AE Order Number Banner

Report Description

This report shows an AE Order Number in Barcode format for purposes of scanning. The Barcode format is Code 39.

App Number: pJXK1610238792

1RP - 4241

LINN OPERATING, INC.

8/23/2016

July 19, 2011

Project No. 12009-0003
via overnight mail

Mr. Geoffery Leking
Oil Conservation Division – District 1
New Mexico Energy, Minerals and Natural Resources Department
1625 North French Drive
Hobbs, New Mexico 88240

Re: ***Soil Abatement Completion Report***
Scharb 9 Battery 2
API Well Number 30-025-28195
Unit F, Section 9, Township 19S, Range 35E
Lea County, New Mexico

Dear Mr. Leking:

On behalf of LINN Operating, Inc. (LINN), SKA Consulting, L.P. (SKA) has completed abatement activities associated with historical saltwater releases at the Scharb 9 Battery 2 location. The enclosed report documents the abatement activities.

If you have any questions regarding the report, please do not hesitate to contact me at (713) 266-6056 or mike.schultz@skaconsulting.com.

Sincerely,

SKA CONSULTING, L.P.

Mike Schultz, P.E.
Vice President and Partner

Enclosure

Cc: Daniel Frick, LINN Operating, Inc. w/o enclosure

G:\2009\12009-0003\Letters\12009-0003.L02.doc

ska

Consulting Engineers, Scientists, and Geologists

Soil Abatement Completion Report
Scharb 9 Tank Battery 2
API Well Number 30-025-28195
Unit F, Section 9, Township 19S, Range 35E
Lea County, New Mexico

Prepared for:

Linn Operating, Inc.
600 Travis Street, Suite 5100
Houston, Texas 77002

June 2011

Project No. 12009-0003

SKA Consulting, LP
1515 Witte Rd., Suite 150
Houston, Texas 77080
P: 713.266.6056
F: 713.266.0996
www.skaconsulting.com

SOIL ABATEMENT COMPLETION REPORT
SCHARB 9 TANK BATTERY 2
API WELL NUMBER 30-025-28195
UNIT F, SECTION 9, TOWNSHIP 19S, RANGE 35E
LEA COUNTY, NEW MEXICO

SKA PROJECT NO. 12009-0003

Prepared for:

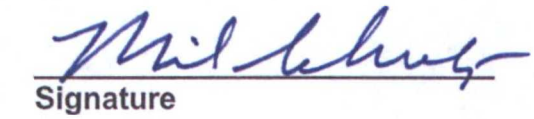
LINN OPERATING, INC.
600 TRAVIS STREET, SUITE 5100
HOUSTON, TEXAS 77002

Prepared by:

SKA CONSULTING, L.P.
1515 WITTE ROAD, SUITE 150
HOUSTON, TEXAS 77080

Prepared by:

MIKE SCHULTZ, P.E.
PROJECT MANAGER



Signature

Reviewed by:

SCOTT K. LEAFE
PRESIDENT

Signature

June 2011

TEXAS REGISTERED ENGINEERING FIRM NO. F-005009
TEXAS REGISTERED GEOSCIENCE FIRM NO. 50011

Table of Contents

1.0 Executive Summary

SKA Consulting, L.P. (SKA) was retained by Linn Operating, Inc. (Linn) to conduct the soil abatement at the Scharb 9 Tank Battery 2 (Site) located at Unit F, Section 9, Township 19 South, Range 35 East in Lea County, New Mexico. See ***Figure 1*** for a Site Vicinity and Topographic Map. The Site American Petroleum Institute (API) well number is 30-025-28195. The Site is located on private land owned by Mr. Chris Northcutt.

On July 9, 2010, Linn discovered a historical release of produced saltwater. The source of the release is not well documented, though impacted soil was observed around the heater treater, tanks, pumps and wellhead. The existing tank battery was moved and re-built to the west of the impacted area. On December 17, 2010, the release was reported to the New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division (OCD). According to the Release Notification, the proposed abatement plan was to remove the upper 4 feet of impacted soil and to line the excavation with a composite geotextile and high-density polyethylene (HDPE) liner, backfill, and seed. This preliminary abatement plan was denied by the OCD. SKA and Linn representatives met with the OCD on January 18, 2011 and discussed a revised abatement plan that involved excavation of the upper 10 feet of impacted soil, placement of a compacted clay liner, backfilling, replacement of topsoil, and seeding. The OCD approved the revised abatement plan on February 9, 2011.

SKA implemented the approved abatement plan and initially hauled off impacted soil stockpiled by Linn's initial abatement contractor, Rio Services (Rio). Because the chloride concentration of the stockpiled impacted soil was less than 1,000 milligrams per kilogram (mg/kg), the impacted soil could be landfarmed at the nearest approved disposal facility, Lazy Ace Land Farm, near Eunice, New Mexico. In accordance with the approved abatement plan, SKA continued the excavation to an ultimate depth of 10 feet below ground surface (ft-bgs). The excavation was backfilled to a depth of 8 ft-bgs with clay obtained from the Lazy Ace Land Farm. The clay was graded and machine compacted with a trackhoe. The excavation was further backfilled up to 2 ft-bgs using native caliche obtained on site. The upper two feet of the excavation was backfilled using topsoil obtained from the Lazy Ace Land Farm and approved by the landowner. After backfilling, the excavated area and other adjacent disturbed areas were reseeded.

SKA has developed the following conclusions based on the completed abatement activities at the Site:

- Chloride-impacted soil to a depth of 10 ft-bgs has been successfully removed from the Site;
- The chloride-impacted soil was properly disposed off-site at the Lazy Ace Land Farm;
- A 2-foot thick clay liner was installed to limit infiltration of rainfall at the affected area; and,
- The Site was properly backfilled, restored with topsoil, and seeded.

SKA on behalf of Linn, requests concurrence from the OCD that no further abatement actions are needed at the Site.

2.0 Introduction

The Site is located at Unit F, Section 9, Township 19 South, Range 35 East in Lea County, New Mexico. This Site is about 20 miles west of Hobbs, New Mexico and consists of an oil/gas production well, heater treater and tank battery. The adjacent property in all directions is native grassland prairie. References cited in this section and in the remainder of this report are contained in ***Appendix 2***.

2.1 Site Background

On December 17, 2010, Linn reported a historical release of produced saltwater to the New Mexico Energy, Minerals, and Natural Resources Department, Oil Conservation Division (OCD). The Release Notification and Corrective Action form is provided in ***Appendix 1***. The source of the release is not well documented, though impacted soil was observed around the heater treater, tanks, pumps and wellhead. The existing tank battery was moved and re-built to the west of the impacted area. According to the Release Notification, the proposed abatement plan was to remove the upper 4 feet of impacted soil and to line the excavation with a composite geotextile and high-density polyethylene (HDPE) liner, backfill, and seed. This preliminary abatement plan was denied by the OCD. SKA and Linn representatives met with the OCD on January 18, 2011 and discussed a revised abatement plan that involved excavation of the upper 10 feet of impacted soil, placement of a compacted clay liner, backfilling, replacement of topsoil, and seeding. The OCD approved the revised abatement plan on February 9, 2011.

2.2 Surface Topography

According to *Geology and Ground-Water Conditions in Southern Lea County, New Mexico*, the Site is located just south of the Llano Estacado which is an extension of the southern High Plains. The Llano Estacado is a smooth plateau about 100 to 300 feet higher in elevation than the surrounding region which gently slopes to the southeast at 10 to 20 feet per mile. The western and southern edge of the Llano Estacado is Mescalero Ridge which forms the western boundary of Lea County. Mescalero Ridge is actually an escarpment of the Llano Estacado with the Pecos River valley to the west.

The Site is depicted on the USGS Ironhouse Draw 7.5-minute topographic quadrangle at approximately 3,830 feet above mean sea level (***Figure 1***). Regional drainage appears to be generally to the southeast on the USGS quadrangle map toward the Pecos River. The Llano Estacado plateau is evident north and east of the Site as the topography becomes much flatter and the USGS quadrangle map notes many depressions and playa features.

2.3 Geologic Setting

According to *Geology and Ground-Water Conditions in Southern Lea County, New Mexico*, the surface geology of the Site is generally Quaternary alluvium. The Site lies in a geological transition area between the Llano Estacado and the Laguna Valley south of Mescalero Ridge. The Laguna Valley is a vast sand dune area with sand deposits and dunes up to 40 feet thick. The surface topography of the Site area, with its well-developed drainage pattern, illustrates this geological transition between the elevated Llano Estacado plateau and the near featureless Laguna Valley.

According to a *Soil Survey for Lea County, New Mexico*, the dominant soil type at the Site is the Kimbrough gravelly loam. This soil typically develops on 0 to 3 percent slopes between 3,600 to 4,200 feet elevation in areas with 12 to 15 inches of annual precipitation. Kimbrough gravelly loam is derived from calcareous alluvium and calcareous eolian deposits. This soil is characteristically well drained, but with a very low available water capacity. A typical soil profile finds cemented material below 6 inches.

2.4 Hydrogeology

According to *Geology and Groundwater Conditions in Southern Lea County, New Mexico*, the principal aquifer underlying southern Lea County is the High Plains Aquifer locally known as the Ogallala Formation. The Ogallala Formation is generally an unconfined aquifer with saturated thicknesses ranging up to 200 feet. Recharge occurs primarily through direct infiltration of precipitation and runoff collected in playas and arroyos. The regional groundwater flow direction in the Ogallala Formation is to the southeast, though exploitation of the Ogallala may shift the local groundwater flow direction. Water quality in the Ogallala is generally suitable for most uses, though the water is often hard. Specific conductance in most of the aquifer is less than 1,000 micromhos/centimeter, corresponding to a total dissolved solids concentration of about 300 mg/L. Higher concentrations of dissolved solids have been observed in areas of increased water elevation decline.

