Robert Speer
Portfolio Manager,
Upstream Business Unit
Remediation Team

Chevron Environmental Management Company
1400 Smith St. 07049
Houston, TX 77002
Tel (731) 372-6117
Cell (713) 301-7274
rspeer@chevron.com

RECEIVED
By JKeyes at 8:40 am, Dec 15, 2015

APPROVED
By JKeyes at 8:40 am, Dec 15, 2015

December 7, 2015

Kellie Jones
Environmental Specialist, District 1
New Mexico Oil Conservation Division
811 South First St.
Artesia, NM 88210

Re: Lovington San Andres Unit 58 Well Pad Abandonment Assessment Report

1RP 4018
nJXK1534931388
pJXK1534931450

Dear Ms. Jones:

Please find enclosed for your files copies of the following report for the Lovington San Andres Unit 58 Well Pad Abandonment Assessment Report. No RP number has been assigned for this project.

- *LSAU 58 Well Pad Abandonment – 2015 Soil Assessment and Delineation Activities Report, Unit E - Section 31 – Township 16 South – Range 37 East, Lea County, NM*

This report was prepared by Conestoga-Rovers & Associates (CRA) on behalf of Chevron Environmental Management Company (CEMC) to document assessment activities for site reclamation following abandonment activities of LSAU 58. Soil sampling in the release area indicate that vertical and horizontal delineation of TPH and Chlorides have been achieved at the site, and that no further assessment or remediation activities are warranted for this project.

Should you have any questions regarding the content of this report, please do not hesitate to contact me. I look forward to working with you in the future.

Sincerely,

Rob Speer
Environmental Project Manager

Soil Assessment and Delineation Activities Report

Lovington San Andres Unit No. 58 Well-Site
Unit E, Section 31, Township 16 South, Range 37 East
Lovington, New Mexico

Chevron Environmental Management Company

1755 Wittington Place, Suite 500 Dallas Texas 75234
074288 | Report No 3 | October 16, 2015

Soil Assessment and Delineation Activities Report

Lovington San Andres Unit No. 58 Well-Site
Unit E, Section 31, Township 16 South, Range 37 East
Lovington, New Mexico

Chevron Environmental Management Company

Thomas C. Larson
Principal, Midland Operations Manager

Jake L. Ferenz
Project Manager

1755 Wittington Place Suite 500 Dallas Texas USA

074288 | Report No 3 |October 16, 2015

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Appendices

1. Introduction

GHD is pleased to present this soil assessment and delineation activities report to Chevron Environmental Management Company (CEMC) for the Lovington San Andres Unit No. 58 Well-Site location (hereafter referred to as the "Site").

2. Project Information and Background

The Site is located in Unit E, Section 31, Township 16 South, Range 37 East, approximately 5.00-miles southeast of Lovington, New Mexico, in eastern Lea County (Figure 1 and Figure 2).

GHD understands the surface property is owned by the City of Lovington and the minerals are managed by the Bureau of Land Management. The LSAU No. 58 well was plugged and abandoned in August 2010. A dry hole marker is present at the location and surface equipment has been removed from the Site.

The original scope of work for the Site included reclamation activities that were developed in personal correspondences between Chevron Midland, Chevron Lovington, City of Lovington, and the Bureau of Land Management. GHD did not participate in any landowner or regulatory agency discussions regarding specific requirements for the Site reclamation. GHD was responsible for the project management, general oversight of the reclamation activities, soil sample collection, and documentation of all site activities. Site reclamation activities began on June 6, 2011 and were completed on June 10, 2011.

On November 20, 2013, GHD and Kegan Boyer (CEMC) met in Midland, Texas to review the status of the Site. CEMC requested that GHD develop and submit a site reclamation activities report detailing the 2011 field activities and any path forward recommendations for the Site.

In February 2014, GHD prepared and submitted a site reclamation completion report to CEMC detailing the site reclamation and sampling activities. Additionally, and based on analytical results of the soil sampling completed in June 2011, GHD recommended implementation of a soil boring program to assess elevated chloride concentrations at the Site. CEMC concurred with the recommendations outlined in GHD's 2014 report. On July 11, 2014, CEMC submitted a GHD prepared work plan proposal for the evaluation of subsurface conditions at the Site to the City of Lovington attorney's office. Ultimately, GHD returned to the Site in 2015 to execute the planned field activities. The results of those activities are provided herein.

3. Regulatory Guidance

Information available on the Petroleum Recovery Research Center (PRRC) Mapping Portal and the United States Geological Survey (USGS) Current Water Database for the Nation; the depth to groundwater at the Site is greater than 100-feet below ground surface (bgs); the nearest private domestic water source is greater than 200-feet from the release site; the nearest public/municipal water source is greater than 1,000-feet from the release site; and the release site lies more than 1,000 horizontal feet from the nearest surface water body. Consequently, the New Mexico Oil Conservation Division (NMOCD) total ranking criteria score is zero (0) for the Site. The site-specific

Recommended Remediation Action Levels (RRALs) that could be applied to this Site are: 10 milligram per kilogram (mg/kg) for benzene; 50 mg/kg for total benzene, toluene, ethylbenzene, and xylenes (BTEX); 5,000 mg/kg for TPH; and an NMOCD accepted 500 mg/kg for chlorides.

4. Drilling and Sampling - 2015

On September 8, 2015, GHD's contracted service provider, Harrison & Cooper, Inc. (HCI) of Lubbock, Texas submitted an initial New Mexico One Call utility locate ticket (2015370327). GHD submitted a MCBU Chevron Dig Plan with appropriate attachments for approval to the Chevron Buckeye Field Management Team. On September 17, 2015, GHD and HCI mobilized to the Site to begin soil boring activities. The soil boring was pre-cleared via air knife techniques to a depth of 5-feet bgs or until refusal. The remainder of the boring was advanced using an air rotary drill rig. One soil boring was advanced to approximately 30-feet bgs. A photo log documenting the 2015 drilling activities is included as Appendix A. The soil boring was logged in accordance with the Unified Soil Classification System and recorded. Visual representation of the singular (2015) boring can be found in Appendix B.

Soil samples were collected for laboratory analysis from the soil boring (SB-1) at varying intervals beginning at the surface (0-feet bgs). Soil samples were packed into laboratory prepared jars and stored in a cooler with ice. The soil samples were sent to Xenco in Midland, Texas for analysis of TPH by Method SW 8015B and chlorides by EPA Method 300/300.1. The soil laboratory analytical report for 2015 is included as Appendix C.

4.1 Soil Sampling Analytical Results - 2015

The soil type observed in soil samples collected during the 2015 drilling program consisted of dull brown sand, having small gravel in the matrix from the surface to approximately 3-feet bgs. Light yellow to gray very fine grained silty sand, unconsolidated, and poorly graded to approximately 20-feet bgs. Light to pale yellow becoming dull orange toward end of matrix, very fine to fine grained sand, interbedded with poorly cemented sandstone, unconsolidated, and poorly graded to approximate total depth at 30-feet bgs. Moisture content was observed as being slightly moist beginning at the 20-foot bgs sample interval.

