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APPROVED
By Olivia Yu at 10:20 am, Jul 26, 2018

May 21, 2018

NMOCD approves of the proposed additional delineation for 1RP-3941.

Olivia Yu
Environmental Specialist
New Mexico Oil Conservation Division, District 1
1625 N. French Drive
Hobbs, NM 88240

Re: Chevron Vacuum Glorietta West Unit Satellite No. 4
2017 Soil Assessment Report
Case No. 1RP-3941
Lea County, New Mexico

Dear Ms. Yu,

Please find enclosed for your files copies of the following report:

- Vacuum Glorietta West Unit Satellite No. 4 – 2017 Soil Assessment Report, Unit B, Section 1, Township 18 South, Range 34 East; Lea County New Mexico.

The report was prepared by GHD Services (GHD) on behalf of Chevron Environmental Management Company (CEMC) to document on-going assessment activities throughout 2017 at the Site.

Please do not hesitate to call Scott Foord with GHD at 713-734-3090 or myself at 713-372-0289, should you have any questions.

Sincerely,

Jason Michelson

Encl. Vacuum Glorietta West Unit Satellite No. 4 – 2017 Soil Assessment Report

C.C. Amy Barnhill, Chevron/MCBU

Soil Assessment Report

Vacuum Grayburg West Unit Satellite
No. 4 (RP-3941)
Injection Trunkline Release
Lea County, New Mexico

Chevron Environmental
Management Company

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1. Introduction

GHD is pleased to present this Soil Assessment Report to Chevron Environmental Management Company (CEMC) for the Vacuum Grayburg West Unit (VGWU) Satellite No. 4 Injection Trunkline release location (hereafter referred to as the "Site"). The Site is located in Unit B, Section 1, Township 18 South, Range 34 East, approximately 1.38-miles southwest of Buckeye, in eastern Lea County, New Mexico (refer to Figure 1 and Figure 2).

2. Project Information and Background

Chevron submitted an initial C-141 Form to the New Mexico Oil Conservation Division (NMOCD) dated March 6, 2009, describing a release of 29 barrels (bbls) of produced water with zero volume being recovered; stating, "No remediation will be done at this time because drilling rig is operating on location (VGSAU #459)." The source of the release was recorded to have been a "Line Leak".

Crain Environmental (Crain) conducted field assessment activities at the Site in August 2009 through October 2010. Crain's assessment included site visits, soil sample collection for analytical laboratory analyses, and a preliminary determination of impacts to environmental media. A soil analytical summary of Crain's soil sample results is presented in Table 1.

In 2014, Chevron contracted GHD to perform a supplemental soil assessment at the Site. On March 18, 2014, GHD oversaw the advancement of six (6) soil borings to depths ranging from approximately 35 feet to 50 feet below ground surface (bgs). Results of the 2014 soil boring and sampling program indicated the presence of elevated chloride concentrations in soil. Soil samples from borings SB-2 and SB-4 exceeded the Site Recommended Remediation Action Level (RRAL) of 250 milligrams per kilogram (mg/kg) for chloride from ground surface to 50 feet bgs within both borings at concentrations at 50 feet bgs of 2,700 mg/kg and 1,880 mg/kg, respectively. SB-3 exceeded the RRAL from 0-5 feet bgs, but soil samples collected were below the RRAL for the remainder of the 35-foot boring.

Three (3) soil borings (SB-7, SB-8, and SB-9) were advanced across the Site in 2015 to further assess chloride impact to soil. The three soil borings were advanced to total depths of 90 feet bgs and soil samples were collected at varying depth intervals. The majority of the twenty-seven soil samples collected from the Site in 2015 for laboratory analyses were below the Site RRAL (250 mg/kg) for chloride with the exception of SB-7 at 10 feet bgs (277 mg/kg), SB-8 at 5 feet bgs (289 mg/kg) and 30 feet bgs (630 mg/kg), and SB-9 at 5 feet bgs (2,540 mg/kg) and 10 feet bgs (474 mg/kg). The soil samples from the terminal depths (90 feet bgs) from all three borings (SB-7, SB-8, SB-9) were below the RRAL for chloride at <2.10 mg/kg, 80.4 mg/kg, and 3.63 mg/kg, respectively.

In 2017, a two-phase geophysical investigation was completed and subsequently three (3) additional soil borings (SB-10, SB-11, and SB-12) were advanced at the Site. Soil samples were collected from each boring for analytical analyses in an attempt to further delineate the horizontal and vertical extents of the chloride impact. The results of the soil borings and geophysical investigation conducted in 2017 are provided herein. Figure 3 depicts the soil boring locations installed between 2014 through 2017.

3. Recommended Remediation Action Limits

Information available from various sources including the Petroleum Recovery Research Center (PRRC) Mapping Portal, currently managed groundwater site(s) data by GHD, and the United States Geological Survey (USGS) Current Water Database for the Nation, concludes:

a) the depth to groundwater at the Site is greater than 100-feet bgs;

b) the nearest private domestic water source is greater than 200-feet from the release site;

c) the nearest public/municipal water source is greater than 1,000-feet from the release site; and

d) the release site lies more than 1,000 horizontal feet from the nearest surface water body.

Additionally, localized depth to groundwater was confirmed to be approximately 130 feet below ground surface in 2017 based on the information from monitoring well MW-12 associated with the Buckeye Compressor Station facility and VGSAU 58 (AP-104) approximately 300-feet east of the Site (both sites monitored by GHD - see Figure 5).

Consequently, the NMOCD total ranking criteria score is twenty (20) for the Site as depth from chloride impacted soil to groundwater is estimated at less than 50 feet. The anticipated site-specific RRALs to be applied to this location by the NMOCD are 10 mg/kg for benzene, 50 mg/kg for total BTEX, 100 mg/kg for total TPH, and 600 mg/kg for horizontal and 250 mg/kg for vertical delineation of chlorides.

In an August 28, 2017 telephone conversation between Bernard Bockisch (GHD) and Jim Griswold (NMOCD Environmental Bureau Chief), GHD was informed that the NMOCD is accepting chloride concentrations of 600 mg/kg for the horizontal delineation assessment clean up levels.

4. Geophysical Survey Methods and Results – EM31 and ER

In June and August 2017, GHD completed a two-phase geophysical investigation at the Site. The purpose of the investigation was to delineate areas of elevated conductivity in order to map the extent of suspected chloride impacts to soil. The first phase of the investigation consisted of an electromagnetic (EM) survey to delineate the footprint of the suspected impacts. Based on the EM survey results, an electrical resistivity (ER) survey was completed to determine the vertical distribution of the suspected impacts. Survey coverage data are presented on Figure 4 and Figure 5.

The EM survey was completed with an EM31 terrain conductivity meter. Prior to conducting the EM31 survey, a grid consisting of parallel lines was established over the proposed area of investigation indicated on Figure 4. Measurements of EM31 data were collected along 30-foot spaced grid lines over the area of investigation, with station spacings of approximately 4 feet on all grid lines. The ER survey line location was chosen based on the EM31 survey results, and transected the EM31 conductivity anomaly. The configuration of the electrodes (also called array) and the electrode spacings were optimized to achieve an approximate depth of investigation of approximately 70 feet bgs, and the electrode spacing on all grid lines was on the order of 6.6 feet (i.e., 2 meters).

4.1 EM31 Survey Methodology

The EM31 survey was completed to determine the horizontal extent or limits of chloride impacts in the shallow subsurface soils at the Site. The EM31 consists of transmitter and receiver coils located at opposite ends of a rigid boom. The coil separation for the EM31 is approximately 13 feet, which yields an approximate depth of penetration of 18 feet bgs in vertical dipole mode. Measurements of terrain conductivity from the EM31 were used to assess the extent of chloride impacts at the Site. The data for the EM31 survey were then processed as a colored contour plot. The plot was superimposed on an aerial image of the Site plan, and used to locate elevated conductivity responses indicative of chloride-impacted areas relative to the Site features. Figure 4 depicts the EM31 survey results.

4.2 EM31 Survey Results

The colored contour conductivity plot presented on Figure 4 reveals that the highest intensity conductivity responses are colored red to purple, while areas of low response are colored blue. All remaining intermediate responses correspond to the color scale presented on the figure. Results from non-impacted areas within the survey coverage indicate that background conductivity responses were approximately 20 milliSiemens/m (mS/m). Anomalous responses relative to background were generally 3 to 5 times higher, and ranged from approximately 60 to 100 mS/m. The EM31 survey results delineated one main area of suspected brine-impacted soils (east perimeter of the Site Boundary). A second smaller conductive zone was detected along the southeast perimeter of the area surveyed. Several additional small conductive zones were detected along the pipelines that intercept the Site, with some of the higher responses (125 to 200 mS/m) believed associated with conductive metallic piping.

4.3 ER Survey Methodology

The ER survey profile was completed in August 2017 to determine the vertical extent of chloride-impact in soil on one selected survey line located along the northeast section of the Site Boundary (see Figure 3). This area exhibited the highest responses during the EM31 survey believed associated with elevated chloride concentrations in soil. The ER survey was conducted with a dual-function resistivity meter, which operates simultaneously as a transmitter and receiver. The survey utilized two multi-electrode cables yielding a total spread of 72 electrodes. The receiver was programmed to automatically “switch” between measured quadripoles, yielding a pseudosection of apparent resistivity. The apparent resistivity data were then imported into an inversion software program, and processed to yield a modeled profile section of resistivity.

4.4 ER Survey Results

The electrical resistivity results for the survey line are presented on Figure 5. These results are based on the measured apparent resistivity values for various depths along the survey line. Calculations of measured apparent resistivity values include the type of ER array (Wenner), the electrode spacing, and raw field data (i.e., applied current and measured voltage for each data point).

The measured apparent resistivity data were processed with the inversion program RES2DINV, to yield the modeled resistivity section presented on Figure 5. The modeled section represents the resistance of earth materials in the shallow subsurface, and thus provides an interpretation of the overburden sequences and areas of suspected brine impacts along the survey line. The highest resistivity values are colored dark blue, while areas of low resistivity (or conversely, high conductivity) are colored yellow to red. All remaining intermediate responses correspond to the color scale presented on the bottom of each section.

The colored plot reveals that the contour intervals ranged from 2.25 to 1,000 Ohm.meters (Ohm.m). The intermediate contour intervals were determined by applying a normalized distribution curve to the data such that the entire range of responses could be identified by discrete colors. The interpreted colored contoured plot suggests that suspected brine-impacted soils can likely be characterized by modeled responses of approximately 2.25 to 40 Ohm.m.