The Site lies south of the southern boundary of the Ogallala Formation along the Mescalero Ridge escarpment. In this area, groundwater moves generally south from the Ogallala into the Quaternary alluvium in the Laguna Valley. Depths to groundwater in this area have been reported as 25-40 ft-bgs.

3.0 Site Assessment Activities

The site activities and results discussed in this section include those of Rio Services and SKA.

3.1 Sample Collection and Analysis

On July 9, 2010, Linn reported a release of produced saltwater to the OCD associated with historical activities around the heater treater, tanks, pumps and wellhead at the Site. Linn had an excavation contractor, Rio Services (Rio), mobilize to the Site and conduct test pit sampling at 6 locations in the contaminated area. The test pits were initially advanced on October 14, 2010 to a depth of 1 foot. Later on November 18-19, 2010, the test pits were advanced further to a maximum depth of 20 ft-bgs at TP1. The test pits were further advanced on December 14-16, 2010. The test pit locations are shown on the Site Plan and Sample Location Map (***Figure 2***). During test pit excavation, soil samples were selected and field screened by Rio for chloride concentrations. The chloride field screening method is not known. Rio's field screening data is provided in ***Table 1***. Rio's Field Analytical Report Forms are provided in ***Appendix 3***. In addition, one soil sample from each test pit was sent to Xenco Laboratories in Odessa, Texas for analysis of benzene, toluene, ethylbenzene, and total xylenes concentrations by Environmental Protection Agency (EPA) Method 8021B; total petroleum hydrocarbons (TPH) by EPA Method SW8015 Modified; and, for chloride concentrations by EPA Method E300. Laboratory data are summarized in ***Table 2*** and laboratory analytical reports are provided in ***Appendix 4***.

3.2 Soil Analytical Result Evaluation

The depth to groundwater is less than 50 ft-bgs in neighboring windmill wells, so the site received the OCD's most stringent ranking in accordance with the OCD's *Guidelines for the Remediation of Leaks, Spills, and Releases.* Therefore, the required soil cleanup levels were:

Benzene: 10 mg/kg
Total BTEX: 50 mg/kg
TPH: 100 mg/kg

The OCD default cleanup level for chloride concentrations in soil is 250 mg/kg.

All of the soil samples analyzed in the laboratory reported contaminant concentrations below their respective applicable OCD cleanup levels. However, chloride concentrations in many soil samples field screened by Rio exceeded the OCD default cleanup level for chloride concentrations as shown in ***Table 1***.

4.0 Soil Abatement Activities

The field-screened soil assessment performed by Rio indicated that the Site had seen releases of saltwater that are probably historical in nature. These releases had impacted soil with elevated chloride concentrations above the OCD default chloride cleanup of 250 mg/kg.

4.1 Soil Abatement

Based on the field-screened chloride concentration data summarized in ***Table 1***, Rio excavated the upper 4 feet of soil in the larger excavation area to the east of the new tank battery location. Rio also excavated the upper 2 feet of soil in the smaller excavation area south of the new tank battery. These excavated soils were stockpiled on site pending OCD approval of the excavation activities. The proposed abatement plan was to remove the upper 4 feet of impacted soil and to line the excavation with a composite geotextile and high-density polyethylene (HDPE) liner, backfill, and seed. OCD denied the proposed abatement plan on December 17, 2010. SKA and Linn representatives met with the OCD on January 18, 2011 and discussed a revised abatement plan that involved excavation of the upper 10 feet of impacted soil, placement of a compacted clay liner, backfilling, replacement of topsoil, and seeding. The OCD approved the revised abatement plan on February 9, 2011.

SKA implemented the approved abatement plan and collected composite soil samples of the soil stockpile. These samples exhibited chloride concentrations of less than 1,000 mg/kg so the soil was eligible for landfarming. The stockpiled soil was hauled and disposed at the Lazy Ace Land Farm, near Eunice, New Mexico. SKA continued the excavation to an ultimate depth of 10 ft-bgs. Additional excavated soil was also disposed of at the Lazy Ace Land Farm. Photographs of the soil abatement activities are provided in ***Appendix 5***.

4.2 Site Restoration

The excavation was backfilled to a depth of 8 ft-bgs with clay obtained from the Lazy Ace Land Farm. The clay was graded and machine compacted with a trackhoe. The excavation was further backfilled up to 2 ft-bgs using native caliche obtained from the landowner's on site pit. The upper two feet of the excavation was backfilled using topsoil obtained from the Lazy Ace Land Farm and approved by the landowner. After backfilling, the excavated area and other adjacent disturbed areas were reseeded.

5.0 Conclusions

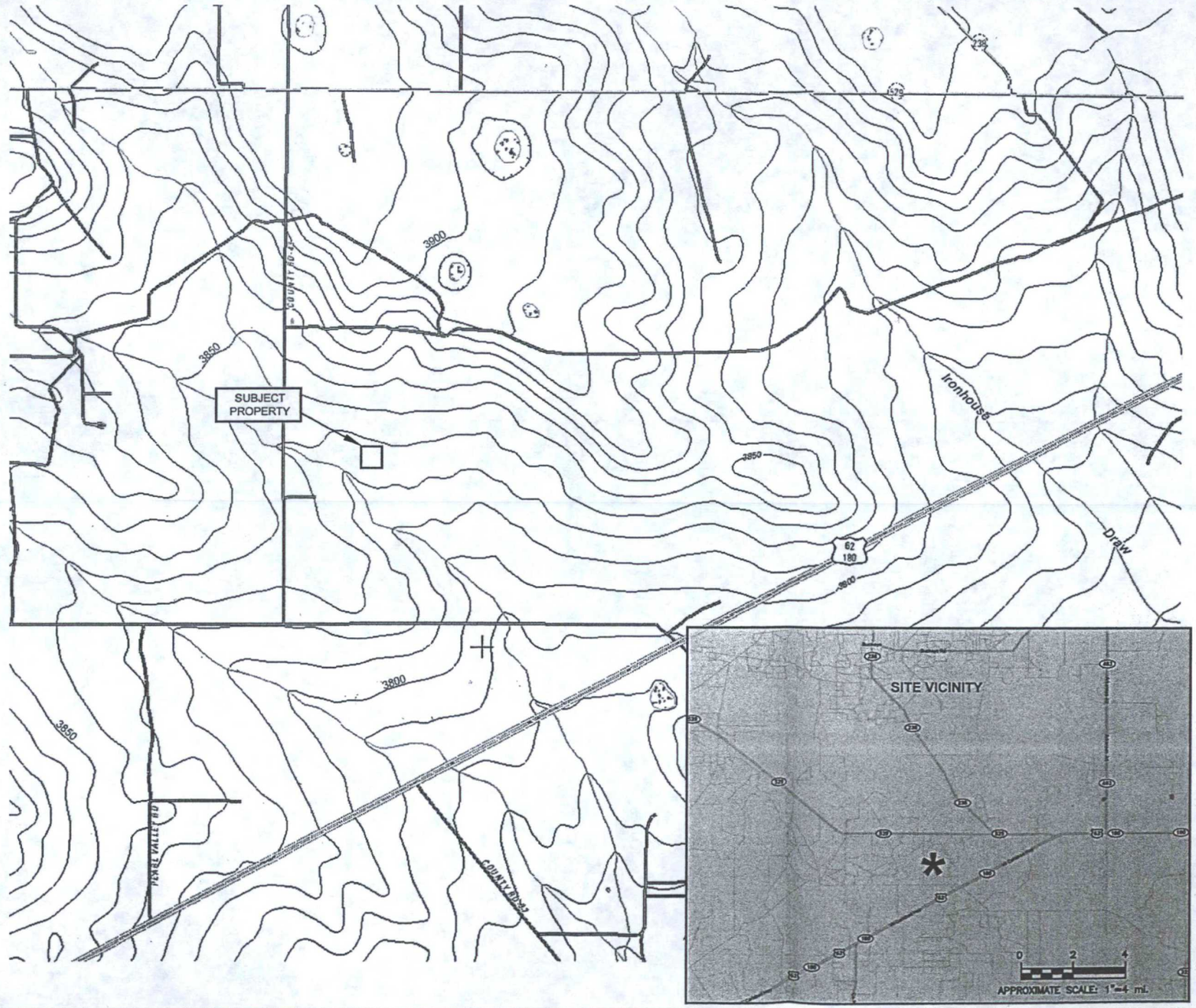
SKA has developed the following conclusions based on the completed abatement activities at the Site:

- Chloride-impacted soil to a depth of 10 ft-bgs has been successfully removed from the Site;
- The chloride-impacted soil was properly disposed off-site at the Lazy Ace Land Farm;
- A 2-foot thick clay liner was installed to limit infiltration of rainfall at the affected area; and,
- The Site was properly backfilled, restored with topsoil, and seeded.

SKA on behalf of Linn, requests concurrence from the OCD that no further abatement actions are needed at the Site.