All seven (7) soil samples collected from SB-1 for laboratory analysis were well below the Site RRALs for both TPH and chlorides. A soil analytical summary of the 2015 results is presented in Table 1. A Site Details and Analytical Results Map (2011 and 2015) is presented as Figure 3.

5. Conclusions

Evaluation of the analytical data obtained from confirmation sampling activities in 2011 and the soil assessment and delineation activities performed in September 2015 indicates that vertical and horizontal delineation of TPH and chloride impacts has been achieved at the Site. Based on data provided in this report, no further action is warranted at the Site.

Figures

Source: USGS 7.5 Minute Quad "Lovington and Lovington SE, Texas"

Lat/Long: 32.8797030ÁNorth, 103.2949907ÁWest

0 1000 2000ft

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

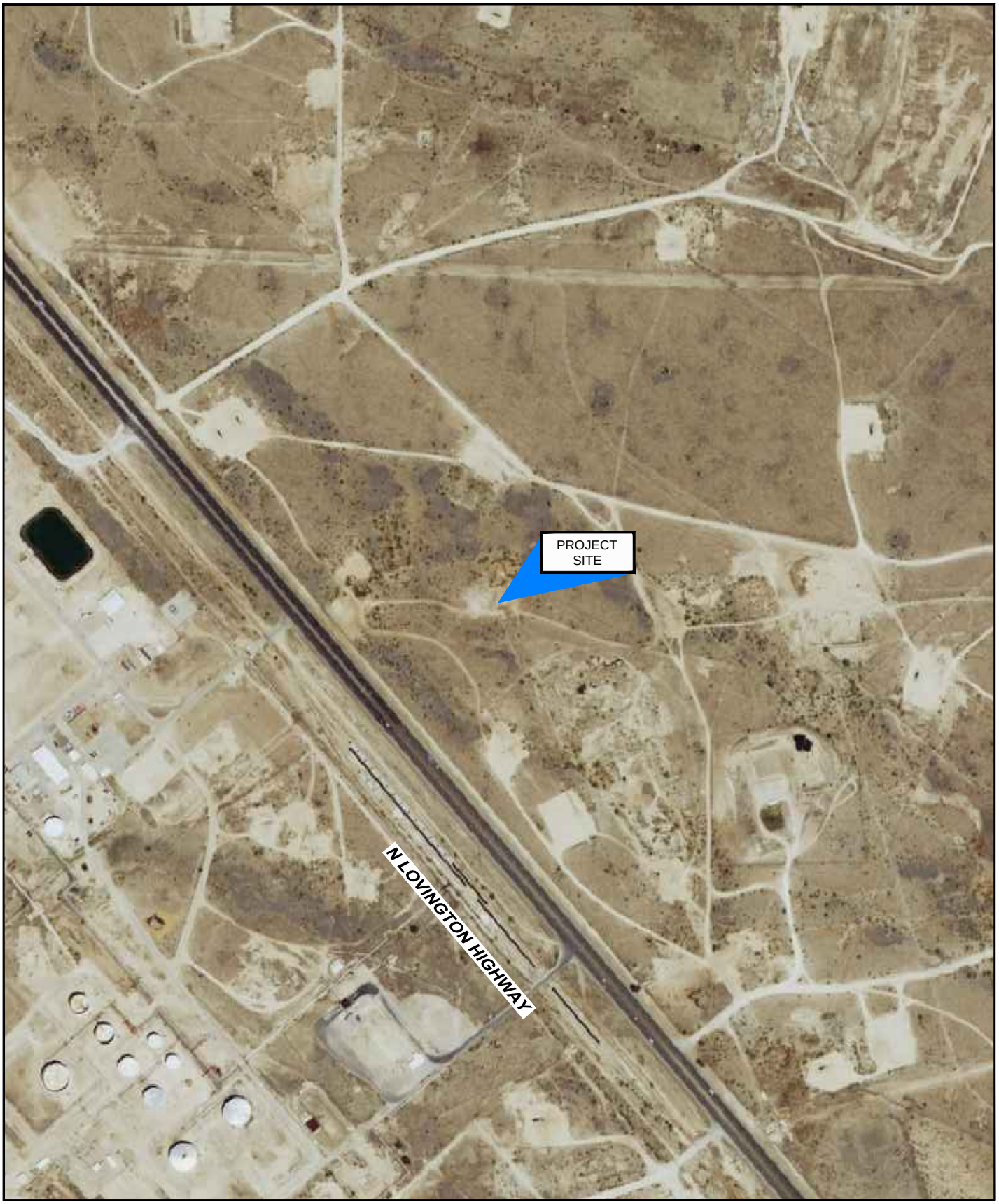
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
LEA COUNTY, NEW MEXICO
LOVINGTON SAN ANDRES UNIT #58

074288-00
Oct 8, 2015

SITE LOCATION MAP

FIGURE 1

CAD File: I:\CAD\Files\07----\074---\074288-CEMC-LSAU #58\074288-00\074288-00(003)\074288-00(003)GN-DL001.dwg



Source: USDA FSA Imagery, May 10, 2014

Lat/Long: 32.8797030ÁNorth, 103.2949907ÁWest

0 250 500ft

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

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
LEA COUNTY, NEW MEXICO
LOVINGTON SAN ANDRES UNIT #58

074288-00

Oct 8, 2015

SITE AERIAL MAP

FIGURE 2

CAD File: I:\CAD\Files\07----\074---\074288-CEMC-LSAU #58\074288-00\074288-00(003)\074288-00(003)GN-DL001.dwg

NOTES:

1. All analytical results reported in mg/kg.
2. "<" indicates below laboratory detection limit.

58N+30'	06/10/11
Depth	2'
TPH (GRO + DRO)	26
Chloride	172.0

58W+30'	06/10/11
Depth	2'
TPH (GRO + DRO)	73
Chloride	316.0

58N+10'	06/10/11
Depth	2'
TPH (GRO + DRO)	1100
Chloride	638.0

58N+30'

58N+10'

58W+30'

58E+30'

SB-1

58S+30'

58E+30'	06/10/11
Depth	2'
TPH (GRO + DRO)	120
Chloride	37.3

SB-1	09/17/15						
Depth	0'	5'	10'	15'	20'	25'	30'
TPH (GRO + DRO)	608	87.5	407	399	107	106	<10.5
Chloride	29.9	82.0	105	156	87.5	351	369

