77	75.7	27.6
MW-2	10/08/15	ND	0.260	ND	ND	ND	0.317	ND	ND	ND	ND	ND	ND	2.950	109	**821**
MW-3	10/08/15	ND	0.0706	ND	ND	ND	**1.23**	ND	ND	ND	ND	ND	0.925	1.83	65.2	28.5
MW-4	10/08/15	ND	0.207	ND	ND	ND	**9.15**	ND	0.0898	ND	ND	ND	ND	4.73	120	193
MW-5	10/08/15	ND	0.0728	ND	ND	ND	0.610	ND	ND	ND	ND	ND	0.683	2.07	71.9	25.1
MW-6	10/08/15	ND	0.0659	ND	ND	ND	1.880	ND	0.0244	ND	ND	ND	ND	1.87	85.5	**544**
Maximum Contaminant Levels from NM WQCC Drinking water standards Sections 1-101.UU and 3-103.A.		**0.1 mg/L**	**1.0 mg/L**	**0.01 mg/L**	**0.05 mg/L**	**1.0 mg/L**	**1.0 mg/L**	**0.05 mg/L**	**0.2 mg/L**	**0.05 mg/L**	**0.05 mg/L**	**0.002 mg/L**	**1.6 mg/L**	**10 mg/L**	**600 mg/L**	**250 mg/L**

Metals[1]=Select metals concentrations analyzed in accordance with EPA SW846-6010b and 7470A

Anions[2]=Select anion concentrations analyzed in accordance with EPA Method 300.0

ND= Constituent not detected above the applicable reporting limit (RL).

-= Not analyzed for that constituent

TABLE 4
2016 ANNUAL REPORT

HISTORICAL GROUNDWATER ANALYTICAL SUMMARY - BTEX[1]
WEST LOVINGTON STRAWN UNIT #8
LEA COUNTY, NEW MEXICO
TERRACON PROJECT #: AR157026

SAMPLE LOCATION	SAMPLE DATE	METHODS: EPA SW 846-8021b and/or 8260B						
		BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL-BENZENE (mg/L)	M,P-XYLENES (mg/L)	O-XYLENES (mg/L)	TOTAL XYLENES (mg/L)	TOTAL BTEX (mg/L)
MW-1	12/13/2012	ND	ND	ND	ND	ND	ND	ND
MW-2	12/13/2012	ND	ND	ND	ND	ND	ND	ND
MW-3	12/13/2012	ND	ND	ND	ND	ND	ND	ND
MW-4	12/13/2012	ND	ND	ND	ND	ND	ND	ND
MW-5	12/13/2012	ND	ND	ND	ND	ND	ND	ND
MW-1	10/8/2015	ND	ND	ND	ND	ND	ND	ND
MW-2	10/8/2015	ND	ND	ND	ND	ND	ND	ND
MW-3	10/8/2015	ND	ND	ND	ND	ND	ND	ND
MW-4	10/8/2015	ND	ND	ND	ND	ND	ND	ND
MW-5	10/8/2015	ND	ND	ND	ND	ND	ND	ND
MW-6	10/8/2015	ND	ND	ND	ND	ND	ND	ND
NMOCD CRITERIA		**0.01**	**0.75**	**0.75**	**TOTAL XYLENES 0.62**			

BTEX[1]=BTEX concentrations analyzed in accordance with EPA SW846-8021B and/or 8260B
ND= Constituent not detected above the applicable reporting limit (RL).

TABLE 5
2016 ANNUAL REPORT

HISTORICAL GROUNDWATER ANALYTICAL SUMMARY - PAHs[1]
WEST LOVINGTON STRAWN UNIT #8
LEA COUNTY, NEW MEXICO
TERRACON PROJECT #: AR157026

All water concentrations are reported in mg/L

SAMPLE LOCATION	SAMPLE DATE	EPA SW846-8270C, 3510																	
		Acenaphthene	Acenaphthylene	Anthracene	Benzo[a]anthracene	Benzo[a]pyrene	Benzo[b]fluoranthene	Benzo[g,h,i]perylene	Benzo[k]fluoranthene	Chrysene	Dibenz[a,h]anthracene	Fluoranthene	Fluorene	Indeno[1,2,3-cd]pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Naphthalene	Phenanthrene	Pyrene
MW-1	12/13/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.62	ND
MW-2	12/13/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.56	ND	ND	ND	ND	ND	0.94	0.33
MW-3	12/13/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.85	ND
MW-4	12/13/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.84	ND
MW-5	12/13/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.6	ND
MW-1	10/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-2	10/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-3	10/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-4	10/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-5	10/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-6	10/8/2016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Contaminant Levels for NM WQCC Drinking Water Standards Sections 1-101.UU and 3-103A.		NA	NA	0.001	0.0001	0.0007	0.001	NA	0.001	0.0002	0.0003	0.001	0.001	0.0004	0.03			0.001	0.001

PAHs[1]=Polynuclear aromatic hydrocarbon concentrations analyzed in accordance with EPA SW846-8270C and 3510

ND= Constituent not detected above the applicable reporting limit (RL).

APPENDIX E

Release Notification and Corrective Action (Form C-141)

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-141
Revised October 10, 2003

Submit 2 Copies to appropriate District Office in accordance with Rule 116 on back side of form

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company: Energen Resources Corporation	Contact: Andrew Cobb
Address: 3300 North A St. Bldg.4,Ste.100 Midland, Tx. 79705	Telephone No.432-687-1155
Facility Name: West Lovington Strawn Unit	Facility Type: Fresh Water Well @ WLSU #8 well 30-025-32291

Surface Owner: Dan Field	Mineral Owner: N/A	~~Lease~~ No. N/A API

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
L	34	15S	35E	1980	FNL	660	FWL	Lea

Latitude 32° 58'19.1" **Longitude** 103° 24' 06.5" / WTR SS'

NATURE OF RELEASE

Type of Release: Unknown	Volume of Release	Volume Recovered
Source of Release	Date and Hour of Occurrence	Date and Hour of Discovery
Was Immediate Notice Given? ☐ Yes ☐ No ☐ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☐ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*
Sampling of fresh water well near the WLSU #8 well shows elevated chloride levels.

Describe Area Affected and Cleanup Action Taken.*
Will begin investigation into cause of the elevated levels and remediate to approved standard.

I hereby certify that the information given above is true and complete to the best of my knowledge and understand that pursuant to NMOCD rules and regulations all operators are required to report and/or file certain release notifications and perform corrective actions for releases which may endanger public health or the environment. The acceptance of a C-141 report by the NMOCD marked as "Final Report" does not relieve the operator of liability should their operations have failed to adequately investigate and remediate contamination that pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD acceptance of a C-141 report does not relieve the operator of responsibility for compliance with any other federal, state, or local laws and/or regulations.

Signature: Andrew Cobb	OIL CONSERVATION DIVISION
Printed Name: Andrew Cobb	Approved by District Supervisor: Johnson ENVIRONMENTAL ENGINEER
Title:Sr. Safety & Environmental Specialist	Approval Date: 3-19-10 Expiration Date: 5-19-10
E-mail Address:andy.cobb@energen.com	Conditions of Approval: Attached ☐ IRP# 10-3-2457
Date: 10-26-09 Phone:432-686-3599	

* Attach Additional Sheets If Necessary

APPENDIX F

CD of the 2016 Annual Groundwater Monitoring Report