FIGURES

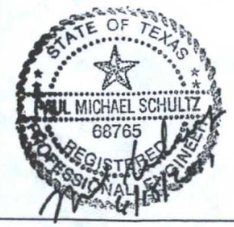
Figure 1
Site Vicinity and Topographic Map



QUADRANGLE LOCATION

REFERENCE: USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLE
IRONHOUSE DRAW, NEW MEXICO
2010

0 1000 2000
APPROXIMATE SCALE: 1"=2000'



ska
SKA CONSULTING, L.P.
1515 WITTE ROAD, SUITE 150
HOUSTON, TEXAS 77080
Texas Registered Engineering Firm F-005009
Texas Registered Geoscience Firm 50011

SITE VICINITY AND TOPOGRAPHIC MAP

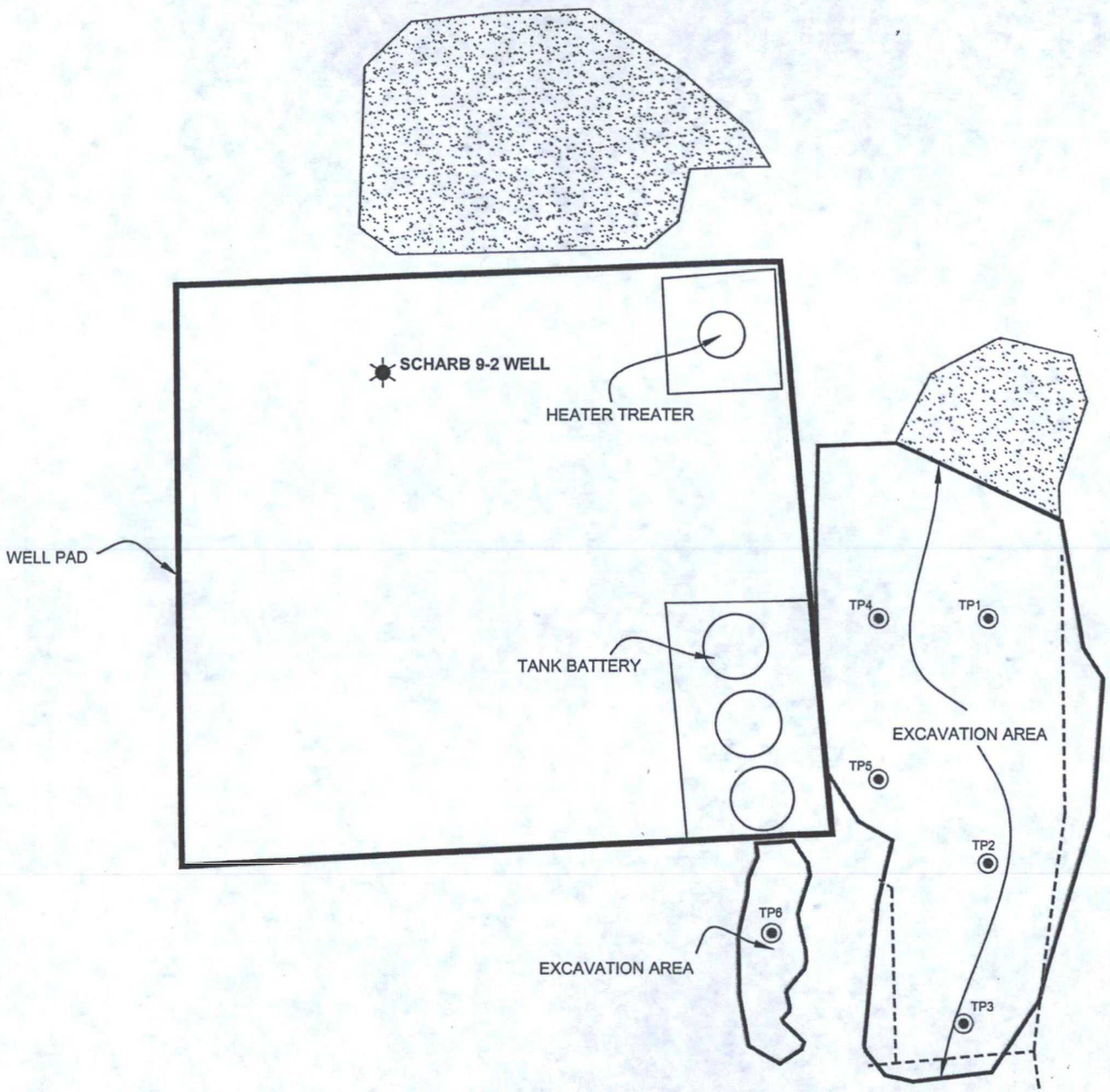
FIGURE 1

SOIL ABATEMENT COMPLETION REPORT
LINN OPERATING, INC.
SCHARB 9 TANK BATTERY 2
32° 40' 36.80" N, 103° 27' 52.24" W
SECTION 9, TOWNSHIP 19 SOUTH, RANGE 35 EAST
LEA COUNTY, NEW MEXICO

DATE:	JUNE 2011	JOB NO: 12009-0003	SCALE: AS SHOWN
1 FIRST REVISION	-	DRAWN BY:	JCS
2 SECOND REVISION	-	CHECKED BY:	JRS
3 THIRD REVISION	-	APPROVED BY:	PMS

FILE INFO: G:\2009\12009-0003\Dwg\D01a.dwg sandersjc NO XREFS ATTACHED

Figure 2
Site Plan and Sample Location Map



LEGEND

- PIPELINE
- OIL/GAS PRODUCTION WELL LOCATION
- STOCKPILED SOIL
- TP1 TEST FIT LOCATIONS (RIO SERVICES, 2010)
- APPROXIMATE EXCAVATION AREA BOUNDARIES

SITE VICINITY

REFERENCE: AEROPOINT LAND SURVEYORS
FEBRUARY 2011

0 15 30
APPROXIMATE SCALE: 1"=30'

ska
SKA CONSULTING, L.P.
1515 WITTE ROAD, SUITE 150
HOUSTON TEXAS 77080
Texas Registered Engineering Firm F-005009
Texas Registered Geoscience Firm 50011

SITE PLAN AND SAMPLE LOCATION MAP

FIGURE 2

SOIL ABATEMENT COMPLETION REPORT
LINN OPERATING, INC.
SCHARB 9 BATTERY 2
SECTION 9, TOWNSHIP 19 SOUTH, RANGE 35 EAST
LEA COUNTY, NEW MEXICO

DATE:	JUNE 2011	JOB NO:	12009-0003	SCALE:	AS SHOWN
1	FIRST REVISION	-	DRAWN BY:	JCS	
2	SECOND REVISION	-	CHECKED BY:	JRS	
3	THIRD REVISION	-	APPROVED BY:	PMS	

FILE INFO: G:\2009\12009-0003\Dwg\D02.dwg sandersjc NO XREFS ATTACHED

Tables

Table 1
Summary of Field Screening Results for Chloride Concentrations

TABLE 1

SUMMARY OF FIELD SCREENING RESULTS FOR CHLORIDE CONCENTRATIONS
SCHARB 9 TANK BATTERY 2
UNIT F, SECTION 9, TOWNSHIP 10 SOUTH, RANGE 35 EAST,
LEA COUNTY, NEW MEXICO

Sample Depth (ft-bgs)	Sample Location						
	Background	TP1	TP2	TP3	TP4	TP5	TP6
Surface	146	-	-	-	-	-	-
1	-	5,878	4,937	540	730	690	285
1.5	-	767	-	-	-	-	-
2	139	678	349	513	270	834	149
3	-	532	-	586	-	526	-
4	-	-	-	651	-	-	-
5	-	-	547	284	-	-	-
6	-	-	488	509	-	577	-
6.5	-	-	-	-	438	-	-
7	-	-	-	-	-	-	-
7.5	-	-	-	-	326	-	-
8	-	-	-	460	-	459	-
8.5	-	-	-	-	376	-	-
9	-	-	1219	-	-	-	-
9.5	-	-	-	-	509	-	-
10	-	457	-	111	-	241	-
10.5	-	-	-	-	460	-	-
11	-	-	-	-	-	-	-
11.5	-	-	-	-	111	-	-
12	-	-	668	-	-	-	-
14	-	-	644	-	-	-	-
16	-	451	642	-	-	-	-
18	-	208	184	-	-	-	-
20	-	240	-	-	-	-	-

NOTES:

1. "ft-bgs" represents feet below ground surface.
2. "-" represents not analyzed.
3. Concentrations in bold and highlighted yellow exceed the NM OCD Default Chloride Remediation Action Level of 250 mg/kg.