58S+30'	06/10/11
Depth	2'
TPH (GRO + DRO)	230
Chloride	117.0

Lease Road

Lease Road

LEGEND

	Soil Boring Location - 2011
	Soil Boring Location - 2015
	LSAU #58 Well Marker
Depth	Depth of Sample (ft)
TPH	Total Petroleum Hydrocarbons Concentration (mg/kg)
DRO	TPH as Diesel Range Organics
GRO	TPH as Gasoline Range Organics

Source: UDSA FSA Imagery, May 10, 2014

Lat/Long: 32.8797030ÁNorth, 103.2949907ÁWest

0 20 40ft

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

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
LEA COUNTY, NEW MEXICO
LOVINGTON SAN ANDRES UNIT #58

074288-00

Oct 8, 2015

SITE DETAILS AND ANALYTICAL RESULTS MAP

FIGURE 3

CAD File: I:\CAD\Files\07----\074---\074288-CEMC-LSAU #58\074288-00\074288-00(003)\074288-00(003)GN-DL001.dwg

Tables

Soil Analytical Summary - 2015
Lovington San Andres Unit No. 58
Lea County, New Mexico

Sample ID	Depth (bgs)	Sample Date	TPH (SW 8015B Modified)			Chlorides
			GRO	DRO	(GRO+DRO)	
NMOCD Recommended Remediation Action Levels			---	---	5,000	500
			(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
SB-1	0'	9/17/15	<9.97	608	608	29.9
SB-1	5'	9/17/15	<10.8	87.5	87.5	82.0
SB-1	10'	9/17/15	<10.4	407	407	105
SB-1	15'	9/17/15	<10.6	399	399	156
SB-1	20'	9/17/15	<10.3	107	107	87.5
SB-1	25'	9/17/15	<10.4	106	106	351
SB-1	30'	9/17/15	<10.5	<10.5	<10.5	369

Notes:
1. All analytical results reported in (mg/kg) milligrams per kilogram
2. Chloride analyses by Method EPA 300/300.1
3. TPH analysis by Method SW 8015B
4. bgs - below ground surface
5. < indicates below laboratory reporting limit
6. (SB) indicates Soil Boring

Appendices

Appendix A
Photograph Log

Photo 1 ï View of borehole clearance activities via air-knife techniques facing north east

Photo 2 ï View of drilling activities (SB-1) and LSAU No. 58 Well marker (at left) facing north west

Site Photographs

Appendix B
Soil Boring Logs

SOIL BORING LOG

Project: LSAU No. 58

Client: Chevron EMC

No. SB-1

File No.: 074288
Date: 09/17/15
Drilling Co.: Harrison and Cooper, Inc.
Supervisor: John Fergerson
Type Rig: Air Rotary
Logged by: Jennifer Riedel

LABORATORY TEST DATA (Results Reported in mg/kg)						FIELD DATA				BORING DATA	
Benzene	Toluene	Ethyl-benzene	Xylenes	Total TPH (C6-C35)	Chlorides	Photo-Ionization Detection Reading (ppm)	Sampling	Depth (feet)	Water Level	Screen Interval	Start Time: 1:25 PM Finish Time: 1:40 PM
						0					Dull brown, unconsolidated fine to very fine sand with some small gravel, dry and no hydrocarbon odor
								5			Sand: Light yellow to gray, very fine sand and silt, unconsolidated, poorly graded, dry, with no hydrocarbon odor
						0		10			
								15			Silty Sand: Light brownish gray, very fine grained, unconsolidated with minor poorly cemented constituents, poorly graded, slightly moist with no hydrocarbon odor
						0		20			
								25			Sand: Light to pale yellow becoming dull orange at end of matrix, very fine to fine grained, interbedded with poorly cemented sandstone, unconsolidated, poorly graded, slightly moist with no hydrocarbon odor
						0		30			**Total Depth: 30-feet bgs**
								35			
								40			

Stratification is Inferred And May Not be Exact.
Soil Classification Based on Visual-Manual Procedure

Appendix C
Soil Laboratory Analytical Report

Analytical Report 515850

for

GHD Services, INC- Midland

Project Manager: Jake Ferenz

LSAU 58

074288

28-SEP-15

Collected By: Client

12600 West I-20 East Odessa, Texas 79765

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

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)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-TX)
Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-TX)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)
Xenco Tucson (EPA Lab code:AZ000989): Arizona (AZ0758)

28-SEP-15

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

Reference: XENCO Report No(s): **515850**
LSAU 58
Project Address: LOVINGTON, NM

Jake Ferenz:

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) 515850. 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. 515850 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

Recipient of the Prestigious Small Business Administration Award of Excellence in 1994.
Certified and approved by numerous States and Agencies.
A Small Business and Minority Status Company that delivers SERVICE and QUALITY

Houston - Dallas - Odessa - San Antonio - Tampa - Lakeland - Atlanta - Phoenix - Oklahoma - Latin America

Sample Cross Reference 515850

GHD Services, INC- Midland, Midland, TX

LSAU 58

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
074288-091715-JR-SBI-0'	S	09-17-15 13:40	- 0 ft	515850-001
074288-091715-JR-SBI-5'	S	09-17-15 13:45	- 5 ft	515850-002
074288-091715-JR-SBI-10'	S	09-17-15 13:50	- 10 ft	515850-003
074288-091715-JR-SBI-15'	S	09-17-15 13:55	- 15 ft	515850-004
074288-091715-JR-SBI-20'	S	09-17-15 14:00	- 20 ft	515850-005
074288-091715-JR-SBI-25'	S	09-17-15 14:05	- 25 ft	515850-006
074288-091715-JR-SBI-30'	S	09-17-15 14:10	- 30 ft	515850-007

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **074288-091715-JR-SBI-0'** Matrix: Soil Sample Depth: 0 ft

Lab Sample Id: 515850-001 Date Collected: 09.17.15 13.40 Date Received: 09.18.15 14.38

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: 1.06 Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**29.9**	10.1	0.358	mg/kg	09.26.15 02:31		5

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: 1.06 Tech: PJB

Seq Number: 977732 Date Prep: 09.25.15 15.00

Prep seq: 698642

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	15.1	9.97	mg/kg	09.26.15 03:32	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	**608**	15.1	9.97	mg/kg	09.26.15 03:32		1
Total TPH	PHC635	**608**		9.97	mg/kg	09.26.15 03:32		

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	95	70 - 135	%		
o-Terphenyl	89	70 - 135	%		

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **074288-091715-JR-SBI-5'** Matrix: Soil Sample Depth: 5 ft

Lab Sample Id: 515850-002 Date Collected: 09.17.15 13.45 Date Received: 09.18.15 14.38

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: 8.5 Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**82.0**	21.9	0.774	mg/kg	09.26.15 03:39		10