4.5 Geophysical Survey Correlations/Conclusions

- The geophysical investigation successfully delineated the horizontal extent of suspected brine-impacted areas.
- In general, the ER survey results indicate the zone of suspected brine impact affecting soils extends beyond 40 feet bgs.

5. Drilling and Sampling

On October 16, 2017, GHD and GHD subcontractor Harrison Cooper, Inc. (HCI), a New Mexico licensed drilling company, mobilized to the Site to begin soil boring installation activities for SB-10, SB-11, and SB-12. The soil borings were pre-cleared with an air knife to a depth of 5 feet bgs or until refusal. The remainder of each boring was advanced using an air rotary drill rig to total depths of 90 feet bgs. Soil borings were logged in accordance with the Unified Soil Classification System and recorded in field books. Boring logs can be found in Appendix A.

The soil types observed in soil samples collected during the drilling program consisted of top soil followed by caliche, sandstone, and silty sand in SB-10; silty sand and caliche in SB-11; and dark brown sandy clay to silty sand in SB-12.

Soil samples were collected for laboratory analysis from each boring at 0.5-1 feet bgs, 4-5 feet bgs, 9-10 feet bgs, and then at 10-foot intervals to the termination of the borings. Soil samples were packed into laboratory prepared jars and stored in a cooler with ice. The soil samples were sent to Xenco Laboratories (Xenco) in Midland, Texas for chloride analysis by EPA Method 300.

5.1 Soil Sampling Analytical Results

A soil analytical summary of the 2017 results is presented in Table 1. A Site Details and Analytical Results Map (2009 – 2017) is presented as Figure 6.

- Chloride concentrations above the RRALs were reported for shallow soil samples in SB-10 from 0.5 to 10 feet bgs, with the highest concentration of 5,720 mg/kg at 0.5-1 feet bgs. Chlorides concentrations above the RRALs were not reported from 19 to 40 feet bgs, but increased above

the RRAL from 49 to 90 feet bgs. The highest concentration was 522 mg/kg at 59-60 feet bgs. The soil sample from the terminal depth (89-90 feet bgs) was slightly above the RRAL at 354 mg/kg.

- SB-11 exhibited chloride concentrations above the RRAL from 0.5 through 30 feet bgs, with the highest concentration of 7,690 mg/kg at 19-20 feet bgs. Chloride concentrations were not reported above the RRAL within the remainder of the samples collected from the borehole (down to 90 feet bgs).
- Chloride concentrations were reported slightly above the RRAL in SB-12 ranging from 322 mg/kg to 355 mg/kg for soil samples collected from 9-20 feet bgs. Chloride concentrations were not reported above the RRAL from 29-40 feet bgs. Field screening of soil samples at from 49 feet to 90 feet bgs indicated chloride concentrations below the RRAL and were therefore not submitted for analytical testing

The 2017 soil laboratory analytical report is included in Appendix B.

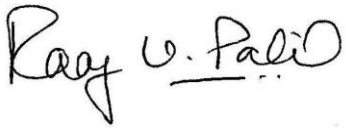
6. Conclusions

Evaluation of the analytical data obtained from soil assessment and delineation activities performed in March 2014, August 2015, and October 2017 indicate horizontal and vertical delineation of chloride impacts to levels protective of groundwater have been achieved at the Site. Limited additional assessment activities to further define the horizontal extent of impact prior to remediation activities (excavation and lining of the area) should be conducted.

Submitted by:

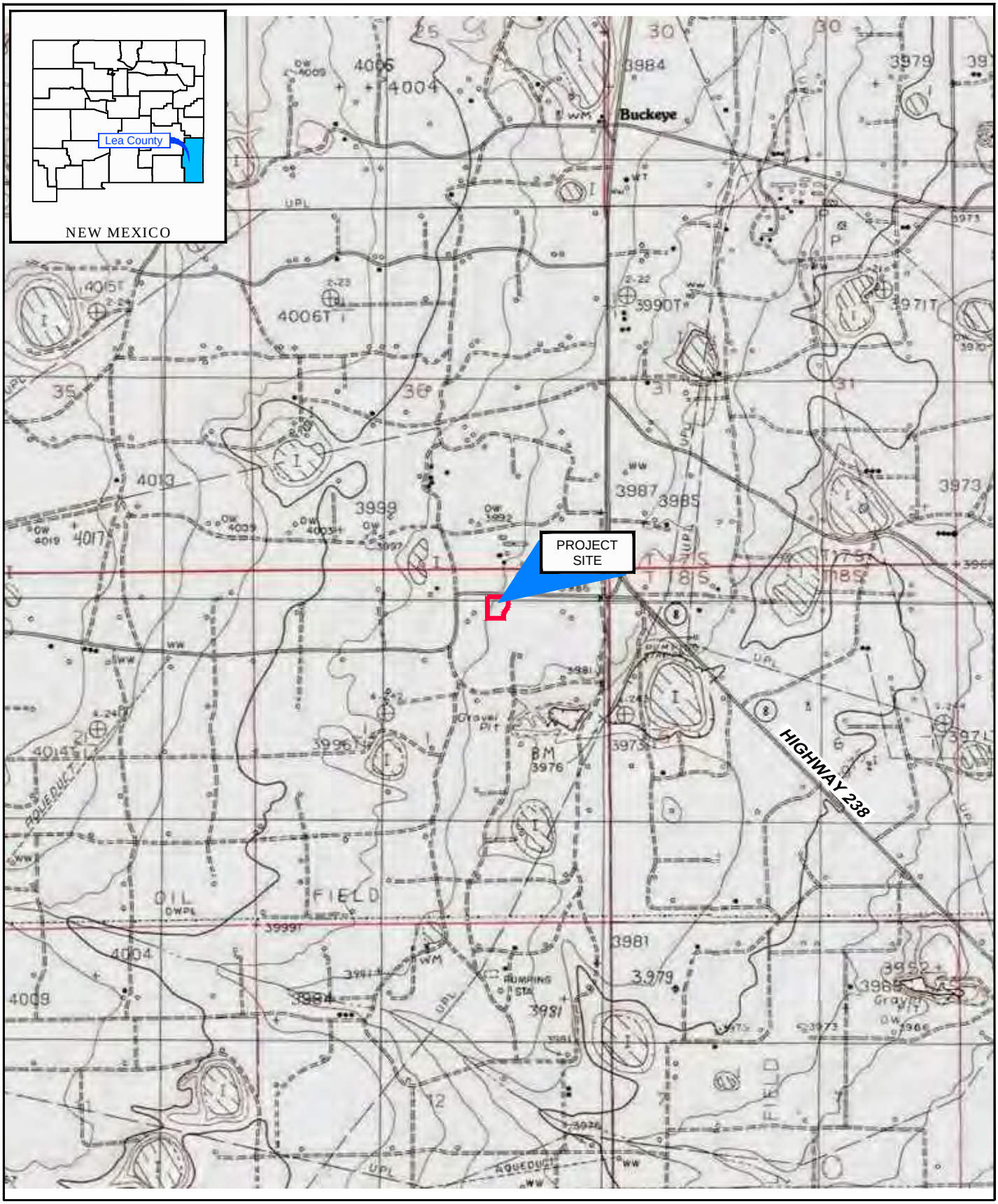
GHD Services, Inc.

Scott Foord, P.G., Project Manager



Raaj U. Patel, P.G., Senior Project Manager

Figures



Source: USGS 7.5 Minute quad "Buckeye And Lovington SW, New Mexico"

Lat/Long: 32.7827ÁNorth, 103.5106ÁWest

0 1000 2000ft

Coordinate System:
NAD 1983 StatePlane-
New Mexico East (US Feet)

CEMC
LEA COUNTY, NEW MEXICO
VGWU SATELLITE #4 TRUNK LINE

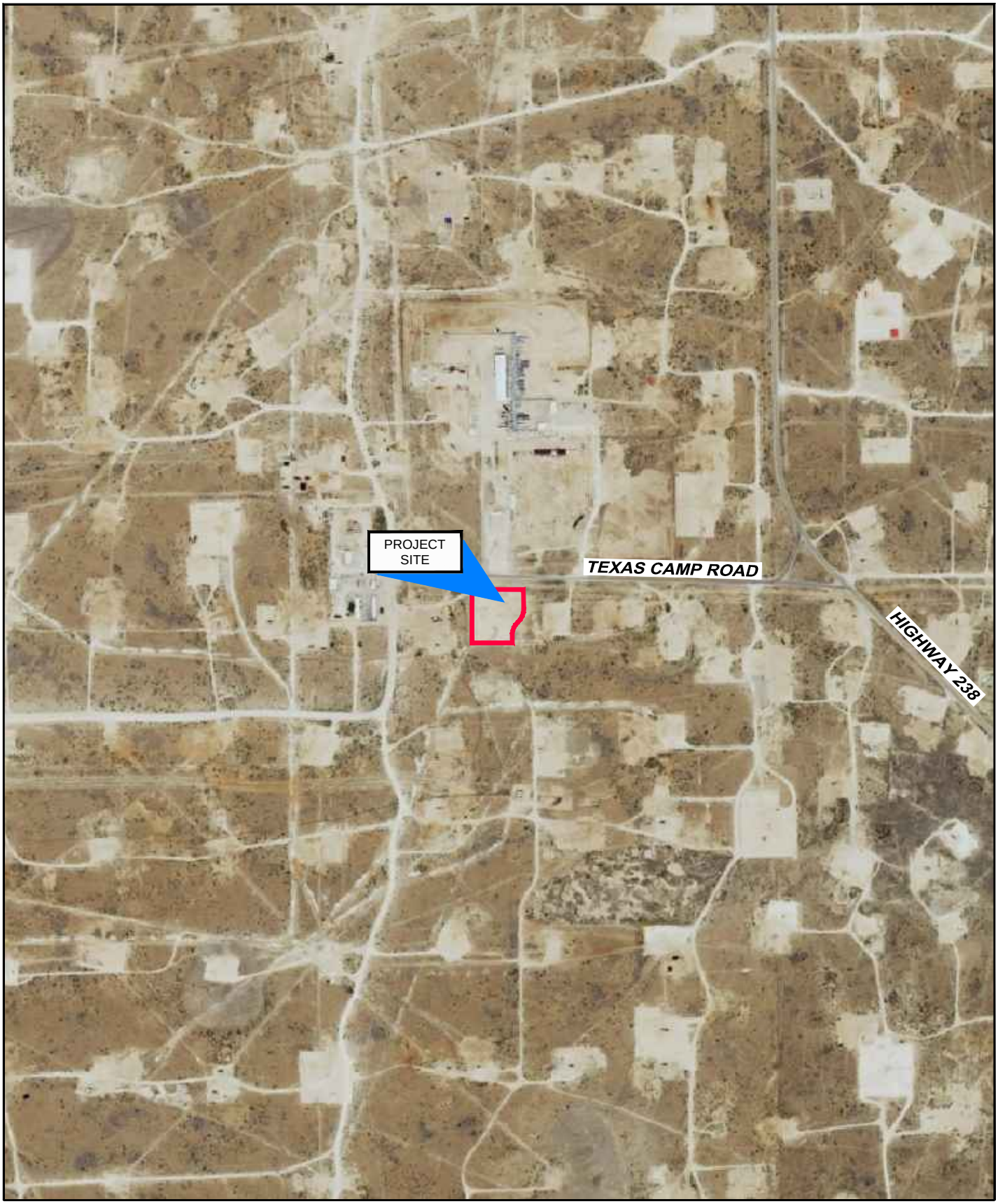
074633-2017

Feb 6, 2018

SITE LOCATION MAP

FIGURE 1

CAD File: I:\CAD\Files\07----\074---\074633-VGWU Satellite #4 Trunkline\074633-2017\074633-2017(004)\074633-2017(004)GN-DL001.dwg



