

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

HOBBS OCD

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

MAR 05 2014

RECEIVED

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	SM Energy Company	Contact	Vickie Martinez
Address	3300 N "A" ST BLDG 7-200 Midland, TX 79705	Telephone No.	(432) 688-1709
Facility Name	EDSU #11	Facility Type	Well

Surface Owner: BLM	Mineral Owner: BLM	Lease No. 3002529940
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LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
2	19	18S	32E	1700	North	330	West	Lea

Latitude N 32.62122° Longitude W 104.04383°

NATURE OF RELEASE

Type of Release: Oil and Salt Water	Volume of Release 60 bbls	Volume Recovered 55 bbls
Source of Release: Stuffing Box	Date and Hour of Occurrence 1/29/2013 1:00 A.M.	Date and Hour of Discovery Same
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? Trisha Badbear with the BLM & Jeff Leking with NMOCD	
By Whom? Bill Hearne	Date and Hour 1/29/2013 8:46 P.M.	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse. N/A	

If a Watercourse was Impacted, Describe Fully.*

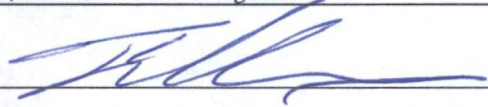
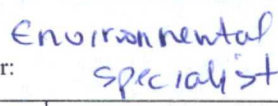
Describe Cause of Problem and Remedial Action Taken.*

Stuffing box failed. SM Energy will be turning this over to Tetra Tech for further evaluation.

Describe Area Affected and Cleanup Action Taken.*

Tetra Tech personnel inspected the site and collected samples to define spills extent. No soils exceeded the RRAL; therefore Tetra Tech prepared a closure report and submitted to NMOCD for review.

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: 		OIL CONSERVATION DIVISION	
Printed Name: Tom Elliott		Approved by District Supervisor: 	
Title: Project Manager		Approval Date: 07/05/16	Expiration Date: -
E-mail Address: Tom.Elliott@TetraTech.com		Conditions of Approval:	Attached ☐
Date: 1-17-2014 Phone: (432) 682-4559			

* Attach Additional Sheets If Necessary

1 RP -4337

SITE INFORMATION

Report Type: Closure Report

General Site Information:

Site:	ESDU #11				
Company:	SM Energy Company				
Section, Township and Range	Unit 2	Sec 19	T 18 S	R 32 E	
Lease Number:	3002529940				
County:	Lea County				
GPS:	32.73552° N			103.81321° W	
Surface Owner:	Federal				
Mineral Owner:					
Directions:	From the intersection of HWY 529 and 126A, travel south on 126A for 4.33 mi. Turn right and head west on lease road for 1.10 miles, then turn south for 0.48 miles and turn east for 0.14 miles. Turn right and travel south for 0.16 miles to the location.				

Release Data:

Date Released:	1/29/2013
Type Release:	Oil and Produced Water
Source of Contamination:	Stuffing Box
Fluid Released:	60 bbls
Fluids Recovered:	55 bbls

Official Communication:

Name:	Vickie Martinez	Ike Tavaréz
Company:	SM Energy Company	Tetra Tech
Address:	3300 N A St. Suite 200	4000 N. Big Spring
P.O. Box		Suite 401
City:	Midland Texas, 79705	Midland, Texas
Phone number:	(432) 688-1709	(432) 682-4559
Fax:	(432) 688-1701	
Email:	vmartinez@sm-energy.com	ike.tavarez@tetrattech.com

Ranking Criteria

Depth to Groundwater:	Ranking Score	Site Data
<50 ft	20	
50-99 ft	10	10
>100 ft.	0	0

WellHead Protection:	Ranking Score	Site Data
Water Source <1,000 ft., Private <200 ft.	20	
Water Source >1,000 ft., Private >200 ft.	0	0

Surface Body of Water:	Ranking Score	Site Data
<200 ft.	20	
200 ft - 1,000 ft.	10	
>1,000 ft.	0	0