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: 8.5 Tech: PJB

Seq Number: 977732 Date Prep: 09.25.15 15.00

Prep seq: 698642

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	16.4	10.8	mg/kg	09.26.15 03:55	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	**87.5**	16.4	10.8	mg/kg	09.26.15 03:55		1
Total TPH	PHC635	**87.5**		10.8	mg/kg	09.26.15 03:55		

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	96	70 - 135	%		
o-Terphenyl	95	70 - 135	%		

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **074288-091715-JR-SBI-10'** Matrix: Soil Sample Depth: 10 ft

Lab Sample Id: 515850-003 Date Collected: 09.17.15 13.50 Date Received: 09.18.15 14.38

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: 5.5 Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**105**	10.6	0.375	mg/kg	09.26.15 04:01		5

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: 5.5 Tech: PJB

Seq Number: 977732 Date Prep: 09.25.15 15.00

Prep seq: 698642

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	15.8	10.4	mg/kg	09.26.15 04:19	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	**407**	15.8	10.4	mg/kg	09.26.15 04:19		1
Total TPH	PHC635	**407**		10.4	mg/kg	09.26.15 04:19		

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	109	70 - 135	%		
o-Terphenyl	109	70 - 135	%		

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **074288-091715-JR-SBI-15'** Matrix: Soil Sample Depth: 15 ft

Lab Sample Id: 515850-004 Date Collected: 09.17.15 13.55 Date Received: 09.18.15 14.38

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: 7.41 Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**156**	21.6	0.765	mg/kg	09.26.15 04:24		10

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: 7.41 Tech: PJB

Seq Number: 977732 Date Prep: 09.25.15 15.00

Prep seq: 698642

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	16.1	10.6	mg/kg	09.26.15 04:43	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	**399**	16.1	10.6	mg/kg	09.26.15 04:43		1
Total TPH	PHC635	**399**		10.6	mg/kg	09.26.15 04:43		

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	92	70 - 135	%		
o-Terphenyl	93	70 - 135	%		

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **074288-091715-JR-SBI-20'** Matrix: Soil Sample Depth: 20 ft

Lab Sample Id: 515850-005 Date Collected: 09.17.15 14.00 Date Received: 09.18.15 14.38

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: 4.34 Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**87.5**	2.09	0.0740	mg/kg	09.26.15 04:47		1

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: 4.34 Tech: PJB

Seq Number: 977732 Date Prep: 09.25.15 15.00

Prep seq: 698642

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	15.7	10.3	mg/kg	09.26.15 05:06	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	**107**	15.7	10.3	mg/kg	09.26.15 05:06		1
Total TPH	PHC635	**107**		10.3	mg/kg	09.26.15 05:06		

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	102	70 - 135	%		
o-Terphenyl	103	70 - 135	%		

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **074288-091715-JR-SBI-25'** Matrix: Soil Sample Depth: 25 ft

Lab Sample Id: 515850-006 Date Collected: 09.17.15 14.05 Date Received: 09.18.15 14.38

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: 5.6 Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**351**	21.2	0.750	mg/kg	09.26.15 05:09		10

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: 5.6 Tech: PJB

Seq Number: 977732 Date Prep: 09.25.15 15.00

Prep seq: 698642

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	15.9	10.4	mg/kg	09.26.15 05:30	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	**106**	15.9	10.4	mg/kg	09.26.15 05:30		1
Total TPH	PHC635	**106**		10.4	mg/kg	09.26.15 05:30		

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	104	70 - 135	%		
o-Terphenyl	104	70 - 135	%		

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **074288-091715-JR-SBI-30'** Matrix: Soil Sample Depth: 30 ft

Lab Sample Id: 515850-007 Date Collected: 09.17.15 14.10 Date Received: 09.18.15 14.38

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: 6.11 Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	**369**	21.3	0.754	mg/kg	09.26.15 05:55		10

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: 6.11 Tech: PJB

Seq Number: 977717 Date Prep: 09.23.15 18.00

Prep seq: 698630

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	16.0	10.5	mg/kg	09.25.15 03:44	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	ND	16.0	10.5	mg/kg	09.25.15 03:44	U	1
Total TPH	PHC635	ND		10.5	mg/kg	09.25.15 03:44	U	

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	94	70 - 135	%		
o-Terphenyl	138	70 - 135	%		**

Certificate of Analytical Results
515850
GHD Services, INC- Midland, Midland, TX
LSAU 58

Sample Id: **698624-1-BLK** Matrix: Solid Sample Depth:

Lab Sample Id: 698624-1-BLK Date Collected: Date Received:

Analytical Method: Inorganic Anions by EPA 300/300.1 Prep Method: E300P

Analyst: JUM % Moist: Tech: JUM

Seq Number: 977727 Date Prep: 09.25.15 15.21

Prep seq: 698624

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
Chloride	16887-00-6	ND	2.00	0.0708	mg/kg	09.25.15 23:07	U	1

Sample Id: **698630-1-BLK** Matrix: Solid Sample Depth:

Lab Sample Id: 698630-1-BLK Date Collected: Date Received:

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: Tech: PJB

Seq Number: 977717 Date Prep: 09.23.15 18.00

Prep seq: 698630

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	15.0	9.88	mg/kg	09.25.15 12:09	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	ND	15.0	9.88	mg/kg	09.25.15 12:09	U	1
Total TPH	PHC635	ND		9.88	mg/kg	09.25.15 12:09	U	

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	72	70 - 135	%		
o-Terphenyl	106	70 - 135	%		

Sample Id: **698642-1-BLK** Matrix: Solid Sample Depth:

Lab Sample Id: 698642-1-BLK Date Collected: Date Received:

Analytical Method: TPH by SW 8015B Prep Method: 1005

Analyst: PJB % Moist: Tech: PJB

Seq Number: 977732 Date Prep: 09.25.15 15.00

Prep seq: 698642

Parameter	CAS Number	Result	MQL	SDL	Units	Analysis Date	Flag	Dil Factor
C6-C10 Gasoline Range Hydrocarbons	C6C10GRO	ND	15.0	9.88	mg/kg	09.26.15 12:48	U	1
C10-C28 Diesel Range Hydrocarbons	C10C28DRO	ND	15.0	9.88	mg/kg	09.26.15 12:48	U	1
Total TPH	PHC635	ND		9.88	mg/kg	09.26.15 12:48	U	

Surrogate	% Recovery	Limits	Units	Analysis Date	Flag
1-Chlorooctane	94	70 - 135	%		
o-Terphenyl	103	70 - 135	%		