0 400 800ft

Coordinate System:
NAD 1983 StatePlane-
New Mexico East (US Feet)

CEMC
LEA COUNTY, NEW MEXICO
VGWU SATELLITE #4 TRUNK LINE

074633-2017

Feb 6, 2018

AERIAL SITE MAP

FIGURE 2

CAD File: I:\CAD\Files\07----\074---\074633-VGWU Satellite #4 Trunkline\074633-2017\074633-2017(004)\074633-2017(004)GN-DL001.dwg

Source: USDA FSA Imagery, May 10, 2014

LAT/LONG: 32.7827° NORTH, 103.5106° WEST

0 20 60ft

Coordinate System:
NAD 1983 StatePlane-
New Mexico East (US Feet)

CEMC
LEA COUNTY, NEW MEXICO
VGWU SATELLITE #4 TRUNK LINE

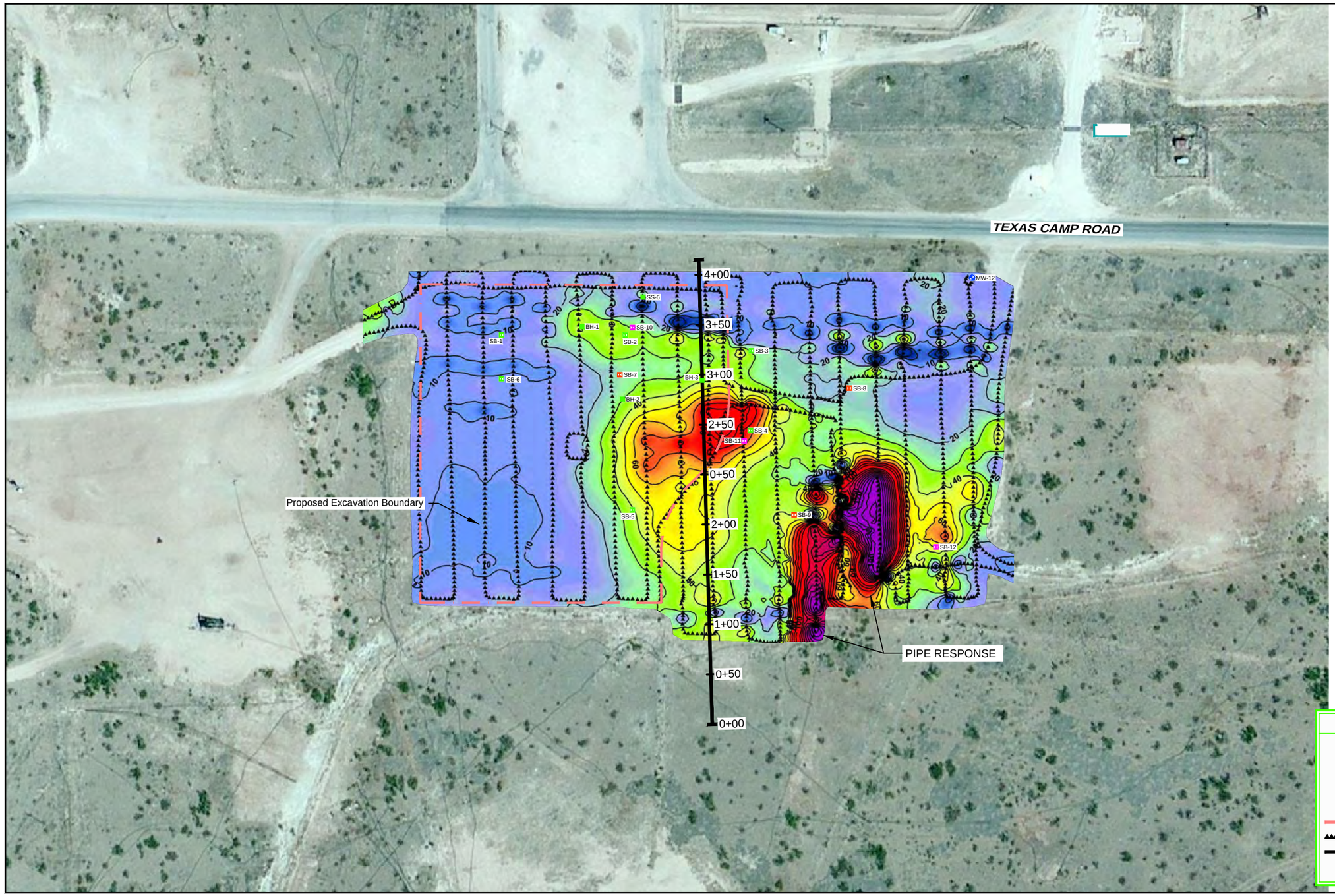
SITE DETAILS

074633-2017

Apr 17, 2018

FIGURE 3

CAD File: I:\CAD\Files\07---\074---\074633-VGWU Satellite #4 Trunkline\074633-2017\074633-2017(004)\074633-2017(004)GN-DL001.dwg



EM31 CONDUCTIVITY RESPONSE (mS/m)

200
175
150
125
100
75
50
25
0

LEGEND

- Soil Boring Location - 2014
- Soil Boring Location - 2015
- Soil Boring Location - 2017
- Crain Sample Location
- Monitor Well Location
- Approximate Site Boundary
- EM31 Survey Coverage
- Electrical Resistivity Survey Line
- 0+50 Fifty Foot Intervals

Source: Image courtesy of ImagePatch>com © Microsoft Corporation

LAT/LONG: 32.7827° NORTH, 103.5106° WEST

0 50 100ft

Coordinate System:
NAD 83 STATE PLANE - NEW MEXICO EAST (US FEET)

C E M C
LEA COUNTY, NEW MEXICO
VGWU SATELLITE #4 TRUNK LINE

074633-2017

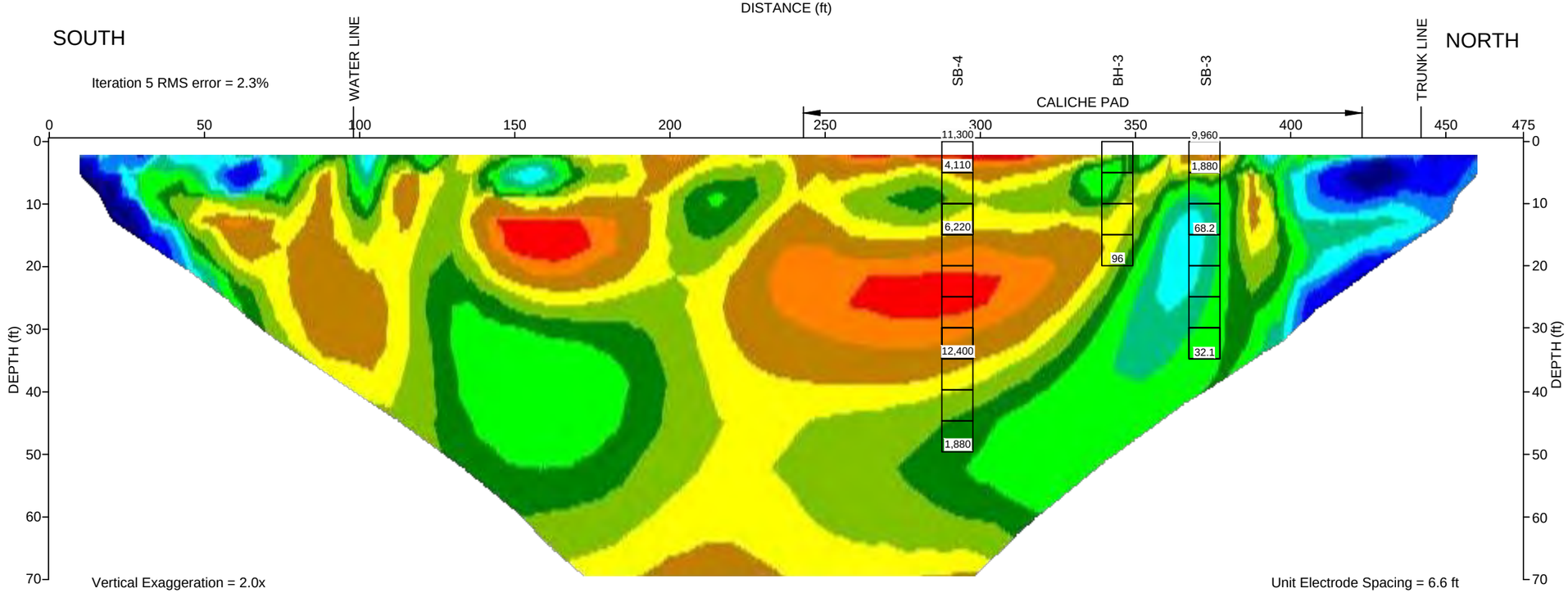
Apr 18, 2018

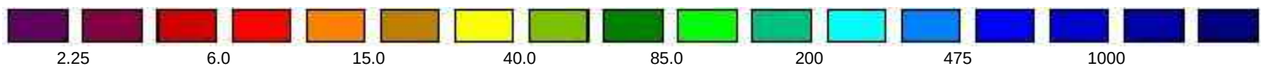
EM31 GEOPHYSICAL INVESTIGATION

FIGURE 4

CAD File: P:\drawings\74000s\74633\74633-REPORTS\74633-2017(006)\74633-2017(006)GN\074633-2017(006)GN-WA001.dwg