Total Ranking Score:	0
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Acceptable Soil RRAL (mg/kg)		
Benzene	Total BTEX	TPH
10	50	5,000

HOBBS OCD

MAR 05 2014

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TETRA TECH

January 17, 2014

Mr. Geoffrey Leking
Environmental Engineer Specialist
Oil Conservation Division, District 1
1625 North French Drive
Hobbs, New Mexico 88240

HOBBS OCD

MAR 05 2014

RECEIVED

**Re: Closure Report for SM Energy Company
EDSU #11 Well
Section 19, Township 18S, Range 32E
Lea County, New Mexico**

Mr. Leking:

Tetra Tech, Inc. (Tetra Tech) was contacted by SM Energy Company (SM Energy) to assess a spill from EDSU #11 wellhead stuffing box, located in Section 19, Township 18S, Range 32E, Lea County, New Mexico (Site). The spill site coordinates are N 32.73561°, W -103.81338°. The site location is shown on Figures 1 and 2.

Background

According to the State of New Mexico Oil Conservation Division (NMOCD) Form C-141 Initial Report, the leak was discovered on January 29, 2013. The spill from the stuffing box released approximately sixty (60) barrels (bbls) of oil and produced water. SM Energy was able to recover approximately fifty five (55) bbls of fluid with a vacuum truck. To alleviate the problem, SM Energy repaired the stuffing box, which caused the problem. The spill impacted an area on the pad approximately 25' x 65'. The spill areas are shown on Figure 3. The initial Form C-141 is enclosed in Appendix A.

Groundwater

There were not any wells listed in Section 19. According to the NMOCD groundwater map the depth to groundwater is between 150' and 200' below surface. The groundwater data is shown in Appendix B.

Tetra Tech

1910 North Big Spring, Midland, TX 79705

Tel 432.682.4559

Fax 432.682.3946

www.tetrattech.com



Regulatory

A risk-based evaluation was performed for the Site in accordance with the NMOCD Guidelines for Remediation of Leaks, Spills and Releases, dated August 13, 1993. The guidelines require a risk-based evaluation of the site to determine recommended remedial action levels (RRAL) for benzene, toluene, ethylbenzene and xylene (collectively referred to as BTEX) and total petroleum hydrocarbons (TPH) in soil. The proposed RRAL for benzene was determined to be 10 parts per million (ppm) or milligrams per kilogram (mg/kg) and 50 ppm for total BTEX (sum of benzene, toluene, ethylbenzene, and xylene). Based upon the depth to groundwater, the proposed RRAL for TPH is 5,000 mg/kg.

Soil Assessment

On February 7, 2013, Tetra Tech personnel inspected and sampled the spill area. A total of three (3) auger holes (AH-1, AH-2 and AH-3) were installed using a stainless steel hand auger to assess the impacted areas. Selected samples were analyzed for TPH analysis by EPA method 8015 modified, BTEX by EPA Method 8021B and chloride by EPA method 300.0. Copies of laboratory analysis and chain-of-custody documentation are included in Appendix C. The sampling results are summarized in Table 1. The auger hole locations are shown on Figure 3.

Analytical Results

Referring to Table 1, auger hole samples (AH-1, AH-2 and AH-3) were below the RRAL for TPH and BTEX. The auger holes also did not show any elevated chloride readings. The laboratory reports and the chain of custody documentation are included in Appendix B.

Conclusion

Based on the remediation activities performed at this location, SM Energy requests closure for this site. The C-141 (Final) is included in Appendix A. If you have any questions or comments concerning the remediation activities performed at the site, please call me at (432) 682-4559.



TETRA TECH

Respectfully submitted,
TETRA TECH, Inc.