XENCO Laboratories
CHRONOLOGY OF HOLDING TIMES

Analytical Method : Percent Moisture
Client : GHD Services, INC- Midland

Work Order #: **515850**
Project ID: 074288

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed **(Days)**	Q
074288-091715-JR-SBI-30'	Sep. 17, 2015	Sep. 18, 2015				Sep.21, 2015	45	4	P
074288-091715-JR-SBI-20'	Sep. 17, 2015	Sep. 18, 2015				Sep.21, 2015	45	4	P
074288-091715-JR-SBI-0'	Sep. 17, 2015	Sep. 18, 2015				Sep.21, 2015	45	4	P
074288-091715-JR-SBI-10'	Sep. 17, 2015	Sep. 18, 2015				Sep.21, 2015	45	4	P
074288-091715-JR-SBI-15'	Sep. 17, 2015	Sep. 18, 2015				Sep.21, 2015	45	4	P
074288-091715-JR-SBI-5'	Sep. 17, 2015	Sep. 18, 2015				Sep.21, 2015	45	4	P
074288-091715-JR-SBI-25'	Sep. 17, 2015	Sep. 18, 2015				Sep.21, 2015	45	4	P

XENCO Laboratories
CHRONOLOGY OF HOLDING TIMES

Analytical Method : Inorganic Anions by EPA 300/300.1 Client : GHD Services, INC- Midland

Work Order #: **515850** Project ID: 074288

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed **(Days)**	Q
074288-091715-JR-SBI-0'	Sep. 17, 2015	Sep. 18, 2015				Sep.26, 2015	28	9	P
074288-091715-JR-SBI-25'	Sep. 17, 2015	Sep. 18, 2015				Sep.26, 2015	28	9	P
074288-091715-JR-SBI-30'	Sep. 17, 2015	Sep. 18, 2015				Sep.26, 2015	28	9	P
074288-091715-JR-SBI-5'	Sep. 17, 2015	Sep. 18, 2015				Sep.26, 2015	28	9	P
074288-091715-JR-SBI-15'	Sep. 17, 2015	Sep. 18, 2015				Sep.26, 2015	28	9	P
074288-091715-JR-SBI-10'	Sep. 17, 2015	Sep. 18, 2015				Sep.26, 2015	28	9	P
074288-091715-JR-SBI-20'	Sep. 17, 2015	Sep. 18, 2015				Sep.26, 2015	28	9	P

XENCO Laboratories
CHRONOLOGY OF HOLDING TIMES

Analytical Method : TPH by SW 8015B
Client : GHD Services, INC- Midland

Work Order #: **515850**
Project ID: 074288

Field Sample ID	Date Collected	Date Received	Date Extracted	Max Holding Time Extracted (Days)	Time Held Extracted (Days)	Date Analyzed	Max Holding Time Analyzed (Days)	Time Held Analyzed **(Days)**	Q
074288-091715-JR-SBI-20'	Sep. 17, 2015	Sep. 18, 2015	Sep. 25, 2015	14	8	Sep.26, 2015	14	1	P
074288-091715-JR-SBI-0'	Sep. 17, 2015	Sep. 18, 2015	Sep. 25, 2015	14	8	Sep.26, 2015	14	1	P
074288-091715-JR-SBI-30'	Sep. 17, 2015	Sep. 18, 2015	Sep. 23, 2015	14	6	Sep.25, 2015	14	2	P
074288-091715-JR-SBI-10'	Sep. 17, 2015	Sep. 18, 2015	Sep. 25, 2015	14	8	Sep.26, 2015	14	1	P
074288-091715-JR-SBI-25'	Sep. 17, 2015	Sep. 18, 2015	Sep. 25, 2015	14	8	Sep.26, 2015	14	1	P
074288-091715-JR-SBI-15'	Sep. 17, 2015	Sep. 18, 2015	Sep. 25, 2015	14	8	Sep.26, 2015	14	1	P
074288-091715-JR-SBI-5'	Sep. 17, 2015	Sep. 18, 2015	Sep. 25, 2015	14	8	Sep.26, 2015	14	1	P

F = These samples were analyzed outside the recommended holding time.
P = Samples analyzed within the recommended holding time.

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

Analytical Log

Analytical Method:	TPH by SW 8015B	Batch #:	977717
Project Name:	LSAU 58	Project ID:	074288
Client Name:	GHD Services, INC- Midland	WO Number:	515850

Client Sample Id	Lab Sample Id	QC Types
074288-091715-JR-SBI-30'	515850-007	SMP
	515850-007 S	MS
	515850-007 SD	MSD
	698630-1-BKS	BKS
	698630-1-BLK	BLK
	698630-1-BSD	BSD

Analytical Log

Analytical Method:	Inorganic Anions by EPA 300/300.1	Batch #:	977727
Project Name:	LSAU 58	Project ID:	074288
Client Name:	GHD Services, INC- Midland	WO Number:	515850

Client Sample Id	Lab Sample Id	QC Types
074288-091715-JR-SBI-0'	515850-001	SMP
074288-091715-JR-SBI-10'	515850-003	SMP
074288-091715-JR-SBI-15'	515850-004	SMP
074288-091715-JR-SBI-20'	515850-005	SMP
074288-091715-JR-SBI-25'	515850-006	SMP
074288-091715-JR-SBI-30'	515850-007	SMP
074288-091715-JR-SBI-5'	515850-002	SMP
	515850-006 S	MS
	515851-019 S	MS
	698624-1-BKS	BKS
	698624-1-BLK	BLK
	698624-1-BSD	BSD

Analytical Log

Analytical Method:	TPH by SW 8015B	Batch #:	977732
Project Name:	LSAU 58	Project ID:	074288
Client Name:	GHD Services, INC- Midland	WO Number:	515850

Client Sample Id	Lab Sample Id	QC Types
074288-091715-JR-SBI-0'	515850-001	SMP
074288-091715-JR-SBI-10'	515850-003	SMP
074288-091715-JR-SBI-15'	515850-004	SMP
074288-091715-JR-SBI-20'	515850-005	SMP
074288-091715-JR-SBI-25'	515850-006	SMP
074288-091715-JR-SBI-5'	515850-002	SMP
	515850-002 S	MS
	515850-002 SD	MSD
	698642-1-BKS	BKS
	698642-1-BLK	BLK
	698642-1-BSD	BSD

Analytical Log

Analytical Method:	Percent Moisture	Batch #:	977745
Project Name:	LSAU 58	Project ID:	074288
Client Name:	GHD Services, INC- Midland	WO Number:	515850

Client Sample Id	Lab Sample Id	QC Types
074288-091715-JR-SBI-0'	515850-001	SMP
074288-091715-JR-SBI-10'	515850-003	SMP
074288-091715-JR-SBI-15'	515850-004	SMP
074288-091715-JR-SBI-20'	515850-005	SMP
074288-091715-JR-SBI-25'	515850-006	SMP
074288-091715-JR-SBI-30'	515850-007	SMP
074288-091715-JR-SBI-5'	515850-002	SMP
	515850-001 D	MD
	515851-004 D	MD
	977745-1-BLK	BLK

Form 2 - Surrogate Recoveries

Project Name: LSAU 58

Work Orders : 515850,

Project ID: 074288

Lab Batch #: 977717 **Sample:** 515850-007 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 09/24/15 09:34