VGWU Satellite 4 TL - LINE 1
INVERSE MODEL RESISTIVITY SECTION





NOTE:

C E M C
LEA COUNTY, NEW MEXICO
VGWU SATELLITE #4 TRUCK LINE

ELECTRICAL RESISTIVITY SURVEY RESULTS
AND HISTORICAL SOIL ANALYTICAL DATA

074633-2017
Apr 18, 2018

FIGURE 5

CAD File: P:\drawings\74000s\74633\74633-REPORTS\74633-2017(006)\74633-2017(006)GN\074633-2017(006)GN-WA002.dwg

Source: USDA FSA Imagery, May 10, 2014

LAT/LONG: 32.7827° NORTH, 103.5106° WEST

0 20 60ft

Coordinate System:
NAD 1983 StatePlane-
New Mexico East (US Feet)

Sample ID — SB-11 10/16/17 — Sample Date
Depth 0.5-1' — Sample Depth (ft)
Chloride 2,520 — Sample Result (mg/kg)

CEMC
LEA COUNTY, NEW MEXICO
VGWU SATELLITE #4 TRUNK LINE

074633-2017
Apr 17, 2018

SITE DETAILS AND ANALYTICAL RESULTS MAP

FIGURE 6

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Tables

TABLE 1
SOIL ANALYTICAL RESULTS SUMAMRY
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
VGWU SATELLITE NO. 4 INJECTION TRUNKLINE
LEA COUNTY, NEW MEXICO

Sample ID	Depth (feet)	Date	Chloride (mg/kg)
NMOCD Recommended Remediation Action Level			**250**
SS-1	0.5	8/4/09	**4890**
	1	9/21/09	**3400**
	2	9/21/09	**4040**
	2.5	9/21/09	**1880**
SS-2	0.5	8/4/09	**23400**
	1	9/21/09	**1280**
	2	9/21/09	**1180**
	3	9/21/09	**1460**
SS-3	0.5	8/4/09	**15500**
	1	9/21/09	**1380**
	2	9/21/09	64
	3	9/21/09	**864**
	4	9/21/09	**1250**
SS-4	0.5	8/4/09	**29400**
SS-5	0.5	9/21/09	**480**
	1	9/21/09	224
SS-6	0.5	9/21/09	64
	1	9/21/09	32
SS-7	0.5	9/21/09	**480**
	1	9/21/09	32
BH-1	4-5	10/6/10	**1520**
	10-11	10/6/10	**736**
	15-16	10/6/10	**528**
	20-21	10/6/10	**1520**
	25-26	10/6/10	**2360**
	30-31	10/6/10	**1140**
BH-2	5-6	10/6/10	160
	10-11	10/6/10	**304**
	15-16	10/6/10	96.0
	20-21	10/6/10	80.0
BH-3	5-6	10/6/10	**576**
	10-11	10/6/10	**640**
	15-16	10/6/10	144
	20-21	10/6/10	96.0

TABLE 1
SOIL ANALYTICAL RESULTS SUMAMRY
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
VGWU SATELLITE NO. 4 INJECTION TRUNKLINE
LEA COUNTY, NEW MEXICO

Sample ID	Depth (feet)	Date	Chloride (mg/kg)
NMOCD Recommended Remediation Action Level			**250**
SB-1	0	3/18/14	163
	10	3/18/14	11.1
	20	3/18/14	4.7
	35	3/18/14	3.58
SB-2	0	3/18/14	**8150**
	5	3/18/14	**857**
	15	3/18/14	**1360**
	35	3/18/14	**1890**
	50	3/18/14	**2700**
SB-3	0	3/18/14	**9960**
	5	3/18/14	**1880**
	15	3/18/14	68.2
	35	3/18/14	32.1
SB-4	0'	3/18/14	**11300**
	5	3/18/14	**4110**
	15	3/18/14	**6220**
	35	3/18/14	**12400**
	50	3/18/14	**1880**
SB-5	0	3/18/14	111
	5	3/18/14	**622**
	15	3/18/14	**553**
	35	3/18/14	18.8
SB-6	0	3/18/14	**311**
	5	3/18/14	21.5
	15	3/18/14	13.4
	35	3/18/14	4.05
SB-7	0	8/21/15	24.2
	5	8/21/15	25.7
	10	8/21/15	**277**
	15	8/21/15	144
	20	8/21/15	203
	30	8/21/15	53.3
	50	8/21/15	7.28
	70	8/21/15	<2.10
	90	8/21/15	<2.10

TABLE 1
SOIL ANALYTICAL RESULTS SUMAMRY
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
VGWU SATELLITE NO. 4 INJECTION TRUNKLINE
LEA COUNTY, NEW MEXICO

Sample ID	Depth (feet)	Date	Chloride (mg/kg)
NMOCD Recommended Remediation Action Level			**250**
SB-8	0	8/21/15	9.05
	5	8/21/15	**289**
	10	8/21/15	172
	15	8/21/15	41.0
	20	8/21/15	55.9
	30	8/21/15	**630**
	50	8/21/15	72.2
	70	8/21/15	67.4
	90	8/21/15	80.4
SB-9	0	8/21/15	79.6
	5	8/21/15	**2540**
	10	8/21/15	**474**
	15	8/21/15	23.9
	20	8/21/15	114
	30	8/21/15	77.2
	50	8/21/15	21.4
	70	8/21/15	4.21
	90	8/21/15	3.63
SB-10	0.5-1	10/16/17	**5720**
	4-5	10/16/17	**1130**
	9-10	10/16/17	**325**
	19-20	10/16/17	47.3
	29-30	10/16/17	17.1
	39-40	10/16/17	15.1
	49-50	10/16/17	**254**
	59-60	10/16/17	**522**
	69-70	10/16/17	**487**
	79-80	10/16/17	**452**
	89-90	10/16/17	**354**

TABLE 1
SOIL ANALYTICAL RESULTS SUMAMRY
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
VGWU SATELLITE NO. 4 INJECTION TRUNKLINE
LEA COUNTY, NEW MEXICO

Sample ID	Depth (feet)	Date	Chloride (mg/kg)
NMOCD Recommended Remediation Action Level			**250**
SB-11	0.5-1	10/16/17	**2520**
	4-5	10/16/17	**1920**
	9-10	10/16/17	**3180**
	19-20	10/16/17	**7690**
	29-30	10/16/17	**970**
	39-40	10/16/17	166
	49-50	10/16/17	135
	59-60	10/16/17	69.8
	69-70	10/16/17	---
	79-80	10/16/17	---
	89-90	10/16/17	125
SB-12	0.5-1	10/16/17	59.7
	4-5	10/16/17	169
	9-10	10/16/17	**355**
	19-20	10/16/17	**322**
	29-30	10/16/17	23.8
	39-40	10/16/17	10.3
	49-50	10/16/17	---
	59-60	10/16/17	---
	69-70	10/16/17	---
SB-12	79-80	10/16/17	---
	89-90	10/16/17	---

Notes:

1. All analytical results reported in (mg/kg) milligrams per kilogram
2. Chloride analyses by EPA Method 300.0
3. Highlighted cells indicate concentrations exceeding guidance RRALs
4. bgs - below ground surface
5. Depth of samples reported in feet
6. '<' Indicates laboratory detection was below the reporting limit
7. Sample was not analyzed

Appendices

Appendix A
Soil Boring Logs

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: VGWU SAT4
PROJECT NUMBER: 74633
CLIENT: Chevron
LOCATION: Lovington

HOLE DESIGNATION: SB-10
DATE COMPLETED: 16 October 2017
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: Rebecca Jones

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	SAMPLE DEPTH (ft)	INTERVAL	REC (ft)	PP (tsf)	Chloride (mg/kg)
	TOP SOIL	1.00					
	Caliche	2.50					
5	SANDSTONE; light brown, contains caliche		4-5		1.0		277
10			9-10		1.0		76
15							
20			19-20		1.0		28
25							
30			29-30		1.0		0
35							
40			39-40		1.0		0
45							
50	END OF BOREHOLE @ 50.0ft BGS		49-50		1.0		99
55	SILTY SAND (SM); light reddish brown	55.00					
60			59-60		1.0		180
65	SILTY SAND (SM); reddish brown	65.00					
70			69-70		1.0		119
75							
80			79-80		1.0		130
85							
90		90.00	89-90		1.0		90
95							

NOTES:

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 074633.GPJ CRA_CORP.GDT 11/4/18

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: VGWU SAT4
PROJECT NUMBER: 74633
CLIENT: Chevron
LOCATION: Lovington

HOLE DESIGNATION: SB-11
DATE COMPLETED: 16 October 2017
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: Rebecca Jones

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	SAMPLE DEPTH (ft)	INTERVAL	REC (ft)	PP (tsf)	Chloride (mg/kg)
0	SILTY SAND (SM); light brown, contains caliche						
5			4-5		1.0		515
10			9-10		1.0		>615
15							
20			19-20		1.0		>615
25							
30			29-30		1.0		329
35							
40			39-40		1.0		46
45							
50			49-50		1.0		34
55	SILTY SAND (SM); reddish brown	55.00					
60			59-60		1.0		0
65							
70			69-70		1.0		0
75							
80			79-80		1.0		0
85							
90	END OF BOREHOLE @ 90.0ft BGS	90.00	89-90		1.0		28
95							

NOTES:

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 074633.GPJ CRA_CORP.GDT 11/4/18

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: VGWU SAT4
PROJECT NUMBER: 74633
CLIENT: Chevron
LOCATION: Lovington

HOLE DESIGNATION: SB-12
DATE COMPLETED: 16 October 2017
DRILLING METHOD: Air Rotary
FIELD PERSONNEL: Rebecca Jones