Table 2
Summary of Soil Analytical Results

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS
SCHARB 9 TANK BATTERY 2
UNIT F, SECTION 9, TOWNSHIP 10 SOUTH, RANGE 35 EAST, LEA COUNTY, NEW MEXICO

SAMPLE DATA			ANIONS	BTEX					TPH			
Sample Name	Sample Depth (ft-bgs)	Sample Date	Chloride	Benzene	Toluene	Ethylbenzene	Xylenes (total)	Total BTEX	C_6-C_{12} Gasoline Range Hydrocarbons	C_{12}-C_{28} Diesel Range Hydrocarbons	C_{28}-C_{35} Oil Range Hydrocarbons	Total Petroleum Hydrocarbons
			Method SW90506 mg/kg	Method 8021B mg/kg	Method 8021B mg/kg	Method 8021B mg/kg	Method 8021B mg/kg	Method 8021B mg/kg	Method SW8015 mg/kg	Method SW8015 mg/kg	Method SW8015 mg/kg	Method SW8015 mg/kg
TP1 20 ft	20	12/14/10	**91.3**	<0.0011	<0.0023	<0.0011	<0.0011	<0.0011	<17.0	<17.0	<17.0	<17.0
TP2 18 ft	18	12/15/10	**17.1**	<0.0011	<0.0022	<0.0011	<0.0011	<0.0011	<16.9	<16.9	<16.9	<16.9
TP3 10 ft	10	12/14/10	**7.65**	<0.0011	<0.0021	<0.0011	<0.0011	<0.0011	<15.9	**20.1**	<15.9	**21.0**
TP4 11.5 ft	11.5	12/14/10	**69.9**	<0.0011	<0.0023	<0.0011	<0.0011	<0.0011	<17.1	<17.1	<17.1	<17.1
TP5 10 ft	10	12/15/10	**19.3**	<0.0011	<0.0022	<0.0011	<0.0011	<0.0011	<16.5	<16.5	<16.5	<16.5
TP6 2 ft	2	12/14/10	**7.22**	<0.0011	<0.0021	<0.0011	<0.0011	<0.0011	<15.9	**19.5**	<15.9	**19.5**
REGULATORY STANDARDS												
NM OCD Default Remediation Action Levels for Soil			**250**	**10**	--	--	--	**50**	--	--	--	**100**

NOTES:

"-" represents not analyzed.

"--" represents not applicable.

"mg/kg" represents milligrams per kilogram.

"<0.0023" indicates the analyte was NOT detected at or above the specified sample detection limit (SDL).

Concentrations in bold exceed their specified SDLs.

Concentrations in bold and highlighted yellow exceed the NM OCD Default Remediation Action Level.

Appendices

Appendix 1
Release Notification and Corrective Action Form

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

State of New Mexico
Energy Minerals and Natural Resources

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

Form C-141
Revised October 10, 2003

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

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company – Linn Energy	Contact – Albert Valero
Address – 2651 JBS Parkway, Bldg. 4 Ste F Odessa, TX 79761	Telephone No. – 432-366-1557
Facility Name – Scharb 9 #2 Battery	Facility Type – Battery

Surface Owner – ~~State~~ Chris Northcutt	Mineral Owner	Lease No.

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
F	9	19S	35E					Lea

Latitude 32° 40.615' N **Longitude** 103° 27.873' W

NATURE OF RELEASE

Type of Release - Historical	Volume of Release - Unknown	Volume Recovered - Unknown
Source of Release - Unknown	Date and Hour of Occurrence - Unknown	Date and Hour of Discovery – 7-9-10
Was Immediate Notice Given? ☐ Yes ☒ No ☐ Not Required	If YES, To Whom?	
By Whom?	Date and Hour	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*

Describe Cause of Problem and Remedial Action Taken.*
Historical impacted soil is present around the heater treater, tanks, pump and wellhead. The battery was moved and rebuilt on a new pad to the west. The site was delineated to the following criteria. The ranking criteria for the site is as follows: Surface Body of Water – 0 points; Wellhead Protection - 0 points; Depth to Groundwater – 20 points (GW = 24' on SEO Data). Total ranking for the site is 20 points. The following is the RAL's for the sampling: TPH Method 8015M – 100 ppm; Chloride – 250 ppm; BTEX 8021B – 50 ppm and Benzene – 0.2 ppm.

Describe Area Affected and Cleanup Action Taken.*
Attached is a plat map, field analysis and lab conformations of the delineation.
Due to the hard rock, Linn Energy proposes to remediate the site with a risk based closure. Linn proposes to excavate 4' of impacted soil and haul to an approved disposal. At the four foot depth the entire site will be layered with 2" of clean sand, then a 4 oz. Geotextile Liner, then a 40 mil poly liner. Above the poly liner another layer of Geotextile felt and sand will be installed. The site will then be backfilled with clean native soil and contoured to the surrounding area. The site will be re-seeded with a custom seed mixture approved by the landowner. Due to the hard rock, low level of chlorides below 4' and the poly liner to be installed, Linn Energy feels that the groundwater will be protected from contamination using this risk based closure.

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

Signature: Albert Valero	OIL CONSERVATION DIVISION Approved by District Supervisor: DENIED	
Printed Name: Albert Valero		
Title: Production Foreman	Approval Date:	Expiration Date:
E-mail Address: avalero@linnenergy.com	Conditions of Approval:	Attached ☐
Date: 12-17-10 Phone: 432-366-1557		

* Attach Additional Sheets If Necessary

- EXCAVATE TO CLEAN
Geoffrey Leking, NMOCD - Hobbs, 12/17/10

Appendix 2
References

REFERENCES

SKA Consulting, L.P. does not warrant the data of regulatory agencies or other third parties supplying information used in the preparation of this report. Documents and commercial information services used in the preparation of this report, as listed below, are all current as most recently published.

Soil Survey of Lea County, New Mexico, Natural Resources Conservation Service, May 17, 2011

Guidelines for the Remediation of Leak, Spills, and Releases, New Mexico Oil Conservation Division, Santa Fe, New Mexico, August 13, 1993, pg 5.

Ironhouse Draw, New Mexico 7.5 Minute Quadrangle Map, United States Geological Survey, 2010

Geology and Ground-Water Conditions in Southern Lea County, New Mexico, State Bureau of Mines and Mineral Resources, Socorro, New Mexico, 1961

Appendix 3
Field Analytical Report Forms (Rio Services)

Rio Services

P O Box 69139 Odessa, TX 79769
Phone (432) 530-2803 Fax (432) 530-2890

Field Analytical Report Form

Client Linn Energy **Analyst** Logan Anderson / Bobby Steadham

Site Scharb 9 #2

Sample ID	Date	Depth	418.1 TPH / PPM	Cl / PPM	PID / PPM	GPS
TP1	10-14-10	1'		5,878		
TP1	11-18-10	1' 6"		767		
TP1	11-18-10	2'		678		
TP1	11-19-10	3'		532		
TP1	11-19-10	10'		457		
TP1	12-16-10	16'		451		
TP1	12-16-10	18'		208		
TP1	11-19-10	20'		240		
TP1	11-19-10	20'		187		
TP2	10-14-10	1'		4,937		
TP2	11-18-10	2'		349		
TP2	11-19-10	5'		547		
TP2	11-19-10	6'		488		
TP2	12-15-10	9'		1,219		
TP2	12-15-10	12'		668		
TP2	12-15-10	14'		644		

Analyst Notes

Rio Services

P O Box 69139 Odessa, TX 79769
Phone (432) 530-2803 Fax (432) 530-2890

Field Analytical Report Form

Client Linn Energy **Analyst** Logan Anderson

Site Scharb 9 #2

Sample ID	Date	Depth	418.1 TPH / PPM	Cl / PPM	PID / PPM	GPS
TP2	12-15-10	16'		642		
TP2	12-15-10	18'		184		
TP3	10-14-10	1'		540		
TP3	11-19-10	2'		513		
TP3	11-19-10	3'		586		
TP3	11-19-10	4'		651		
TP3	11-19-10	5'		284		
TP3	12-14-10	6'		509		
TP3	12-14-10	8'		460		
TP3	12-14-10	10'		111		
TP4	10-14-10	1'		730		
TP4	11-18-10	2'		270		
TP4	12-14-10	6.5'		438		
TP4	12-14-10	7.5'		326		
TP4	12-14-10	8.5'		376		

Analyst Notes

Rio Services

P O Box 69139 Odessa, TX 79769
Phone (432) 530-2803 Fax (432) 530-2890

Field Analytical Report Form

Client Linn Energy **Analyst** Logan Anderson

Site Scharb 9 #2

Sample ID	Date	Depth	418.1 TPH / PPM	Cl / PPM	PID / PPM	GPS
TP4	12-14-10	9.5'		509		
TP4	12-14-10	10.5'		460		
TP4	12-14-10	11.5'		111		
TP5	10-14-10	1'		690		
TP5	11-18-10	2'		834		
TP5	11-18-10	3'		526		
TP5	12-15-10	6'		577		
TP5	12-15-10	8'		459		
TP5	12-15-10	10'		241		
TP6	10-14-10	1'		285		
TP6	11-19-10	2'		149		
Background	10-14-10	Surface		146		
Background	11-19-10	2'		139		

Analyst Notes

Appendix 4
Laboratory Analytical Reports

Analytical Report 400704

for

Rio Services

Project Manager: Logan Anderson

Linn Energy

16-DEC-10

Celebrating 20 Years of commitment to excellence in Environmental Testing Services

12600 West I-20 East Odessa, Texas 79765

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215-10-6-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)
Rhode Island (LAO00312), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):
Florida (E87429), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)
Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-TX)
Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-TX)
Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370)
Xenco-Boca Raton (EPA Lab Code: FL01273):
Florida(E86240),South Carolina(96031001), Louisiana(04154), Georgia(917)
North Carolina(444), Texas(T104704468-TX), Illinois(002295), Florida(E86349)

Xenco Phoenix (EPA Lab Code: AZ00901):
Arizona(AZ0757), California(06244CA), Texas(104704435-10-2), Nevada(NAC-445A), DoD(65816)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)
Xenco Tucson (EPA Lab code:AZ000989): Arizona (AZ0758)

16-DEC-10

Project Manager: **Logan Anderson**
Rio Services
P.O. Box 69139
Odessa, TX 79769

Reference: XENCO Report No: **400704**
Linn Energy
Project Address: Scharb 9 #2 Battery

Logan Anderson:

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 400704. 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. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. 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. 400704 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,

Brent Barron, II
Odessa Laboratory Manager

Sample Cross Reference 400704

Rio Services, Odessa, TX

Linn Energy

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
TP1	S	Dec-14-10 14:30	20 ft	400704-001
TP3	S	Dec-14-10 15:40	10 ft	400704-002
TP4	S	Dec-14-10 14:20	11.5 ft	400704-003
TP6	S	Dec-14-10 16:00	2 ft	400704-004

CASE NARRATIVE

Client Name: Rio Services
Project Name: Linn Energy

Project ID:
Work Order Number: 400704

Report Date: 16-DEC-10
Date Received: 12/15/2010

Sample receipt non conformances and Comments:

None

Sample receipt Non Conformances and Comments per Sample:

None

Analytical Non Conformances and Comments:

Batch: LBA-836181 BTEX by EPA 8021B
SW8021BM

Batch 836181, 1,4-Difluorobenzene recovered below QC limits . Matrix interferences is suspected; data confirmed by re-analysis
Samples affected are: 400704-003,400704-001.