TPH by SW 8015B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	120	100	120	70-135	
o-Terphenyl	55.0	50.0	110	70-135	

Lab Batch #: 977717 **Sample:** 515850-007 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 09/24/15 09:59

TPH by SW 8015B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	115	100	115	70-135	
o-Terphenyl	46.4	50.0	93	70-135	

Lab Batch #: 977717 **Sample:** 698630-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 09/25/15 12:09

TPH by SW 8015B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	72.3	100	72	70-135	
o-Terphenyl	53.1	50.0	106	70-135	

Lab Batch #: 977717 **Sample:** 698630-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 09/25/15 16:26

TPH by SW 8015B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	83.5	100	84	70-135	
o-Terphenyl	36.1	50.0	72	70-135	

Lab Batch #: 977717 **Sample:** 698630-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 09/25/15 16:51

TPH by SW 8015B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	86.1	100	86	70-135	
o-Terphenyl	37.5	50.0	75	70-135	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

Form 2 - Surrogate Recoveries

Project Name: LSAU 58

Work Orders : 515850,

Project ID: 074288

Lab Batch #: 977732 **Sample:** 698642-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 09/26/15 02:45

SURROGATE RECOVERY STUDY

TPH by SW 8015B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	119	100	119	70-135	
o-Terphenyl	52.7	50.0	105	70-135	

Lab Batch #: 977732 **Sample:** 698642-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 09/26/15 03:09

SURROGATE RECOVERY STUDY

TPH by SW 8015B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	103	100	103	70-135	
o-Terphenyl	43.6	50.0	87	70-135	

Lab Batch #: 977732 **Sample:** 515850-002 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 09/26/15 05:53

SURROGATE RECOVERY STUDY

TPH by SW 8015B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	106	99.7	106	70-135	
o-Terphenyl	44.9	49.9	90	70-135	

Lab Batch #: 977732 **Sample:** 515850-002 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 09/26/15 06:18

SURROGATE RECOVERY STUDY

TPH by SW 8015B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	104	100	104	70-135	
o-Terphenyl	45.5	50.0	91	70-135	

Lab Batch #: 977732 **Sample:** 698642-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 09/26/15 12:48

SURROGATE RECOVERY STUDY

TPH by SW 8015B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	93.6	100	94	70-135	
o-Terphenyl	51.3	50.0	103	70-135	

* Surrogate outside of Laboratory QC limits

** Surrogates outside limits; data and surrogates confirmed by reanalysis

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

All results are based on MDL and validated for QC purposes.

BS / BSD Recoveries

Project Name: LSAU 58

Work Order #: 515850 **Project ID:** 074288

Analyst: JUM **Date Prepared:** 09/25/2015 **Date Analyzed:** 09/25/2015

Lab Batch ID: 977727 **Sample:** 698624-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

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	U	50.0	47.7	95	50.0	46.7	93	2	90-110	20	

Analyst: PJB **Date Prepared:** 09/23/2015 **Date Analyzed:** 09/25/2015

Lab Batch ID: 977717 **Sample:** 698630-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH by SW 8015B 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
C6-C10 Gasoline Range Hydrocarbons	U	1000	719	72	1000	738	74	3	70-135	35	
C10-C28 Diesel Range Hydrocarbons	U	1000	895	90	1000	935	94	4	70-135	35	

Analyst: PJB **Date Prepared:** 09/25/2015 **Date Analyzed:** 09/26/2015

Lab Batch ID: 977732 **Sample:** 698642-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH by SW 8015B 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
C6-C10 Gasoline Range Hydrocarbons	U	1000	1010	101	1000	860	86	16	70-135	35	
C10-C28 Diesel Range Hydrocarbons	U	1000	877	88	1000	764	76	14	70-135	35	

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: LSAU 58

Work Order #: 515850

Lab Batch #: 977727 **Project ID:** 074288

Date Analyzed: 09/26/2015 **Date Prepared:** 09/25/2015 **Analyst:** JUM

QC- Sample ID: 515850-006 S **Batch #:** 1 **Matrix:** Soil

Reporting Units: mg/kg

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	351	530	890	102	80-120	

Lab Batch #: 977727

Date Analyzed: 09/26/2015 **Date Prepared:** 09/25/2015 **Analyst:** JUM

QC- Sample ID: 515851-019 S **Batch #:** 1 **Matrix:** Soil

Reporting Units: mg/kg

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	511	526	1050	102	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

Form 3 - MS / MSD Recoveries

Project Name: LSAU 58

Work Order # : 515850 **Project ID:** 074288

Lab Batch ID: 977717 **QC- Sample ID:** 515850-007 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 09/24/2015 **Date Prepared:** 09/23/2015 **Analyst:** PJB

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TPH by SW 8015B 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
C6-C10 Gasoline Range Hydrocarbons	U	1070	886	83	1070	903	84	2	70-135	35	
C10-C28 Diesel Range Hydrocarbons	U	1070	853	80	1070	860	80	1	70-135	35	

Lab Batch ID: 977732 **QC- Sample ID:** 515850-002 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 09/26/2015 **Date Prepared:** 09/25/2015 **Analyst:** PJB

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TPH by SW 8015B 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
C6-C10 Gasoline Range Hydrocarbons	U	1090	998	92	1090	972	89	3	70-135	35	
C10-C28 Diesel Range Hydrocarbons	87.5	1090	901	75	1090	902	75	0	70-135	35	

Matrix Spike Percent Recovery [D] = 100*(C-A)/B
Relative Percent Difference RPD = 200*|(C-F)/(C+F)|

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

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.

Sample Duplicate Recovery

Project Name: LSAU 58

Work Order #: 515850

Lab Batch #: 977745 **Project ID:** 074288

Date Analyzed: 09/21/2015 13:15 **Date Prepared:** 09/21/2015 **Analyst:** WRU

QC- Sample ID: 515850-001 D **Batch #:** 1 **Matrix:** Soil

Reporting Units: %

Percent Moisture Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Percent Moisture	1.06	1.05	1	20	

Lab Batch #: 977745

Date Analyzed: 09/21/2015 13:15 **Date Prepared:** 09/21/2015 **Analyst:** WRU

QC- Sample ID: 515851-004 D **Batch #:** 1 **Matrix:** Soil

Reporting Units: %

Percent Moisture Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Percent Moisture	8.48	9.20	8	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

Attachment A Laboratory Data Package Cover Page

Project Name: **LSAU 58** Laboratory Number: **515850**

This Data package consists of : Laboratory Batch No(s) **698624, 977745, 698642, 698630**

This signature page, the laboratory review checklist, and the following reportable data:

☐ R1 Field chain-of-custody documentation;

☐ R2 Sample identification cross-reference;

☐ R3 Test reports (analytical data sheets) for each environmental sample that includes:
- a) Items consistent with NELAC 5
- b) dilution factors,
- c) preparation methods,
- d) cleanup methods, and
- e) if required for the project, tentatively identified compounds (TICs).