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	DEPTH ft BGS	SAMPLE DEPTH (ft)	SAMPLE INTERVAL	SAMPLE REC (ft)	SAMPLE PP (tsf)	SAMPLE Chloride (mg/kg)
0	SANDY CLAY (CLS); dark brown						
5							
		7.50					
10	CLAYEY SAND (SC); brown, contains caliche		9-10		1.0		82
15		15.00					
	SILTY SAND (SM); light brown, contains caliche						
20			19-20		1.0		90
25		25.00					
	SILTY SAND (SM); light brown						
30			29-30		1.0		0
35							
40			39-40		1.0		0
45		45.00					
	SILTY SAND (SM); light brown, contains caliche						
50			49-50		1.0		0
55		55.00					
	SILTY SAND (SM); reddish brown						
60			59-60		1.0		0
65							
70			69-70		1.0		0
75							
80			79-80		1.0		0
85							
90		90.00	89-90		1.0		0
	END OF BOREHOLE @ 90.0ft BGS						
95							

NOTES:

LABORATORY ANALYSIS ( )

OVERBURDEN LOG 074633.GPJ CRA_CORP.GDT 11/4/18

Appendix B
Soil Laboratory Analytical Report - 2017

Certificate of Analysis Summary 565927

GHD Services, INC- Midland, Midland, TX

Project Name: VGWU Satellite 4 (Sat-4)

Project Id: 074633
Contact: Scott Foord
Project Location: Lovington, NM

Date Received in Lab: Thu Oct-19-17 08:46 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

Analysis Requested													
	Lab Id:	565927-001		565927-002		565927-003		565927-004		565927-005		565927-011	
	Field Id:	SB-12-S-4-5-171016		SB-12-S-9-10-171016		SB-12-S-19-20-171016		SB-12-S-29-30-171016		SB-12-S-39-40-171016		SB-12-S-0.5-1-171016	
	Depth:												
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	Oct-16-17 10:45		Oct-16-17 10:50		Oct-16-17 10:55		Oct-16-17 11:00		Oct-16-17 11:05		Oct-16-17 12:05	
Chloride by EPA 300	***Extracted:***	Oct-27-17 12:30		Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 15:45	
	Analyzed:	Oct-27-17 18:26		Oct-27-17 19:04		Oct-27-17 19:23		Oct-27-17 19:30		Oct-27-17 19:36		Oct-27-17 20:34	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		169	5.92	355	6.13	322	5.16	23.8	5.39	10.3	5.30	59.7	5.04
Percent Moisture	***Extracted:***												
	Analyzed:	Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00	
	Units/RL:	%	RL	%	RL	%	RL	%	RL	%	RL	%	RL
Percent Moisture		15.8	1.00	19.0	1.00	3.03	1.00	8.20	1.00	5.90	1.00	2.39	1.00

Kelsey Brooks
Project Manager

Certificate of Analysis Summary 565927

GHD Services, INC- Midland, Midland, TX

Project Name: VGWU Satellite 4 (Sat-4)

Project Id: 074633
Contact: Scott Foord
Project Location: Lovington, NM

Date Received in Lab: Thu Oct-19-17 08:46 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

Analysis Requested													
	Lab Id:	565927-012		565927-013		565927-014		565927-015		565927-016		565927-017	
	Field Id:	SB-11-0.5-1-171016		SB-11-S-4-5-171016		SB-11-S-9-10-171016		SB-11-S-19-20-171016		SB-11-S-29-30-171016		SB-11-S-39-40-171016	
	Depth:												
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	Oct-16-17 13:40		Oct-16-17 12:50		Oct-16-17 12:55		Oct-16-17 13:00		Oct-16-17 13:05		Oct-16-17 13:10	
Chloride by EPA 300	***Extracted:***	Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 15:45	
	Analyzed:	Oct-27-17 20:27		Oct-27-17 20:53		Oct-27-17 20:59		Oct-27-17 21:18		Oct-27-17 21:25		Oct-27-17 21:31	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		2520	52.1	1920	25.9	3180	27.0	7690	58.1	970	5.39	166	5.28
Percent Moisture	***Extracted:***												
	Analyzed:	Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00	
	Units/RL:	%	RL	%	RL	%	RL	%	RL	%	RL	%	RL
Percent Moisture		4.41	1.00	4.54	1.00	8.50	1.00	14.6	1.00	8.67	1.00	5.99	1.00

Kelsey Brooks
Project Manager

Certificate of Analysis Summary 565927

GHD Services, INC- Midland, Midland, TX

Project Name: VGWU Satellite 4 (Sat-4)

Project Id: 074633
Contact: Scott Foord
Project Location: Lovington, NM

Date Received in Lab: Thu Oct-19-17 08:46 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

Analysis Requested													
	Lab Id:	565927-018		565927-019		565927-022		565927-023		565927-024		565927-025	
	Field Id:	SB-11-S-49-50-171016		SB-11-S-59-60-171016		SB-11-S-89-90-171016		SB-10-S-0.5-1-171016		SB-10-S-4-5-171016		SB-10-S-9-10-171016	
	Depth:												
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	Oct-16-17 13:15		Oct-16-17 13:20		Oct-16-17 13:35		Oct-16-17 14:10		Oct-16-17 14:15		Oct-16-17 14:20	
Chloride by EPA 300	***Extracted:***	Oct-27-17 15:45		Oct-27-17 15:45		Oct-27-17 14:40		Oct-27-17 14:40		Oct-27-17 14:40		Oct-27-17 14:40	
	Analyzed:	Oct-27-17 21:37		Oct-27-17 21:44		Oct-27-17 22:35		Oct-27-17 22:54		Oct-27-17 23:00		Oct-27-17 23:07	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		135	5.30	69.8	7.25	125	7.03	5720	49.9	1130	5.47	325	5.21
Percent Moisture	***Extracted:***												
	Analyzed:	Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00	
	Units/RL:	%	RL	%	RL	%	RL	%	RL	%	RL	%	RL
Percent Moisture		6.36	1.00	31.2	1.00	29.1	1.00	1.25	1.00	8.71	1.00	5.15	1.00

Kelsey Brooks
Project Manager

Certificate of Analysis Summary 565927

GHD Services, INC- Midland, Midland, TX

Project Name: VGWU Satellite 4 (Sat-4)

Project Id: 074633
Contact: Scott Foord
Project Location: Lovington, NM

Date Received in Lab: Thu Oct-19-17 08:46 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

Analysis Requested													
	Lab Id:	565927-026		565927-027		565927-028		565927-029		565927-030		565927-031	
	Field Id:	SB-10-S-19-20-171016		SB-10-S-29-30-171016		SB-10-S-39-40-171016		SB-10-S-49-50-171016		SB-10-S-59-60-171016		SB-10-S-69-70-171016	
	Depth:												
	Matrix:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
	Sampled:	Oct-16-17 14:25		Oct-16-17 14:30		Oct-16-17 14:35		Oct-16-17 14:40		Oct-16-17 14:45		Oct-16-17 14:50	
Chloride by EPA 300	***Extracted:***	Oct-27-17 14:40		Oct-27-17 14:40		Oct-27-17 14:40		Oct-27-17 14:40		Oct-27-17 14:40		Oct-27-17 14:40	
	Analyzed:	Oct-27-17 23:13		Oct-27-17 23:32		Oct-27-17 23:39		Oct-27-17 23:45		Oct-27-17 23:51		Oct-27-17 23:58	
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL
Chloride		47.3	5.22	17.1	5.51	15.1	5.25	254	5.33	522	5.23	487	5.16
Percent Moisture	***Extracted:***												
	Analyzed:	Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00		Oct-19-17 12:00	
	Units/RL:	%	RL	%	RL	%	RL	%	RL	%	RL	%	RL
Percent Moisture		5.21	1.00	9.99	1.00	6.11	1.00	7.69	1.00	5.28	1.00	4.66	1.00

Kelsey Brooks
Project Manager

Certificate of Analysis Summary 565927

GHD Services, INC- Midland, Midland, TX

Project Name: VGWU Satellite 4 (Sat-4)

Project Id: 074633
Contact: Scott Foord
Project Location: Lovington, NM

Date Received in Lab: Thu Oct-19-17 08:46 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

Analysis Requested									
	Lab Id:	565927-032		565927-033					
	Field Id:	SB-10-S-79-80-171016		SB-10-S-89-90-171016					
	Depth:								
	Matrix:	SOIL		SOIL					
	Sampled:	Oct-16-17 14:55		Oct-16-17 15:00					
Chloride by EPA 300	***Extracted:***	Oct-27-17 14:40		Oct-27-17 14:40					
	Analyzed:	Oct-28-17 00:04		Oct-28-17 00:23					
	Units/RL:	mg/kg	RL	mg/kg	RL				
Chloride		452	5.24	354	5.25				
Percent Moisture	***Extracted:***								
	Analyzed:	Oct-19-17 12:00		Oct-19-17 12:00					
	Units/RL:	%	RL	%	RL				
Percent Moisture		5.57	1.00	5.59	1.00				

Kelsey Brooks
Project Manager

Analytical Report 565927

for

GHD Services, INC- Midland

Project Manager: Scott Foord

VGWU Satellite 4 (Sat-4)

074633

30-OCT-17

Collected By: Client

1211 W. Florida Ave, Midland TX 79701

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215-17-23), Arizona (AZ0765), Florida (E871002-24), Louisiana (03054)
Oklahoma (2017-142)

Xenco-Dallas (EPA Lab code: TX01468):
Texas (T104704295-17-15), Arizona (AZ0809), Arkansas (17-063-0)

Xenco-El Paso (EPA Lab code: TX00127): Texas (T104704221-17-12)
Xenco-Lubbock (EPA Lab code: TX00139): Texas (T104704219-17-16)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-17-13)
Xenco-San Antonio (EPA Lab Code: TNI02385): Texas (T104704534-17-3)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)

30-OCT-17

Project Manager: **Scott Foord**
GHD Services, INC- Midland
2135 S Loop 250 W
Midland, TX 79703

Reference: XENCO Report No(s): **565927**
VGWU Satellite 4 (Sat-4)
Project Address: Lovington, NM

Scott Foord:

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) 565927. 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. 565927 will be filed for 45 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 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
SB-12-S-4-5-171016	S	10-16-17 10:45		565927-001
SB-12-S-9-10-171016	S	10-16-17 10:50		565927-002
SB-12-S-19-20-171016	S	10-16-17 10:55		565927-003
SB-12-S-29-30-171016	S	10-16-17 11:00		565927-004
SB-12-S-39-40-171016	S	10-16-17 11:05		565927-005
SB-12-S-0.5-1-171016	S	10-16-17 12:05		565927-011
SB-11-0.5-1-171016	S	10-16-17 13:40		565927-012
SB-11-S-4-5-171016	S	10-16-17 12:50		565927-013
SB-11-S-9-10-171016	S	10-16-17 12:55		565927-014
SB-11-S-19-20-171016	S	10-16-17 13:00		565927-015
SB-11-S-29-30-171016	S	10-16-17 13:05		565927-016
SB-11-S-39-40-171016	S	10-16-17 13:10		565927-017
SB-11-S-49-50-171016	S	10-16-17 13:15		565927-018
SB-11-S-59-60-171016	S	10-16-17 13:20		565927-019
SB-11-S-89-90-171016	S	10-16-17 13:35		565927-022
SB-10-S-0.5-1-171016	S	10-16-17 14:10		565927-023
SB-10-S-4-5-171016	S	10-16-17 14:15		565927-024
SB-10-S-9-10-171016	S	10-16-17 14:20		565927-025
SB-10-S-19-20-171016	S	10-16-17 14:25		565927-026
SB-10-S-29-30-171016	S	10-16-17 14:30		565927-027
SB-10-S-39-40-171016	S	10-16-17 14:35		565927-028
SB-10-S-49-50-171016	S	10-16-17 14:40		565927-029
SB-10-S-59-60-171016	S	10-16-17 14:45		565927-030
SB-10-S-69-70-171016	S	10-16-17 14:50		565927-031
SB-10-S-79-80-171016	S	10-16-17 14:55		565927-032
SB-10-S-89-90-171016	S	10-16-17 15:00		565927-033
SB-12-S-49-50-171016	S	10-16-17 11:10		Not Analyzed
SB-12-S-59-60-171016	S	10-16-17 11:15		Not Analyzed
SB-12-S-69-70-171016	S	10-16-17 11:20		Not Analyzed
SB-12-S-79-80-171016	S	10-16-17 11:25		Not Analyzed
SB-12-S-89-90-171016	S	10-16-17 11:30		Not Analyzed
SB-11-S-69-70-171016	S	10-16-17 13:25		Not Analyzed
SB-11-S-79-80-171016	S	10-16-17 13:30		Not Analyzed

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-12-S-4-5-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-001	Date Collected:	10.16.17 10.45		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	15.82
Analyst:	MNV	Date Prep:	10.27.17 12.30	Basis:	Dry Weight
Seq Number:	3031683				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**169**	5.92	mg/kg	10.27.17 18.26		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-12-S-9-10-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-002	Date Collected:	10.16.17 10.50		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	18.97
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**355**	6.13	mg/kg	10.27.17 19.04		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-12-S-19-20-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-003	Date Collected:	10.16.17 10.55		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	3.03
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**322**	5.16	mg/kg	10.27.17 19.23		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-12-S-29-30-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-004	Date Collected:	10.16.17 11.00		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	8.2
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**23.8**	5.39	mg/kg	10.27.17 19.30		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-12-S-39-40-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-005	Date Collected:	10.16.17 11.05		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	5.9
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**10.3**	5.30	mg/kg	10.27.17 19.36		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-12-S-0.5-1-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-011	Date Collected:	10.16.17 12.05		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	2.39
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**59.7**	5.04	mg/kg	10.27.17 20.34		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-0.5-1-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-012	Date Collected:	10.16.17 13.40		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	4.41
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**2520**	52.1	mg/kg	10.27.17 20.27		10

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-4-5-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-013	Date Collected:	10.16.17 12.50		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	4.54
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**1920**	25.9	mg/kg	10.27.17 20.53		5

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-9-10-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-014	Date Collected:	10.16.17 12.55		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	8.5
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**3180**	27.0	mg/kg	10.27.17 20.59		5

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-19-20-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-015	Date Collected:	10.16.17 13.00		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	14.63
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**7690**	58.1	mg/kg	10.27.17 21.18		10

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-29-30-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-016	Date Collected:	10.16.17 13.05		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	8.67
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**970**	5.39	mg/kg	10.27.17 21.25		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-39-40-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-017	Date Collected:	10.16.17 13.10		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	5.99
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**166**	5.28	mg/kg	10.27.17 21.31		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-49-50-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-018	Date Collected:	10.16.17 13.15		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	6.36
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**135**	5.30	mg/kg	10.27.17 21.37		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-59-60-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-019	Date Collected:	10.16.17 13.20		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	31.18
Analyst:	MNV	Date Prep:	10.27.17 15.45	Basis:	Dry Weight
Seq Number:	3031753				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**69.8**	7.25	mg/kg	10.27.17 21.44		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-11-S-89-90-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-022	Date Collected:	10.16.17 13.35		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	29.06
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**125**	7.03	mg/kg	10.27.17 22.35		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-0.5-1-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-023	Date Collected:	10.16.17 14.10		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	1.25
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**5720**	49.9	mg/kg	10.27.17 22.54		10

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-4-5-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-024	Date Collected:	10.16.17 14.15		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	8.71
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**1130**	5.47	mg/kg	10.27.17 23.00		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-9-10-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-025	Date Collected:	10.16.17 14.20		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	5.15
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**325**	5.21	mg/kg	10.27.17 23.07		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-19-20-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-026	Date Collected:	10.16.17 14.25		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	5.21
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**47.3**	5.22	mg/kg	10.27.17 23.13		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-29-30-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-027	Date Collected:	10.16.17 14.30		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	9.99
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**17.1**	5.51	mg/kg	10.27.17 23.32		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-39-40-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-028	Date Collected:	10.16.17 14.35		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	6.11
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**15.1**	5.25	mg/kg	10.27.17 23.39		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-49-50-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-029	Date Collected:	10.16.17 14.40		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	7.69
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**254**	5.33	mg/kg	10.27.17 23.45		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-59-60-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-030	Date Collected:	10.16.17 14.45		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	5.28
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**522**	5.23	mg/kg	10.27.17 23.51		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-69-70-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-031	Date Collected:	10.16.17 14.50		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	4.66
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**487**	5.16	mg/kg	10.27.17 23.58		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-79-80-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-032	Date Collected:	10.16.17 14.55		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	5.57
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**452**	5.24	mg/kg	10.28.17 00.04		1

Certificate of Analytical Results 565927

GHD Services, INC- Midland, Midland, TX

VGWU Satellite 4 (Sat-4)

Sample Id:	**SB-10-S-89-90-171016**	Matrix:	Soil	Date Received:	10.19.17 08.46
Lab Sample Id:	565927-033	Date Collected:	10.16.17 15.00		
Analytical Method:	Chloride by EPA 300			Prep Method:	E300P
Tech:	MNV			% Moisture:	5.59
Analyst:	MNV	Date Prep:	10.27.17 14.40	Basis:	Dry Weight
Seq Number:	3031757				

Parameter	Cas Number	Result	RL	Units	Analysis Date	Flag	Dil
Chloride	16887-00-6	**354**	5.25	mg/kg	10.28.17 00.23		1

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

GHD Services, INC- Midland

VGWU Satellite 4 (Sat-4)

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031683 Matrix: Solid Date Prep: 10.27.17
MB Sample Id: 7633336-1-BLK LCS Sample Id: 7633336-1-BKS LCSD Sample Id: 7633336-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<5.00	250	240	96	240	96	90-110	0	20	mg/kg	10.27.17 15:21	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031757 Matrix: Solid Date Prep: 10.27.17
MB Sample Id: 7633404-1-BLK LCS Sample Id: 7633404-1-BKS LCSD Sample Id: 7633404-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<5.00	250	248	99	245	98	90-110	1	20	mg/kg	10.27.17 22:22	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031753 Matrix: Solid Date Prep: 10.27.17
MB Sample Id: 7633403-1-BLK LCS Sample Id: 7633403-1-BKS LCSD Sample Id: 7633403-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<5.00	250	247	99	245	98	90-110	1	20	mg/kg	10.27.17 18:52	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031683 Matrix: Soil Date Prep: 10.27.17
Parent Sample Id: 566209-017 MS Sample Id: 566209-017 S MSD Sample Id: 566209-017 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<4.90	245	252	103	250	102	90-110	1	20	mg/kg	10.27.17 15:40	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031683 Matrix: Soil Date Prep: 10.27.17
Parent Sample Id: 566422-006 MS Sample Id: 566422-006 S MSD Sample Id: 566422-006 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	<4.99	250	259	104	258	103	90-110	0	20	mg/kg	10.27.17 17:10	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031757 Matrix: Soil Date Prep: 10.27.17
Parent Sample Id: 565927-022 MS Sample Id: 565927-022 S MSD Sample Id: 565927-022 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	125	352	472	99	473	99	90-110	0	20	mg/kg	10.27.17 22:41	

GHD Services, INC- Midland

VGWU Satellite 4 (Sat-4)

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031757 Matrix: Soil Date Prep: 10.27.17
Parent Sample Id: 565927-032 MS Sample Id: 565927-032 S MSD Sample Id: 565927-032 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	452	262	696	93	705	97	90-110	1	20	mg/kg	10.28.17 00:11	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031753 Matrix: Soil Date Prep: 10.27.17
Parent Sample Id: 565927-002 MS Sample Id: 565927-002 S MSD Sample Id: 565927-002 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	355	307	644	94	651	96	90-110	1	20	mg/kg	10.27.17 19:11	

Analytical Method: **Chloride by EPA 300** Prep Method: E300P
Seq Number: 3031753 Matrix: Soil Date Prep: 10.27.17
Parent Sample Id: 565927-011 MS Sample Id: 565927-011 S MSD Sample Id: 565927-011 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Chloride	59.7	252	309	99	309	99	90-110	0	20	mg/kg	10.27.17 20:40	

Analytical Method: **Percent Moisture**
Seq Number: 3030983 Matrix: Solid
MB Sample Id: 3030983-1-BLK

Parameter	MB Result	Units	Analysis Date	Flag
Percent Moisture	<1.00	%	10.19.17 12:00	

Analytical Method: **Percent Moisture**
Seq Number: 3030986 Matrix: Solid
MB Sample Id: 3030986-1-BLK

Parameter	MB Result	Units	Analysis Date	Flag
Percent Moisture	<1.00	%	10.19.17 12:00	

Analytical Method: **Percent Moisture**
Seq Number: 3030983 Matrix: Soil
Parent Sample Id: 565867-001 MD Sample Id: 565867-001 D

Parameter	Parent Result	MD Result	%RPD	RPD Limit	Units	Analysis Date	Flag
Percent Moisture	9.90	10.7	8	20	%	10.19.17 12:00	

QC Summary 565927

GHD Services, INC- Midland

VGWU Satellite 4 (Sat-4)

Analytical Method: **Percent Moisture**
Seq Number: 3030983 Matrix: Soil
Parent Sample Id: 565927-014 MD Sample Id: 565927-014 D