Certificate of Analysis Summary 400704

Rio Services, Odessa, TX

Project Name: Linn Energy

Project Id:

Contact: Logan Anderson

Project Location: Scharb 9 #2 Battery

Date Received in Lab: Wed Dec-15-10 12:51 pm

Report Date: 16-DEC-10

Project Manager: Brent Barron, II

Analysis Requested													
	Lab Id:	400704-001		400704-002		400704-003		400704-004					
	Field Id:	TP1		TP3		TP4		TP6					
	Depth:	20 ft		10 ft		11.5 ft		2 ft					
	Matrix:	SOIL		SOIL		SOIL		SOIL					
	Sampled:	Dec-14-10 14:30		Dec-14-10 15:40		Dec-14-10 14:20		Dec-14-10 16:00					
Anions by E300	*Extracted:*												
	Analyzed:	Dec-15-10 14:05		Dec-15-10 14:05		Dec-15-10 14:05		Dec-15-10 14:05					
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL				
Chloride		91.3	4.20	7.65	4.20	69.9	4.20	7.22	4.20				
BTEX by EPA 8021B	*Extracted:*	Dec-15-10 13:40		Dec-15-10 13:40		Dec-15-10 13:40		Dec-15-10 13:40					
	Analyzed:	Dec-16-10 01:33		Dec-16-10 02:58		Dec-16-10 03:20		Dec-16-10 03:41					
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL				
Benzene		ND	0.0011	ND	0.0011	ND	0.0011	ND	0.0011				
Toluene		ND	0.0023	ND	0.0021	ND	0.0023	ND	0.0021				
Ethylbenzene		ND	0.0011	ND	0.0011	ND	0.0011	ND	0.0011				
m_p-Xylenes		ND	0.0023	ND	0.0021	ND	0.0023	ND	0.0021				
o-Xylene		ND	0.0011	ND	0.0011	ND	0.0011	ND	0.0011				
Total Xylenes		ND	0.0011	ND	0.0011	ND	0.0011	ND	0.0011				
Total BTEX		ND	0.0011	ND	0.0011	ND	0.0011	ND	0.0011				
Percent Moisture	*Extracted:*												
	Analyzed:	Dec-16-10 08:30		Dec-16-10 08:30		Dec-16-10 08:30		Dec-16-10 08:30					
	Units/RL:	%	RL	%	RL	%	RL	%	RL				
Percent Moisture		12.0	1.00	5.22	1.00	11.6	1.00	5.78	1.00				
TPH By SW8015 Mod	*Extracted:*	Dec-15-10 13:50		Dec-15-10 13:50		Dec-15-10 13:50		Dec-15-10 13:50					
	Analyzed:	Dec-16-10 09:25		Dec-16-10 09:44		Dec-16-10 10:03		Dec-16-10 10:22					
	Units/RL:	mg/kg	RL	mg/kg	RL	mg/kg	RL	mg/kg	RL				
C6-C12 Gasoline Range Hydrocarbons		ND	17.0	ND	15.9	ND	17.1	ND	15.9				
C12-C28 Diesel Range Hydrocarbons		ND	17.0	20.1	15.9	ND	17.1	19.5	15.9				
C28-C35 Oil Range Hydrocarbons		ND	17.0	ND	15.9	ND	17.1	ND	15.9				
Total TPH		ND	17.0	20.1	15.9	ND	17.1	19.5	15.9				

Brent Barron, II
Odessa Laboratory Manager

XENCO Laboratories

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 effect the recovery of the spike concentration. This condition could also effect 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 MQL and above the SQL.

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.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit

PQL Practical Quantitation Limit

* Outside XENCO's scope of NELAC Accreditation.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: Linn Energy

Work Orders : 400704,

Project ID:

Lab Batch #: 836181 **Sample:** 591409-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/15/10 23:46

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0275	0.0300	92	80-120	
4-Bromofluorobenzene	0.0295	0.0300	98	80-120	

Lab Batch #: 836181 **Sample:** 591409-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/16/10 00:07

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0285	0.0300	95	80-120	
4-Bromofluorobenzene	0.0284	0.0300	95	80-120	

Lab Batch #: 836181 **Sample:** 591409-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/16/10 01:11

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0241	0.0300	80	80-120	
4-Bromofluorobenzene	0.0294	0.0300	98	80-120	

Lab Batch #: 836181 **Sample:** 400704-001 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 01:33

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0230	0.0300	77	80-120	**
4-Bromofluorobenzene	0.0295	0.0300	98	80-120	

Lab Batch #: 836181 **Sample:** 400704-001 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 01:54

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0263	0.0300	88	80-120	
4-Bromofluorobenzene	0.0281	0.0300	94	80-120	

* 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.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: Linn Energy

Work Orders : 400704,

Project ID:

Lab Batch #: 836181 **Sample:** 400704-001 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 02:15

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0262	0.0300	87	80-120	
4-Bromofluorobenzene	0.0275	0.0300	92	80-120	

Lab Batch #: 836181 **Sample:** 400704-002 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 02:58

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0251	0.0300	84	80-120	
4-Bromofluorobenzene	0.0288	0.0300	96	80-120	

Lab Batch #: 836181 **Sample:** 400704-003 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 03:20

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0233	0.0300	78	80-120	**
4-Bromofluorobenzene	0.0300	0.0300	100	80-120	

Lab Batch #: 836181 **Sample:** 400704-004 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 03:41

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0240	0.0300	80	80-120	
4-Bromofluorobenzene	0.0288	0.0300	96	80-120	

Lab Batch #: 836178 **Sample:** 591413-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/15/10 14:48

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	72.2	99.5	73	70-135	
o-Terphenyl	49.2	49.8	99	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.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: Linn Energy

Work Orders : 400704,

Project ID:

Lab Batch #: 836178 **Sample:** 591413-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/15/10 15:07

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	76.6	100	77	70-135	
o-Terphenyl	38.9	50.2	77	70-135	

Lab Batch #: 836178 **Sample:** 591413-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/15/10 15:25

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	74.8	100	75	70-135	
o-Terphenyl	38.9	50.0	78	70-135	

Lab Batch #: 836178 **Sample:** 400704-001 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 09:25

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	73.9	99.5	74	70-135	
o-Terphenyl	38.1	49.8	77	70-135	

Lab Batch #: 836178 **Sample:** 400704-002 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 09:44

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	77.4	100	77	70-135	
o-Terphenyl	39.5	50.2	79	70-135	

Lab Batch #: 836178 **Sample:** 400704-003 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 10:03

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	76.6	101	76	70-135	
o-Terphenyl	39.8	50.3	79	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.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: Linn Energy

Work Orders : 400704,

Project ID:

Lab Batch #: 836178 **Sample:** 400704-004 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 10:22

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	75.6	99.9	76	70-135	
o-Terphenyl	39.0	50.0	78	70-135	

Lab Batch #: 836178 **Sample:** 400678-004 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 12:14

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	74.9	99.8	75	70-135	
o-Terphenyl	38.9	49.9	78	70-135	

Lab Batch #: 836178 **Sample:** 400678-004 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 12:32

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	72.2	99.5	73	70-135	
o-Terphenyl	39.2	49.8	79	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.