☐ R4 Surrogate Recovery data including:
- a) Calculated recovery (%R), and
- b) The laboratory's surrogate QC limits.

☐ R5 Test reports/summary forms for blank samples;

☐ R6 Test reports/summary forms for laboratory control samples (LCSs) including:
- a) LCS spiking amounts,
- b) Calculated %R for each analyte, and
- c) The laboratory's LCS QC limits.

☐ R7 Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
- a) Samples associated with the MS/MSD clearly identified,
- b) MS/MSD spiking amounts,
- c) Concentration of each MS/MSD analyte measured in the parent and spiked samples,
- d) Calculated %Rs and relative percent differences (RPDs) and
- e) The laboratory's MS/MSD QC limits

☐ R8 Laboratory anaytical duplicate (if applicable) recovery and precision:
- a) the amount of analyte measured in the duplicate,
- b) the calculated RPD, and
- c) the laboratory's QC limits for analytical duplicates.

☐ R9 List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix;

☐ R10 Other problems or anomalies.

☐ Exception Report for every "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception reports. By my signature below, I affirm to the best of my knowledge all problems/anomalies, observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC 25.6 and was last inspection by [ ] TCEQ or [ ] _____ on (enter date of last inspection). Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The offical signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Kelsey Brooks		**Project Manager**	**28-SEP-15**
Name (Printed)	Signature	Official Title (printed)	Date

A1

Attachment A (cont'd) : Laboratory Review Checklist: Reportable Data

Laboratory Name:	XENCO LABORATORIES	LRC Date :	28-SEP-15
Project Name:	LSAU 58	Laboratory Job Number :	515850
Reviewer Name:	KEB	Batch Number(s) :	698624, 977745, 698642, 698630

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
R1	OI	**Chain-of-Custody (COC)**					
		Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		Were all departures from standard conditions described in an exception report?			X		
R2	OI	**Sample and Quality Control (QC) Identification**					
		Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		Are all laboratory ID numbers cross-referenced to the corresponding QC data?	X				
R3	OI	**Test Reports**					
		Were all samples prepared and analyzed within holding times?	X				
		Other than those results <MQL, were all other raw values bracketed by calibration standards?	X				
		Were calculations checked by a peer or supervisor?	X				
		Were all analyte identifications checked by a peer or supervisor?	X				
		Were sample detection limits reported for all analytes not detected?	X				
		Were all results for soil and sediment samples reported on a dry weight basis?	X				
		Were % moisture (or solids) reported for all soil and sediment samples?	X				
		Were bulk soil/solid samples for volatile analysis extracted with methanol per SW846 Method 5035?	X				
		If required for the project, were TICs reported?			X		
R4	O	**Surrogate Recovery Data**					
		Were surrogates added prior to extraction?	X				
		Were surrogates added prior to extraction?			X		
		Were surrogate percent recoveries in all samples within the laboratory QC limits?	X				
		Were surrogate percent recoveries in all samples within the laboratory QC limits?		X			1
		Were surrogate percent recoveries in all samples within the laboratory QC limits?			X		
R5	OI	**Test Reports/Summary Forms for Blank Samples**					
		Were appropriate type(s) of blanks analyzed?	X				
		Were blanks analyzed at the appropriate frequency ?	X				
		Were method blanks taken through the entire analytical procedure, including preparation and, if applicable, cleanup procedures ?	X				
		Were Blank Concentrations <MQL?	X				
R6	OI	**Laboratory Control Samples (LCS):**					
		Were all COCs included in the LCS?	X				
		Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		Were LCSs analyzed at the required frequency?	X				
		Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		Does the detectability check sample data document the laboratory's capability to detect the COCs at the MDL used to calculate the SDLs?	X				
		Was the LCSD RPD within the QC limits?	X				
		Was the LCSD RPD within the QC limits?			X		
R7	OI	**Matrix Spike (MS) and Matrix Spike Duplicate (MSD) data**					
		Were the project/method specified analytes included in the MS and MSD?	X				
		Were the project/method specified analytes included in the MS and MSD?			X		
		Were MS/MSD analyzed at the appropriate frequency?	X				
		Were MS/MSD analyzed at the appropriate frequency?			X		
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?	X				
		Were MS (and MSD, if applicable) %Rs within the laboratory QC limits?			X		
		Were MS/MSD RPDs within the laboratory QC limits?	X				
		Were MS/MSD RPDs within the laboratory QC limits?			X		
R8	OI	**Analytical Duplicate Data**					
		Were appropriate analytical duplicates analyzed for each matrix?	X				
		Were appropriate analytical duplicates analyzed for each matrix?			X		
		Were analytical duplicates analyzed at the appropriate frequency?	X				
		Were analytical duplicates analyzed at the appropriate frequency?			X		
		Were RPDs or relative standard deviations within the laboratory QC limits?	X				
		Were RPDs or relative standard deviations within the laboratory QC limits?			X		

R9	OI	**Method Quantitation Limits (MQLs)**					
		Are the MQLs for each method analyte included in the laboratory data package?	X				
		Do the MQLs correspond to the concentration of the lowest non-zero calibration standard?	X				
		Are unadjusted MQLs and DCSs included in the laboratory data package?	X				
R10	OI	**Other Problems/Anomalies**					
		Are all known problems/anomalies/special conditions noted in this LRC and ER?	X				
		Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
		Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted to the TCEQ-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable).
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report Identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Attachment A (cont'd) : Laboratory Review Checklist: Reportable Data

Laboratory Name:	XENCO LABORATORIES	LRC Date :	28-SEP-15
Project Name:	LSAU 58	Laboratory Job Number :	515850
Reviewer Name:	KEB	Batch Number(s) :	698624, 977745, 698642, 698630