Tom Elliott
Project Manager

cc: Vicki Martinez – SM Energy
Jim Amos - BLM

FIGURES

Bottomless
Lakes
State Park

Chaves

380

82

Maljamar

Loco
Hills

Buckeye

Lea

ESDU #11

Eddy

82

Carlsbad
North
Carlsbad
285
285
285

Otis

285

Loving

Malaga

Black
River
Village



Figure 1

EDSU #11

Overview Map

Eddy County, New Mexico

Project : 112MC05013

Date : 12/12/2013

File : H:\GIS\MC05013



SCALE: 1 in = 41,667 feet

0 20,000 40,000
Feet



EXPLANATION

- AUGER HOLE SAMPLE LOCATIONS
- ★ LEAK SOURCE

SCALE: 1 IN = 50 FEET

Feet 0 20 40



Figure 3

EDSU #11

Spill Assessment Map

Eddy County, New Mexico

Project : 112MC05013

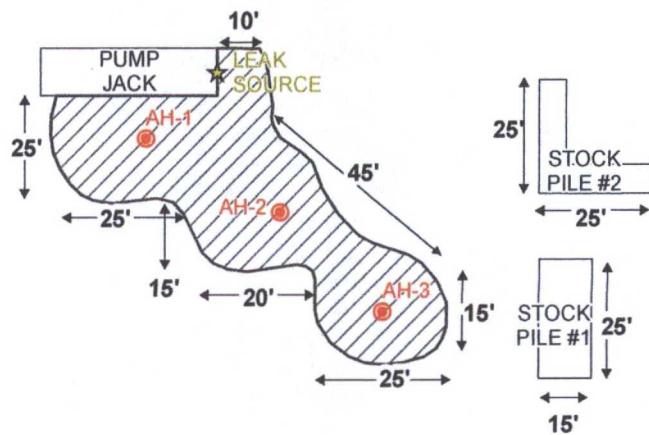
Date : 12/12/2013

File : H:\GIS\MC05013



PASTURE

PAD



PASTURE

EXPLANATION

- AUGER HOLE SAMPLE LOCATIONS
- ☆ LEAK SOURCE

SCALE: 1 IN = 60 FEET

Feet 0 20 40



Figure 3

EDSU #11

Spill Assessment Map

Eddy County, New Mexico

Project : 112MC05013

Date : 12/12/2013

File : H:\GIS\MC05013



TABLES

Table 1
SM Energy
ESDU #11
Lea County, New Mexico

Sample ID	Sample Date	Sample Depth (ft)	Soil Status		TPH (mg/kg)			Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylene (mg/kg)	Total BTEX (mg/kg)	Chloride (mg/kg)
			In-Situ	Removed	GRO	DRO	Total						
AH-1	2/7/2013	0-1	X		<4.00	<50.0	<50.0	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<20.0
	"	1-1.5	X		-	-	-	-	-	-	-	-	43.5
	"	2-2.5	X		-	-	-	-	-	-	-	-	87.0
	"	3-3.5	X		-	-	-	-	-	-	-	-	72.5
AH-2	2/7/2013	0-1	X		<20.0	<50.0	<50.0	<0.100	<0.100	<0.100	<0.100	<0.100	<20.0
	"	1-1.5	X		-	-	-	-	-	-	-	-	<20.0
	"	2-2.5	X		-	-	-	-	-	-	-	-	<20.0
	"	3-3.5	X		-	-	-	-	-	-	-	-	280
	"	4-4.5	X		-	-	-	-	-	-	-	-	416
AH-3	2/7/2013	0-1	X		<8.00	<50.0	<50.0	<0.0400	<0.0400	<0.0400	<0.0400	<0.0400	<20.0
	"	1-1.5	X		-	-	-	-	-	-	-	-	24.5
	"	2-2.5	X		-	-	-	-	-	-	-	-	44.1
	"	3-3.5	X		-	-	-	-	-	-	-	-	<20.0

(--) Not Analyzed

PHOTOGRAPHS

SM Energy Company
EDSU #11 Tank Battery
Lea County, New Mexico



TETRA TECH



View West – Area of AH-1.



View Southwest – Area of AH-2 and AH-3.