XENCO Laboratories

BS / BSD Recoveries

ACCREDITED IN ACCORDANCE WITH nelac

Project Name: Linn Energy

Work Order #: 400704 **Project ID:**

Analyst: SEE **Date Prepared:** 12/15/2010 **Date Analyzed:** 12/15/2010

Lab Batch ID: 836181 **Sample:** 591409-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B 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
Benzene	ND	0.1004	0.1032	103	0.0996	0.1003	101	3	70-130	35	
Toluene	ND	0.1004	0.0912	91	0.0996	0.0896	90	2	70-130	35	
Ethylbenzene	ND	0.1004	0.0915	91	0.0996	0.0895	90	2	71-129	35	
m_p-Xylenes	ND	0.2008	0.1791	89	0.1992	0.1743	88	3	70-135	35	
o-Xylene	ND	0.1004	0.0913	91	0.0996	0.0893	90	2	71-133	35	

Analyst: LATCOR **Date Prepared:** 12/15/2010 **Date Analyzed:** 12/15/2010

Lab Batch ID: 836094 **Sample:** 836094-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Anions by E300 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	<0.420	10.0	8.76	88	10	8.88	89	1	75-125	20	

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

XENCO Laboratories

BS / BSD Recoveries

Project Name: Linn Energy

Work Order #: 400704 **Project ID:**

Analyst: BEV **Date Prepared:** 12/15/2010 **Date Analyzed:** 12/15/2010

Lab Batch ID: 836178 **Sample:** 591413-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

	BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY										
TPH By SW8015 Mod **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-C12 Gasoline Range Hydrocarbons	<50.0	995	977	98	1000	1030	103	5	70-135	35	
C12-C28 Diesel Range Hydrocarbons	<50.0	995	881	89	1000	1020	102	15	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: Linn Energy

Work Order #: 400704
Lab Batch #: 836094
Project ID:
Date Analyzed: 12/15/2010
Date Prepared: 12/15/2010
Analyst: LATCOR
QC- Sample ID: 400673-002 S
Batch #: 1
Matrix: Soil
Reporting Units: mg/kg

Inorganic Anions by EPA 300	MATRIX / MATRIX SPIKE RECOVERY STUDY					
Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Chloride	230	200	398	84	75-125	

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: Linn Energy

Work Order # : 400704 **Project ID:**

Lab Batch ID: 836181 **QC- Sample ID:** 400704-001 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 12/16/2010 **Date Prepared:** 12/15/2010 **Analyst:** SEE

Reporting Units: mg/kg

BTEX by EPA 8021B Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	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
Benzene	ND	0.1146	0.1072	94	0.1125	0.1041	93	3	70-130	35	
Toluene	ND	0.1146	0.0951	83	0.1125	0.0941	84	1	70-130	35	
Ethylbenzene	ND	0.1146	0.0953	83	0.1125	0.0927	82	3	71-129	35	
m_p-Xylenes	ND	0.2291	0.1851	81	0.2250	0.1811	80	2	70-135	35	
o-Xylene	ND	0.1146	0.0952	83	0.1125	0.0938	83	1	71-133	35	

Lab Batch ID: 836178 **QC- Sample ID:** 400678-004 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 12/16/2010 **Date Prepared:** 12/15/2010 **Analyst:** BEV

Reporting Units: mg/kg

TPH By SW8015 Mod Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	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-C12 Gasoline Range Hydrocarbons	<16.1	1080	1100	102	1070	1070	100	3	70-135	35	
C12-C28 Diesel Range Hydrocarbons	<16.1	1080	855	79	1070	819	77	4	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 ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

XENCO Laboratories

Sample Duplicate Recovery

ACCREDITED IN ACCORDANCE WITH nelac

Project Name: Linn Energy

Work Order #: 400704

Lab Batch #: 836094 **Project ID:**

Date Analyzed: 12/15/2010 14:05 **Date Prepared:** 12/15/2010 **Analyst:** LATCOR

QC- Sample ID: 400673-002 D **Batch #:** 1 **Matrix:** Soil

Reporting Units: mg/kg

Anions by E300 Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY				
	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Chloride	230	224	3	20	

Lab Batch #: 836104

Date Analyzed: 12/16/2010 08:30 **Date Prepared:** 12/16/2010 **Analyst:** JLG

QC- Sample ID: 400673-001 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	2.97	3.25	9	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

Xenco Laboratories

The Environmental Lab of Texas

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

12600 West I-20 East
Odessa, Texas 79765

Phone: 432-563-1800
Fax: 432-563-1713

Project Manager: Logan Anderson
Company Name: Rio Services
Company Address: P O Box 69139
City/State/Zip: Odessa, TX 79769
Telephone No: 432-381-5700 Fax No: 432-530-2890
Sampler Signature:
e-mail: logan_rioservices@yahoo.com

Project Name: Lion Energy
Project #:
Project Loc: Scharb 9 #2 Battery
PO #:
Report Format: ☒ Standard ☐ TRRP ☐ NPDES

(lab use only)
ORDER #: 400704

LAB # (lab use only)	FIELD CODE	Beginning Depth	Ending Depth	Date Sampled	Time Sampled	Field Filtered	Total # of Containers	Preservation & # of Containers: Ice	HNO_3	HCl	H_2SO_4	NaOH	$Na_2S_2O_3$	None	Other (Specify)	Matrix: DW=Drinking Water SL=Sludge GW = Groundwater Si-Soil/Solid NP=Non-Potable Specify Other	Analyze For: TPH: 418.1 8015M	TPH: TX 1005 TX 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, Alkalinity)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	BTEX 8021B 8030 or BTEX 8260	RCI	N.O.R.M.	RUSH TAT (Pre-Schedule) 24, 48, 72 hrs	Standard TAT
	TP1 @ 20'		20'	12-14-10	2:30P		1	X								S	X			X					X				X	
	TP 3@ 10'		10'	12-14-10	3:40P		1	X								S	X			X					X				X	
	TP 4@ 11.5'		11.5'	12-14-10	2:20P		1	X								S	X			X					X				X	
	TP6 @ 2'		2'	12-14-10	4:00P		1	X								S	X			X					X				X	

TCLP:
TOTAL:

Special Instructions:

Relinquished by:	Date	Time	Received by:	Date	Time
	12-15-10	12:51P			
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by ELOT:	Date	Time
			Lisa Murdock	12-15-10	12:51

Laboratory Comments:

Sample Containers Intact?	(Y)	N
VOCs Free of Headspace?	Y	(NA)
Labels on container(s)	(Y)	N
Custody seals on container(s)	(Y)	N
Custody seals on cooler(s)	Y	(N)
Sample Hand Delivered by Sampler/Client Rep. ?	(Y)	N
by Courier? UPS DHL FedEx Lone Star	(Y)	N

Temperature Upon Receipt: 4c glass 4.6 °C

XENCO Laboratories

XENCO Laboratories
Atlanta, Boca Raton, Corpus Christi, Dallas
Houston, Miami, Odessa, Philadelphia
Phoenix, San Antonio, Tampa

Document Title: Sample Receipt Checklist
Document No.: SYS-SRC
Revision/Date: No. 01, 5/27/2010
Effective Date: 6/1/2010 Page 1 of 1

Prelogin / Nonconformance Report - Sample Log-In

Client: Rio Services
Date/Time: 12-15 10 12:51
Lab ID #: 400704
Initials: KM

Sample Receipt Checklist

1. Samples on ice?	Blue	Water	No	
2. Shipping container in good condition?	Yes	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	Yes	No	N/A	
4. Chain of Custody present?	Yes	No		
5. Sample instructions complete on chain of custody?	Yes	No		
6. Any missing / extra samples?	Yes	No		
7. Chain of custody signed when relinquished / received?	Yes	No		
8. Chain of custody agrees with sample label(s)?	Yes	No		
9. Container labels legible and intact?	Yes	No		
10. Sample matrix / properties agree with chain of custody?	Yes	No		
11. Samples in proper container / bottle?	Yes	No		
12. Samples properly preserved?	Yes	No	N/A	
13. Sample container intact?	Yes	No		
14. Sufficient sample amount for indicated test(s)?	Yes	No		
15. All samples received within sufficient hold time?	Yes	No		
16. Subcontract of sample(s)?	Yes	No	N/A	
17. VOC sample have zero head space?	Yes	No	N/A	

18. Cooler 1 No.		Cooler 2 No.		Cooler 3 No.		Cooler 4 No.		Cooler 5 No.	
lbs	4.6 °C	lbs	°C	lbs	°C	lbs	°C	lbs	°C

Nonconformance Documentation

Contact: _____ Contacted by: _____ Date/Time: _____

Regarding: _____

Corrective Action Taken: _____

Check all that apply:
- ☐ Cooling process has begun shortly after sampling event and out of temperature condition acceptable by NELAC 5.5.8.3.1.a.1.
- ☐ Initial and Backup Temperature confirm out of temperature conditions
- ☐ Client understands and would like to proceed with analysis

Analytical Report 400790

for

Rio Services

Project Manager: Logan Anderson

Scharb 9 # 2

16-DEC-10

Celebrating 20 Years of commitment to excellence in Environmental Testing Services

12600 West I-20 East Odessa, Texas 79765

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215-10-6-TX), Arizona (AZ0738), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)
Rhode Island (LAO00312), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):
Florida (E87429), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)
Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-TX)
Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-TX)
Xenco-Corpus Christi (EPA Lab code: TX02613): Texas (T104704370)
Xenco-Boca Raton (EPA Lab Code: FL01273):
Florida(E86240),South Carolina(96031001), Louisiana(04154), Georgia(917)
North Carolina(444), Texas(T104704468-TX), Illinois(002295), Florida(E86349)

Xenco Phoenix (EPA Lab Code: AZ00901):
Arizona(AZ0757), California(06244CA), Texas(104704435-10-2), Nevada(NAC-445A), DoD(65816)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)
Xenco Tucson (EPA Lab code:AZ000989): Arizona (AZ0758)

16-DEC-10

Project Manager: **Logan Anderson**
Rio Services
P.O. Box 69139
Odessa, TX 79769

Reference: XENCO Report No: **400790**
Scharb 9 # 2
Project Address: Linn Operating

Logan Anderson:

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 400790. 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. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. 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. 400790 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,

Brent Barron, II
Odessa Laboratory Manager

Sample Cross Reference 400790

Rio Services, Odessa, TX

Scharb 9 # 2

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
TP 2 @ 18'	S	Dec-15-10 14:15	18 ft	400790-001
TP 5 @ 10'	S	Dec-15-10 13:00	10 ft	400790-002