Parameter	Parent Result	MD Result	%RPD	RPD Limit	Units	Analysis Date	Flag
Percent Moisture	8.50	8.69	2	20	%	10.19.17 12:00	

Analytical Method: **Percent Moisture**
Seq Number: 3030986 Matrix: Soil
Parent Sample Id: 565927-029 MD Sample Id: 565927-029 D

Parameter	Parent Result	MD Result	%RPD	RPD Limit	Units	Analysis Date	Flag
Percent Moisture	7.69	7.72	0	20	%	10.19.17 12:00	

Analytical Method: **Percent Moisture**
Seq Number: 3030986 Matrix: Soil
Parent Sample Id: 565927-033 MD Sample Id: 565927-033 D

Parameter	Parent Result	MD Result	%RPD	RPD Limit	Units	Analysis Date	Flag
Percent Moisture	5.59	5.22	7	20	%	10.19.17 12:00	

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South Charleston, WV +1 304 356 3168
York, PA +1 717 505 5280

Chain of Custody Form

COC ID: 168785

S65927

ALS Project Manager:

ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	074633 VGWU Sattellite 4 (Sat-	A	300_S (300 Chloride)
Work Order		Project Number	074633	B	SW3550 (Moist%)
Company Name	GHD	Bill To Company	GHD	C	
Send Report To	Scott Foord	Invoice Attn		D	
Address	6320 Rothway, Suite 100	Address	13091 Pond Springs Road, Suite	E	
				F	
City/State/Zip	Houston, TX 77040	City/State/Zip	Austin TX 78729	G	
Phone	(713) 734-3090	Phone	(512) 506-8803	H	
Fax	(713) 734-3391	Fax		I	
e-Mail Address	William.Foord@ghd.com	e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SB-12-S-4-5-171016	10-16-17	1045	Soil	8	1	X	X									
2	SB-12-S-9-10-171016		1050			1											
3	SB-12-S-19-20-171016		1055			1											
4	SB-12-S-29-30-171016		1100			1											
5	SB-12-S-39-40-171016		1105			1											
6	SB-12-S-49-50-171016		1110			1											X
7	SB-12-S-59-60-171016		1115			1											
8	SB-12-S-69-70-171016		1120			1											
9	SB-12-S-79-80-171016		1125			1											
10	SB-12-S-89-90-171016		1130			1											

Temp: 5.7 IR ID:R-8
CF:(0-6: -0.2°C)
(6-23: +0.2°C)
Corrected Temp: 5.5

Sampler(s) Please Print & Sign: Scott Foord

Shipment Method:

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by:	Date: 10/18/17	Time: 9:00	Received by: 10.19.17 8:46
Relinquished by:	Date:	Time:	Received by (Laboratory):
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes: [GHD CEMC New Mexico]

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

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Chain of Custody Form

COC ID: 168788

565927

ALS Project Manager: | ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	074633 VGWU Sattellite 4 (Sat-	A	300_S (300 Chloride)
Work Order		Project Number	074633	B	SW3550 (Moist%)
Company Name	GHD	Bill To Company	GHD	C	
Send Report To	Scott Foord	Invoice Attn		D	
Address	6320 Rothway, Suite 100	Address	13091 Pond Springs Road, Suite	E	
				F	
City/State/Zip	Houston, TX 77040	City/State/Zip	Austin TX 78729	G	
Phone	(713) 734-3090	Phone	(512) 506-8803	H	
Fax	(713) 734-3391	Fax		I	
e-Mail Address	William.Foord@ghd.com	e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SB-12-S-0.5-1-171016	10-16-17	1205	Soil	8	1	X	X									
2	SB-11-S-0.5-1-171016		1340														
3	SB-11-S-4-5-171016		1250														
4	SB-11-S-9-10-171016		1255														
5	SB-11-S-19-20-171016		1300														
6	SB-11-S-29-30-171016		1305														
7	SB-11-S-39-40-171016		1310														
8	SB-11-S-49-50-171016		1315														
9	SB-11-S-59-60-171016		1320														
10	SB-11-S-69-70-171016		1325														

Temp: 5.7 IR ID:R-8
CF:(0-6: -0.2°C)
(6-23: +0.2°C)
Corrected Temp: 5.5

Sampler(s) Please Print & Sign: Scott Foord

Shipment Method: drop off

Required Turnaround Time: (Check Box) [X] STD 10 Wk Days [ ] 5 Wk Days [ ] 2 Wk Days [ ] 24 Hour [ ] Other

Results Due Date:

Relinquished by:	Date: 10/18/17	Time: 9:00	Received by:	8.19.17 8:46
Relinquished by:	Date:	Time:	Received by (Laboratory):	
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):	

Notes: [GHD CEMC New Mexico]

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
[X] Level II Std QC
[ ] Level III Std QC/Raw Data
[ ] Level IV SW846/CLP
[ ] Other
[ ] TRRP Checklist
[ ] TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
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Final 1.000

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Chain of Custody Form

Page 3 of 4

COC ID: 168787

565927

ALS Project Manager:		ALS Work Order #:	

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	074633 VGWU Sattellite 4 (Sat-	A	300_S (300 Chloride)
Work Order		Project Number	074633	B	SW3550 (Moist%)
Company Name	GHD	Bill To Company	GHD	C	
Send Report To	Scott Foord	Invoice Attn		D	
Address	6320 Rothway, Suite10	Address	13091 Pond Springs Road, Suite	E	
				F	
City/State/Zip	Houston, TX 77040	City/State/Zip	Austin TX 78729	G	
Phone	(713) 734-3090	Phone	(512) 506-8803	H	
Fax	(713) 734-3391	Fax		I	
e-Mail Address	William.Foord@ghd.com	e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SB-11-S-79-80-171016	10-16-17	1330	Soil	8	1	X	X									X
2	SB-11-S-89-90-171016		1335			1											X
3	SB-10-S-0.5-1-171016		1410			1											
4	SB-10-S-4-5-171016		1415			1											
5	SB-10-S-9-10-171016		1420			1											
6	SB-10-S-19-20-171016		1425			1											
7	SB-10-S-29-30-171016		1430			1											
8	SB-10-S-39-40-171016		1435			1											
9	SB-10-S-49-50-171016		1440			1											
10	SB-10-S-59-60-171016		1445			1											

Temp: 5.7 IR ID:R-8
CF:(0-6: -0.2°C)
(6-23: +0.2°C)
Corrected Temp: 5.5

Sampler(s) Please Print & Sign: Scott Foord

Shipment Method:

Required Turnaround Time: (Check Box) ☐ Other ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour

Results Due Date:

Relinquished by:	Date:	Time:	Received by:
	10/18/17	9:00	10.19.17 8:46
Relinquished by:	Date:	Time:	Received by (Laboratory):
Logged by (Laboratory):	Date:	Time:	Checked by (Laboratory):

Notes: [GHD CEMC New Mexico]

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
☒ Level II Std QC
☐ Level III Std QC/Raw Data
☐ Level IV SW846/CLP
☐ Other
☐ TRRP Checklist
☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
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York, PA +1 717 505 5280

Chain of Custody Form

COC ID: 168786

565927

ALS Project Manager:		ALS Work Order #:	

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	074633 VGWU Sattellite 4 (Sat-	A	300_S (300 Chloride)
Work Order		Project Number	074633	B	SW3550 (Moist%)
Company Name	GHD	Bill To Company	GHD	C	
Send Report To	Scott Foord	Invoice Attn		D	
Address	6320 Rothway, Suite 100	Address	13091 Pond Springs Road, Suite	E	
				F	
City/State/Zip	Houston, TX 77040	City/State/Zip	Austin TX 78729	G	
Phone	(713) 734-3090	Phone	(512) 506-8803	H	
Fax	(713) 734-3391	Fax		I	
e-Mail Address	William.Foord@ghd.com	e-Mail Address		J	

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	F	G	H	I	J	Hold
1	SB-10-S-69-70-171016	10-16-17	1450	Soil	8	1	X	X									
2	SB-10-S-79-80-171016	↓	1455	↓	↓	1	\	\									
3	SB-10-S-89-90-171016	↓	1500	↓	↓	1	\	\									
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Temp: 5.7 IR ID:R-8
CF:(0-6: -0.2°C)
(6-23: +0.2°C)
Corrected Temp: 5.5

Sampler(s) Please Print & Sign: Scott Foord

Shipment Method:

Required Turnaround Time: (Check Box) ☒ STD 10 Wk Days ☐ 5 Wk Days ☐ 2 Wk Days ☐ 24 Hour ☐ Other

Results Due Date:

Relinquished by: Date: 10/18/17 Time: 9:00 Received by:

Relinquished by: Date: Time: Received by (Laboratory): 10.19.17 8:40

Logged by (Laboratory): Date: Time: Checked by (Laboratory):

Notes: [GHD CEMC New Mexico]

Cooler ID	Cooler Temp.

QC Package: (Check One Box Below)
☒ Level II Std QC
☐ Level III Std QC/Raw Date
☐ Level IV SW846/CLP
☐ Other
☐ TRRP Checklist
☐ TRRP Level IV

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
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XENCO Laboratories
Prelogin/Nonconformance Report- Sample Log-In

Client: GHD Services, INC- Midland

Date/ Time Received: 10/19/2017 08:46:00 AM

Work Order #: 565927

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)?	5.5
#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 Any missing/extra samples?	**No**
#9 Chain of Custody signed when relinquished/ received?	**Yes**
#10 Chain of Custody agrees with sample labels/matrix?	**Yes**
#11 Container label(s) legible and intact?	**Yes**
#12 Samples in proper container/ bottle?	**Yes**
#13 Samples properly preserved?	**Yes**
#14 Sample container(s) intact?	**Yes**
#15 Sufficient sample amount for indicated test(s)?	**Yes**
#16 All samples received within hold time?	**Yes**
#17 Subcontract of sample(s)?	**No**
#18 Water VOC samples have zero headspace?	**N/A**

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

Analyst: PH Device/Lot#:

Checklist completed by: Shawnee Smith Date: 10/19/2017
Shawnee Smith

Checklist reviewed by: Kelsey Brooks Date: 10/19/2017
Kelsey Brooks

Appendix C
2018 Work Plan

May 18, 2018 Reference No. 074633

Ms. Olivia Yu
Environmental Specialist
New Mexico Oil Conservation Division – District 1
1625 N. French Drive
Hobbs, New Mexico 88240

Re: 2018 Scope of Work – Additional Soil Assessment
VGWU SAT No. 4 Injection Trunkline Release (RP-3941)
Lea County, New Mexico

Dear Ms. Yu:

1. Project Information

The Site is located in Unit B, Section 1, Township 18 South, Range 34 East, approximately 1.38-miles southwest of Buckeye, New Mexico, in eastern Lea County. Chevron submitted an initial C-141 Form to the New Mexico Oil Conservation Division (NMOCD) dated March 6, 2009 describing a release of 29 barrels (bbls) of produced water with zero (0) volume being recovered; stating, "No remediation will be done at this time because drilling rig is operating on location (VGSAU #459)." The source of the release was recorded to have been a line leak.