#[1]	A[2]	Description	Yes	No	NA[3]	NR[4]	ER#[5]
S1	OI	**Initial Calibration (ICAL)**					
		Were response factors and/or relative response factors for each analyte within QC limits?	X				
		Were percent RSDs or correlation coefficient criteria met?	X				
		Was the number of standards recommended in the method used for all analytes?	X				
		Were all points generated between the lowest and the highest standard used to calculate the curve?	X				
		Are ICAL data available for all instruments used?	X				
		Has the initial calibration curve been verified using an appropriate second source standard?	X				
S2	OI	**Initial and Continuing Calibration Verification (ICCV and CCV) and continuing calibration blank (**					
		Was the CCV analyzed at the method-required frequency?	X				
		Were percent differences for each analyte within the method-required QC limits?	X				
		Was the ICAL curve verified for each analyte?	X				
		Was the absolute value of the analyte concentration in the inorganic CCB <MDL?			X		
S3	O	**Mass Spectral Tuning**					
		Was the appropriate compound for the method used for tuning?			X		
		Were ion abundance data within the method-required QC limits?			X		
S4	O	**Internal Standard (IS)**					
		Were IS area counts and retention times within the method-required QC limits?			X		
S5	OI	**Raw Data (NELAC 5.5.10)**					
		Were the raw data (for example, chromatograms, spectral data) reviewed by an analyst?	X				
		Were data associated with manual integrations flagged on the raw data?	X				
S6	O	**Dual Column Confirmation**					
		Did dual column confirmation results meet the method-required QC?			X		
S7	O	**Tentatively Identified Compounds (TICs)**					
		If TICs were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
S8	I	**Interference Check Sample (ICS) Results**					
		Were percent recoveries within method QC limits?			X		
S9	I	**Serial Dilutions, Post Digestions Spikes, and Method of Standard Additions**					
		Were percent differences, recoveries, and the linearity within the QC limits specified in the method?			X		
S10	OI	**Method Detection Limit (MDL) Studies**					
		Was a MDL study performed for each reported analyte?	X				
		Is the MDL either adjusted or supported by the analysis of DCSs?	X				
S11	OI	**Proficiency Test Reports**					
		Was the laboratory's performance acceptable on the applicable proficiency tests or evaluation studies?	X				
S12	OI	**Standards Documentation**					
		Are all standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
S13	OI	**Compound/Analyte Identification Procedures**					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	**Demonstration of Analyst Competency (DOC)**					
		Was DOC conducted consistent with NELAC Chapter 5?	X				
		Is documentation of the analyst's competency up-to-date and on file?	X				
S15	OI	**Verification/Validation Documentation for Methods (NELAC Chapter 5)**					
		Are all methods used to generate the data documented, verified, and validated, where applicable?	X				
S16	OI	**Laboratory Standard Operating Procedures (SOPs)**					
		Are laboratory SOPs current and on file for each method performed?	X				

1. Items identified by the letter "R" must be included in the laboratory data package submitted to the TCEQ-required report(s). Items identified by the letter "S" should be retained and made available upon request for the appropriate retention period.
2. O = organic analyses; I = inorganic analyses (and general chemistry, when applicable).
3. NA = Not applicable;
4. NR = Not reviewed;
5. ER# = Exception Report Identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

Attachment A (cont'd): Laboratory Review Checklist: Exception Reports

Laboratory Name:	XENCO LABORATORIES	LRC Date:	28-SEP-15
Project Name:	LSAU 58	Laboratory Job Number:	515850
Reviewer Name:	KEB	Batch Number(s) :	698624, 977745, 698642, 698630

ER# [1]	DESCRIPTION
1	SW8015B_NM Batch 977717, Surrogate o-Terphenyl recovered above QC limits. Matrix interferences is suspected; data confirmed by re-analysis. Samples affected are: 515850-007.

1 ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No is checked on the LRC).

GHD Services, INC- Midland, Midland, TX

LSAU 58

CHAIN OF CUSTODY

Page 1 of 1

XENCO LABORATORIES

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Stafford, Texas (281-240-4200)
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Norcross, Georgia (770-449-8800)
Lakeland, Florida (863-646-8526)
Tampa, Florida (813-620-2000)
www.xenco.com

Xenco Quote #: | Xenco Job #: 515850

Client / Reporting Information

Company Name / Branch: GHD - Dallas
Company Address: 1755 Wittington Pl., Ste. 500 Dallas, TX 75234
Email: jake.ferenz@ghd.com
Phone No: 972-331-8500
Project Contact: Jake Ferenz
Samplers's Name: Jennifer Riedel/John Fergerson

Project Information

Project Name/Number: LSHU 58 / 074288
Project Location: Lovington, NM
Invoice To:
PO Number:

Analytical Information

TPH (GRO + DRO), Chlorides

Matrix Codes

A= Air
S = Soil/Sed/Solid
GW =Ground Water
DW = Drinking Water
P = Product
SW = Surface water
SL = Sludge
WW= Waste Water
W = Wipe
O = Oil

WW= Waste Water

No	Field ID / Point of Collection	Collection: Sample Depth	Date	Time	Matrix	# of bottles	Number of preserved bottles: HCl	NaOH/Zn Acetate	HNO3	H2SO4	NaOH	NaHSO4	MEOH	NONE	Field Comments
1	074288-091715-JR-SB1-0'	0'	9/17	1340	S	1								X	
2	074288-091715-JR-SB1-5'	5'	9/17	1345	S	1									
3	074288-091715-JR-SB1-10'	10'	9/17	1350	S	1									
4	074288-091715-JR-SB1-15'	15'	9/17	1355	S	1									
5	074288-091715-JR-SB1-20'	20'	9/17	1400	S	1									
6	074288-091715-JR-SB1-25'	25'	9/17	1405	S	1									
7	074288-091715-JR-SB1-30'	30'	9/17	1410	S	1									
8															
9															
10															

Turnaround Time (Business days)

- [ ] Same Day TAT
- [ ] 5 Day TAT
- [ ] Next Day EMERGENCY
- [x] 7 Day TAT
- [ ] 2 Day EMERGENCY
- [ ] Contract TAT
- [ ] 3 Day EMERGENCY

TAT Starts Day received by Lab, if received by 3:00 pm

Data Deliverable Information

- [ ] Level II Std QC
- [ ] Level IV (Full Data Pkg /raw data)
- [ ] Level III Std QC+ Forms
- [ ] TRRP Level IV
- [ ] Level 3 (CLP Forms)
- [ ] UST / RG -411
- [ ] TRRP Checklist

Notes: See SSOW

FED-EX / UPS: Tracking #

SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION, INCLUDING COURIER DELIVERY

	Relinquished by Sampler:	Date Time:	Received By:	Relinquished By:	Date Time:	Received By:
1	Jennifer Riedel	9/18/15 1438		2	9/18/15 1438	2
3	Relinquished by:	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4
5	Relinquished by:	Date Time:	Received By: 5	Custody Seal #	Preserved where applicable	On Ice: X

Cooler Temp. 1.5 Thermo. Corr. Factor

Notice: Signature of this document and relinquishment of samples constitutes a valid purchase order from client company to XENCO Laboratories and its affiliates, subcontractors and assigns XENCO's standard terms and conditions of service unless previously negotiated under a fully executed client contract.

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Client: GHD Services, INC- Midland

Date/ Time Received: 09/18/2015 02:38:00 PM

Work Order #: 515850

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

Temperature Measuring device used :

Sample Receipt Checklist	Comments
#1 *Temperature of cooler(s)?	1.5
#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 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#:

Checklist completed by: Caroline Dugan Date: 09/18/2015

Checklist reviewed by: Julian Martinez Date: 09/19/2015