CASE NARRATIVE

Client Name: Rio Services
Project Name: Scharb 9 # 2

Project ID:
Work Order Number: 400790

Report Date: 16-DEC-10
Date Received: 12/15/2010

Sample receipt non conformances and Comments:

None

Sample receipt Non Conformances and Comments per Sample:

None

Certificate of Analysis Summary 400790

Rio Services, Odessa, TX

Project Name: Scharb 9 # 2

Project Id:

Contact: Logan Anderson

Project Location: Linn Operating

Date Received in Lab: Wed Dec-15-10 05:16 pm

Report Date: 16-DEC-10

Project Manager: Brent Barron, II

Analysis Requested								
	Lab Id:	400790-001		400790-002				
	Field Id:	TP 2 @ 18'		TP 5 @ 10'				
	Depth:	18 ft		10 ft				
	Matrix:	SOIL		SOIL				
	Sampled:	Dec-15-10 14:15		Dec-15-10 13:00				
Anions by E300	*Extracted:*							
	Analyzed:	Dec-16-10 08:23		Dec-16-10 08:23				
	Units/RL:	mg/kg	RL	mg/kg	RL			
Chloride		17.1	4.74	19.3	4.62			
BTEX by EPA 8021B	*Extracted:*	Dec-15-10 17:20		Dec-15-10 17:20				
	Analyzed:	Dec-16-10 11:27		Dec-16-10 11:48				
	Units/RL:	mg/kg	RL	mg/kg	RL			
Benzene		ND	0.0011	ND	0.0011			
Toluene		ND	0.0022	ND	0.0022			
Ethylbenzene		ND	0.0011	ND	0.0011			
m_p-Xylenes		ND	0.0022	ND	0.0022			
o-Xylene		ND	0.0011	ND	0.0011			
Total Xylenes		ND	0.0011	ND	0.0011			
Total BTEX		ND	0.0011	ND	0.0011			
Percent Moisture	*Extracted:*							
	Analyzed:	Dec-16-10 11:52		Dec-16-10 11:52				
	Units/RL:	%	RL	%	RL			
Percent Moisture		11.3	1.00	9.15	1.00			
TPH By SW8015 Mod	*Extracted:*	Dec-16-10 08:30		Dec-16-10 08:30				
	Analyzed:	Dec-16-10 15:21		Dec-16-10 15:39				
	Units/RL:	mg/kg	RL	mg/kg	RL			
C6-C12 Gasoline Range Hydrocarbons		ND	16.9	ND	16.5			
C12-C28 Diesel Range Hydrocarbons		ND	16.9	ND	16.5			
C28-C35 Oil Range Hydrocarbons		ND	16.9	ND	16.5			
Total TPH		ND	16.9	ND	16.5			

Brent Barron, II
Odessa Laboratory Manager

Final 1.000

XENCO Laboratories

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 effect the recovery of the spike concentration. This condition could also effect 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 MQL and above the SQL.

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.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit

PQL Practical Quantitation Limit

* Outside XENCO's scope of NELAC Accreditation.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: Scharb 9 # 2

Work Orders : 400790, **Project ID:**

Lab Batch #: 836181 **Sample:** 591409-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/15/10 23:46

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0275	0.0300	92	80-120	
4-Bromofluorobenzene	0.0295	0.0300	98	80-120	

Lab Batch #: 836181 **Sample:** 591409-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/16/10 00:07

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0285	0.0300	95	80-120	
4-Bromofluorobenzene	0.0284	0.0300	95	80-120	

Lab Batch #: 836181 **Sample:** 591409-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/16/10 01:11

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0241	0.0300	80	80-120	
4-Bromofluorobenzene	0.0294	0.0300	98	80-120	

Lab Batch #: 836181 **Sample:** 400704-001 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 01:54

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0263	0.0300	88	80-120	
4-Bromofluorobenzene	0.0281	0.0300	94	80-120	

Lab Batch #: 836181 **Sample:** 400704-001 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 02:15

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0262	0.0300	87	80-120	
4-Bromofluorobenzene	0.0275	0.0300	92	80-120	

* 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.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: Scharb 9 # 2

Work Orders : 400790,

Project ID:

Lab Batch #: 836181 **Sample:** 400790-001 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 11:27

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0249	0.0300	83	80-120	
4-Bromofluorobenzene	0.0304	0.0300	101	80-120	

Lab Batch #: 836181 **Sample:** 400790-002 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 11:48

BTEX by EPA 8021B Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0244	0.0300	81	80-120	
4-Bromofluorobenzene	0.0298	0.0300	99	80-120	

Lab Batch #: 836230 **Sample:** 591448-1-BKS / BKS **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/16/10 14:24

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	72.9	99.6	73	70-135	
o-Terphenyl	42.1	49.8	85	70-135	

Lab Batch #: 836230 **Sample:** 591448-1-BSD / BSD **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/16/10 14:42

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	72.8	99.6	73	70-135	
o-Terphenyl	38.1	49.8	77	70-135	

Lab Batch #: 836230 **Sample:** 591448-1-BLK / BLK **Batch:** 1 **Matrix:** Solid

Units: mg/kg **Date Analyzed:** 12/16/10 15:01

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	72.7	99.7	73	70-135	
o-Terphenyl	35.9	49.9	72	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.

XENCO Laboratories

Form 2 - Surrogate Recoveries

Project Name: Scharb 9 # 2

Work Orders : 400790,

Project ID:

Lab Batch #: 836230 **Sample:** 400790-001 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 15:21

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	72.5	99.8	73	70-135	
o-Terphenyl	37.4	49.9	75	70-135	

Lab Batch #: 836230 **Sample:** 400790-002 / SMP **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 15:39

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	74.6	99.8	75	70-135	
o-Terphenyl	38.4	49.9	77	70-135	

Lab Batch #: 836230 **Sample:** 400790-002 S / MS **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 15:57

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	71.3	100	71	70-135	
o-Terphenyl	36.8	50.2	73	70-135	

Lab Batch #: 836230 **Sample:** 400790-002 SD / MSD **Batch:** 1 **Matrix:** Soil

Units: mg/kg **Date Analyzed:** 12/16/10 16:16

TPH By SW8015 Mod Analytes	SURROGATE RECOVERY STUDY Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1-Chlorooctane	70.6	101	70	70-135	
o-Terphenyl	39.9	50.3	79	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.

XENCO Laboratories

BS / BSD Recoveries

Project Name: Scharb 9 # 2

Work Order #: 400790 **Project ID:**

Analyst: SEE **Date Prepared:** 12/15/2010 **Date Analyzed:** 12/15/2010

Lab Batch ID: 836181 **Sample:** 591409-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B 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
Benzene	ND	0.1004	0.1032	103	0.0996	0.1003	101	3	70-130	35	
Toluene	ND	0.1004	0.0912	91	0.0996	0.0896	90	2	70-130	35	
Ethylbenzene	ND	0.1004	0.0915	91	0.0996	0.0895	90	2	71-129	35	
m_p-Xylenes	ND	0.2008	0.1791	89	0.1992	0.1743	88	3	70-135	35	
o-Xylene	ND	0.1004	0.0913	91	0.0996	0.0893	90	2	71-133	35	

Analyst: LATCOR **Date Prepared:** 12/16/2010 **Date Analyzed:** 12/16/2010

Lab Batch ID: 836214 **Sample:** 836214-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Anions by E300 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	ND	10.0	9.52	95	10	9.56	96	0	75-125	20	

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

XENCO Laboratories

BS / BSD Recoveries

Project Name: Scharb 9 # 2

Work Order #: 400790 **Project ID:**

Analyst: BEV **Date Prepared:** 12/16/2010 **Date Analyzed:** 12/16/2010

Lab Batch ID: 836230 **Sample:** 591448-1-BKS **Batch #:** 1 **Matrix:** Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH By SW8015 Mod 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-C12 Gasoline Range Hydrocarbons	ND	996	1020	102	996	969	97	5	70-135	35	
C12-C28 Diesel Range Hydrocarbons	ND	996	919	92	996	893	90	3	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

XENCO Laboratories

Form 3 - MS Recoveries

Project Name: Scharb 9 # 2

Work Order #: 400790
Lab Batch #: 836214
Project ID:
Date Analyzed: 12/16/2010
Date Prepared: 12/16/2010
Analyst: LATCOR
QC- Sample ID: 400790-001 S
Batch #: 1
Matrix: Soil
Reporting Units: mg/kg

Inorganic Anions by EPA 300	MATRIX / MATRIX SPIKE RECOVERY STUDY					
Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	%R [D]	Control Limits %R	Flag
Chloride	17.1	113	124	95	75-125	

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: Scharb 9 # 2

Work Order # : 400790 **Project ID:**

Lab Batch ID: 836181 **QC- Sample ID:** 400704-001 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 12/16/2010 **Date Prepared:** 12/15/2010 **Analyst:** SEE

Reporting Units: mg/kg

BTEX by EPA 8021B Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	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
Benzene	ND	0.1146	0.1072	94	0.1125	0.1041	93	3	70-130	35	
Toluene	ND	0.1146	0.0951	83	0.1125	0.0941	84	1	70-130	35	
Ethylbenzene	ND	0.1146	0.0953	83	0.1125	0.0927	82	3	71-129	35	
m_p-Xylenes	ND	0.2291	0.1851	81	0.2250	0.1811	80	2	70-135	35	
o-Xylene	ND	0.1146	0.0952	83	0.1125	0.0938	83	1	71-133	35	

Lab Batch ID: 836230 **QC- Sample ID:** 400790-002 S **Batch #:** 1 **Matrix:** Soil