Information available from various sources including the Petroleum Recovery Research Center (PRRC) Mapping Portal, currently managed groundwater site(s) data by GHD, and the United States Geological Survey (USGS) Current Water Database for the Nation, concludes:

a) the depth to groundwater at the Site is greater than 100-feet below ground surface (bgs);

b) the nearest private domestic water source is greater than 200-feet from the release site;

c) the nearest public/municipal water source is greater than 1,000-feet from the release site; and

d) the release site lies more than 1,000 horizontal feet from the nearest surface water body.

Additionally, localized depth to groundwater was confirmed to be approximately 130 feet bgs in 2017 based on the information from monitoring well MW-12 associated with the Buckeye Compressor Station facility and VGSAU 58 (AP-104) approximately 300-feet east of the Site (both sites monitored by GHD - see Figure 1).

Consequently, the NMOCD total ranking criteria score is twenty (20) for the Site as depth from chloride impacted soil to groundwater is estimated at less than 50 feet. The anticipated site-specific RRALs to be applied to this location by the NMOCD are 10 mg/kg for benzene, 50 mg/kg for total BTEX, 100 mg/kg for total TPH, and 600 mg/kg for horizontal and 250 mg/kg for vertical delineation of chlorides.

GHD
6320 Rothway Street Suite 100 Houston Texas 77040 USA
T 713 734 3090 **F** 713 734 3391 **W** http://www.ghd.com/

In an August 28, 2017 telephone conversation between Bernard Bockisch (GHD) and Jim Griswold (NMOCD Environmental Bureau Chief), GHD was informed that the NMOCD is accepting chloride concentrations of 600 mg/kg for the horizontal delineation assessment clean up levels.

Soil assessment activities were performed in March of 2014, August of 2015, and in October 2017 at the Site. The data from these assessments indicate that vertical and horizontal delineation of chloride impacts have generally been achieved at the Site. However, data from soil boring location SB-10 (see Figure 1) indicated that the vertical extent of chloride in the soil was not completely assessed to the conservative RRAL of 250 mg/kg for chloride.

The low concentrations of chloride detected in the vicinity of SB-10 at depths greater than 50 feet bgs are not believed a risk to groundwater at the Site. Additionally, monitoring well MW-12 was sampled for total dissolved solids in April 2018 and was reported at a concentration of 529 milligrams per liter (mg/L), well below the New Mexico Water Quality Control Commission (NMWQCC) standard of 1,000 mg/L (analytical data available upon request).

2. 2018 Scope of Work

The scope of work for this project in 2018 will involve further assessment of soils at the Site for chloride through the advancement and sampling of seven additional soil borings to 50 feet bgs. The specific locations of the soil borings have been determined based on the geophysical survey and previous soil sample analytical results (see Figure 1).

Field Program

The field program will consist of the following:

Soil Boring Installation:

- Prior to mobilizing the drilling equipment to the Site, a site visit will be performed by GHD. GHD will mark the proposed boring locations for New Mexico 811 notification. A One Call ticket will be initiated by the driller to identify subsurface hazards within the proposed drilling areas. Chevron will spot locate any underground utilities and/or pipelines within the assessment area;
- A ground penetrating radar (GPR) survey will be conducted across the Site and the findings of the survey will be marked, as appropriate;
- GHD will coordinate field work with management personnel of the Chevron FMT. A MCBU Dig Plan and FMT excavation permit will be acquired before performing the proposed tasks;
- An air knife, hydro-excavation methods or similar borehole clearance equipment will be utilized to clear each boring location to a depth of approximately 5-feet bgs (or refusal) and approximately 8-inches in diameter. An air-rotary drilling rig, operated by a licensed State of New Mexico water well driller, will be utilized to advance the proposed borings;
- A geologist will record the subsurface lithology and sample data of soil boring logs. Soil samples will be collected at ten foot intervals. A chloride field sampling kit will be used to field test intervals during

boring activities. The total depth and nature of any sampling of soils will be based on results of the chloride field screening and the professional judgment of the GHD geologist. The intent of the sampling is to establish the depth at which soil concentrations are below the Site RRAL's;

- Selected soil samples will be submitted to Xenco Laboratories, Midland, Texas for analysis of chlorides by EPA Method 300; and
- The soil borings will be properly plugged with bentonite.

Quality Assurance/ Quality Control

Confirmation soil sampling will be completed in accordance with our standard Quality Assurance/ Quality Control procedures designed to minimize cross-contamination between samples and to provide reliable laboratory results.

Reporting

A short letter report summarizing remediation activities will be submitted. The letter report will include a Site description, project history, description of field events, a discussion of results, and recommendations (if any).

The report will include:

- A scaled Site plan showing the locations of the soil borings and other Site features;
- Soil boring logs;
- Tabulation of field screening and laboratory analytical results; and
- Geotagged photographic documentation of field activities.

3. Work Plan Approval Request

GHD is prepared to initiate the scope of work immediately. If you have any questions or comments with regards to this work plan, please do not hesitate to contact our Houston office at (713) 734-3090. Your timely response to this correspondence is appreciated.

Sincerely,

GHD

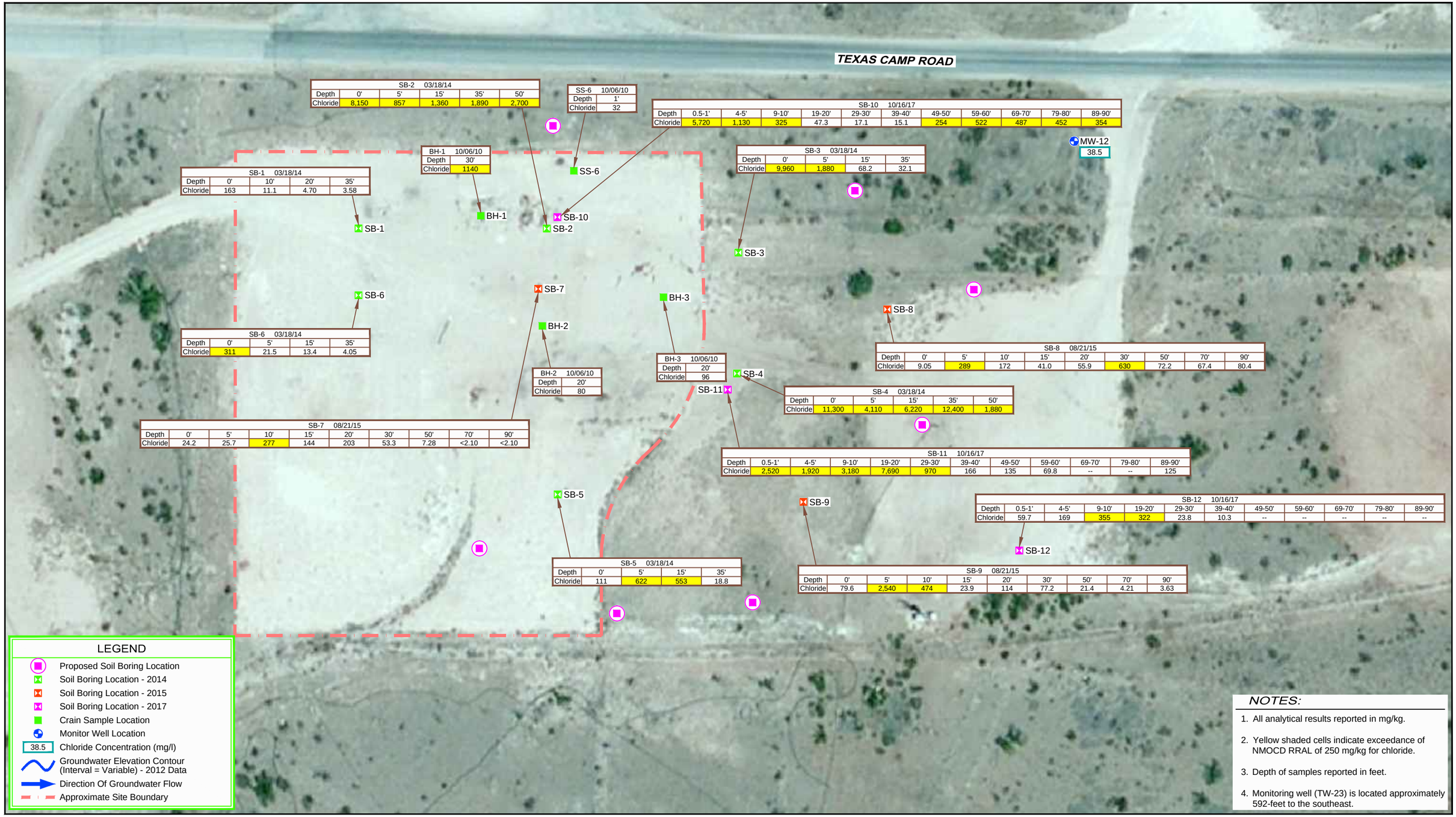
Scott Foord, P.G.
Project Manager

SF/ag/1

Encl.

Attachment: Figure 1 – Proposed Soil Boring Location Map

Figure



Source: USDA FSA Imagery, May 10, 2014

LAT/LONG: 32.7827ÂNORTH, 103.5106ÂWEST

0 20 60ft

Coordinate System:
NAD 83 STATE PLANE -
NEW MEXICO EAST (US FEET)

Sample ID — SB-11 10/16/17 — Sample Date
Depth 0.5-1' — Sample Depth (ft)
Chloride 2,520 — Sample Result (mg/kg)

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
LEA COUNTY, NEW MEXICO
VGWU SATELLITE #4 TRUNK LINE

074633-00

May 18, 2018

PROPOSED SOIL BORING LOCATION MAP

FIGURE 1

CAD File: I:\CAD\Files\07----\074---\074633-VGWU Satellite #4 Trunkline\Proposal\074633-00(Proposal)GN-DL005.dwg