Date Analyzed: 12/16/2010 **Date Prepared:** 12/16/2010 **Analyst:** BEV

Reporting Units: mg/kg

TPH By SW8015 Mod Analytes	MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY										
	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-C12 Gasoline Range Hydrocarbons	ND	1110	1060	95	1110	1060	95	0	70-135	35	
C12-C28 Diesel Range Hydrocarbons	ND	1110	836	75	1110	822	74	2	70-135	35	

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

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not ApplicableN = See Narrative, EQL = Estimated Quantitation Limit

Final 1.000

Sample Duplicate Recovery

Project Name: Scharb 9 # 2

Work Order #: 400790

Lab Batch #: 836214 **Project ID:**

Date Analyzed: 12/16/2010 08:23 **Date Prepared:** 12/16/2010 **Analyst:** LATCOR

QC- Sample ID: 400790-001 D **Batch #:** 1 **Matrix:** Soil

Reporting Units: mg/kg

Anions by E300 Analyte	SAMPLE / SAMPLE DUPLICATE RECOVERY				
	Parent Sample Result [A]	Sample Duplicate Result [B]	RPD	Control Limits %RPD	Flag
Chloride	17.1	16.3	5	20	

Lab Batch #: 836162

Date Analyzed: 12/16/2010 11:52 **Date Prepared:** 12/16/2010 **Analyst:** JLG

QC- Sample ID: 400790-001 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	11.3	11.5	1	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

Xenco Laboratories

The Environmental Lab of Texas

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

12600 West I-20 East
Odessa, Texas 79765

Phone: 432-563-1800
Fax: 432-563-1713

Project Manager: LOGAN ANDERSON

Company Name: RIO SERVICES

Company Address:

City/State/Zip: ODESSA TX

Telephone No: Fax No:

Sampler Signature:

Project Name: SUMAC 9 #2

Project #:

Project Loc: LINN OPERATING

PO #:

Report Format: [X] Standard [ ] TRRP [ ] NPDES

e-mail: logan_riosevices@yahoo.com

(lab use only)

ORDER #: 400790

LAB # (lab use only)	FIELD CODE	Beginning Depth	Ending Depth	Date Sampled	Time Sampled	Field Filtered	Total #. of Containers	Preservation & # of Containers: Ice	HNO3	HCl	H2SO4	NaOH	Na2S2O3	None	Other (Specify)	Matrix: DW=Drinking Water SL=Sludge	GW=Groundwater S=Soil/Solid	NP=Non-Potable Specify Other	Analyze For: TCLP: TPH: 8015M / 80158	TPH: 418.1	TPH: TX 1005	TX 1006	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, Alkalinity)	SAR / ESP / CEC	Metals: As Ag Ba Cd Cr Pb Hg Se	Volatiles	Semivolatiles	TOTAL: BTEX 8021B/5030 or BTEX 8260	RCI	N.O.R.M.	RUSH TAT (Pre-Schedule) 24, 72 hrs	Standard TAT
01	TP 2 @ 18'		18'	12-15-10	2:15PM		1	X									S		X					X				X				X	
02	TP 5 @ 10'		10'	12-15-10	1:00PM		1	X									S		X					X				X				X	

Special Instructions:

	Date	Time	Received by:	Date	Time
Relinquished by:	12/15/10	5:16PM			
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by ELOT: Andrea Elam	Date 12-15-10	Time 17:16

Laboratory Comments:

Sample Containers Intact?	Y	N
VOCs Free of Headspace?	Y	N
Labels on container(s)	Y	N
Custody seals on container(s)	Y	N
Custody seals on cooler(s)	Y	N
Sample Hand Delivered	Y	N

by Sampler/Client Rep. ? by Courier? UPS DHL FedEx Lone Star

4 0 glass

Temperature Upon Receipt: 10.1 °C

XENCO Laboratories

XENCO Laboratories
Atlanta, Boca Raton, Corpus Christi, Dallas
Houston, Miami, Odessa, Philadelphia
Phoenix, San Antonio, Tampa

Document Title: Sample Receipt Checklist
Document No.: SYS-SRC
Revision/Date: No. 01, 5/27/2010
Effective Date: 6/1/2010 Page 1 of 1

Prelogin / Nonconformance Report - Sample Log-In

Client: Rio Services
Date/Time: 12.15.10 17.16
Lab ID #: 400790
Initials: AE

Sample Receipt Checklist

1. Samples on ice?	Blue	(Water)	No	
2. Shipping container in good condition?	(Yes)	No	None	
3. Custody seals intact on shipping container (cooler) and bottles?	(Yes)	No	N/A	
4. Chain of Custody present?	(Yes)	No		
5. Sample instructions complete on chain of custody?	(Yes)	No		
6. Any missing / extra samples?	Yes	(No)		
7. Chain of custody signed when relinquished / received?	(Yes)	No		
8. Chain of custody agrees with sample label(s)?	(Yes)	No		
9. Container labels legible and intact?	(Yes)	No		
10. Sample matrix / properties agree with chain of custody?	(Yes)	No		
11. Samples in proper container / bottle?	(Yes)	No		
12. Samples properly preserved?	(Yes)	No	N/A	
13. Sample container intact?	(Yes)	No		
14. Sufficient sample amount for indicated test(s)?	(Yes)	No		
15. All samples received within sufficient hold time?	(Yes)	No		
16. Subcontract of sample(s)?	Yes	No	(N/A)	
17. VOC sample have zero head space?	(Yes)	No	N/A	

18. Cooler 1 No.		Cooler 2 No.		Cooler 3 No.		Cooler 4 No.		Cooler 5 No.	
lbs	10.1 °C	lbs	°C	lbs	°C	lbs	°C	lbs	°C

Nonconformance Documentation

Contact:_____ Contacted by:_____ Date/Time:_____

Regarding: _____

Corrective Action Taken: _____

Check all that apply:
- ☐ Cooling process has begun shortly after sampling event and out of temperature condition acceptable by NELAC 5.5.8.3.1.a.1.
- ☐ Initial and Backup Temperature confirm out of temperature conditions
- ☐ Client understands and would like to proceed with analysis

Appendix 5
Photographs

Photo No. 1: A view to the south showing the preliminary excavation and the re-built tank battery to the right.

Photo No. 2: View to the south showing the completed excavation and the re-built tank battery to the right.

Photo No. 3: View to the northwest showing the chloride-contaminated soil being loaded for off-site disposal.

Photo No. 4: View to the west showing the excavation bottom being compacted by the dozer before placement of the clay liner. Note the orange clay liner fill marks on the excavation walls.

Photo No. 5: View to the south of red clay liner material being pushed into the excavation by the dozer.

Photo No. 6: View to the southeast showing the excavation backfilled with caliche.

Photo No. 7: View to the south showing the restored site with topsoil.

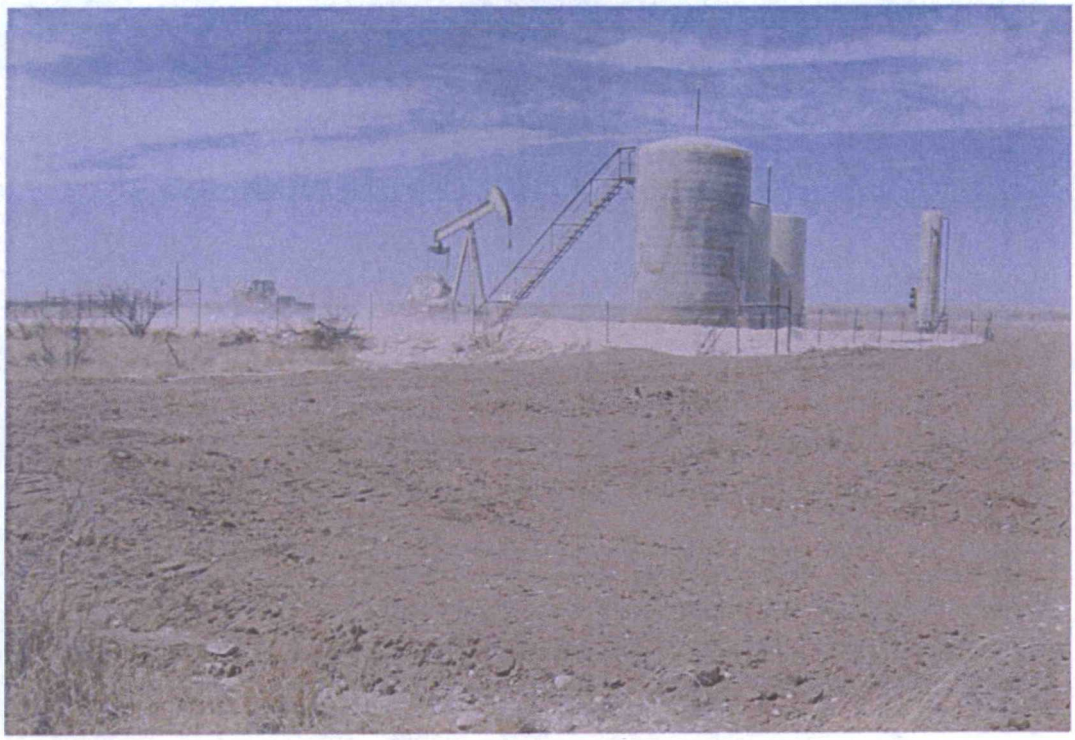


Photo No. 8: View to the northwest of the restored site with topsoil.