APPENDIX A

District I
1625 N. French Dr., Hobbs, NM 88240
District II
811 S. First St., 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 August 8, 2011

Submit 1 Copy to appropriate District Office in
accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

OPERATOR

☒ Initial Report ☐ Final Report

Name of Company SM ENERGY COMPANY	Contact VICKIE MARTINEZ
Address 3300 N "A" STREET, BLDG 7-200	Telephone No. (432)688-1709
Facility Name ESDU 11	Facility Type WELL

Surface Owner BLM	Mineral Owner BLM	API No. 3002529940
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LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
2	19	18S	32E	1700	NORTH	330	WEST	LEA

Latitude _____ Longitude _____

NATURE OF RELEASE

Type of Release OIL & SALT WATER	Volume of Release 60	Volume Recovered 55
Source of Release STUFFING BOX	Date and Hour of Occurrence 1/29/13 10:00 AM	Date and Hour of Discovery SAME
Was Immediate Notice Given? ☒ Yes ☐ No ☐ Not Required	If YES, To Whom? TRISH BADBEAR WITH BLM & JEFF LEKING WITH NMOCD	
By Whom? BILL HEARNE	Date and Hour 1/29/13 8:46 AM	
Was a Watercourse Reached? ☐ Yes ☒ No	If YES, Volume Impacting the Watercourse.	

If a Watercourse was Impacted, Describe Fully.*
N/A

Describe Cause of Problem and Remedial Action Taken.*

STUFFING BOX FAILED. SM ENERGY WILL BE TURNING THIS OVER TO TETRA TECH FOR FURTHER EVALUATION.

Describe Area Affected and Cleanup Action Taken.*

SPILL AREA: 65'X85' = 5525 SQ FT. PICKED UP ALL STANDING FLUID. TALON LPE DUG OUT SPILL AREA AND BEGAN HAULING OUT CONTAMINATED SOIL TO LEA LAND FOR DISPOSAL. REPACKED STUFFING BOX AND RESUMED PRODUCTION. WILL INSTALL STUFFING BOX LEAK DETECTOR EQUIPMENT AND ELECTRICAL KILLS.

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: <i>Vickie Martinez</i>	OIL CONSERVATION DIVISION		
Printed Name: VICKIE MARTINEZ	Approved by Environmental Specialist:		
Title: ENGINEER TECH II	Approval Date:	Expiration Date:	
E-mail Address: VMARTINEZ@SM-ENERGY.COM	Conditions of Approval:		Attached ☐
Date: 01/30/2013	Phone: (432)688-1709		

* Attach Additional Sheets If Necessary

APPENDIX B

Water Well Data
Average Depth to Groundwater (ft)
SM Energy EDSU #11
Lea County, New Mexico

17 South 31 East					
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36
			271		

18 South 31 East					
6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	98	14
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36
				261	

19 South 31 East					
6	5	4	3	2	1
7	SITE	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36
		180			
		101			130

17 South 32 East					
6	5	4	82	3	2
7	8	9	10	132	11
18	17	16	15	14	13
19	20	21	22	23	24
30	180	29	28	27	26
31	dry	32	33	34	35
					225

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

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

17 South 33 East					
6	90	5	4	3	2
7	167	8	9	10	11
18	173	17	16	15	14
19	188	20	21	22	23
30	69	29	28	27	26
31	32	33	34	35	36
					150

18 South 33 East					
6	5	4	3	2	1
7	8	100	9	10	11
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36
					143

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

- New Mexico State Engineers Well Reports
- USGS Well Reports
- Geology and Groundwater Conditions in Southern Eddy, County, NM
- NMOCD - Groundwater Data
- Field water level
- New Mexico Water and Infrastructure Data System



New Mexico Office of the State Engineer Wells with Well Log Information

No wells found.

PLSS Search:

Section(s): 19

Township: 18S

Range: 32E

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

12/4/13 2:10 PM

WELLS WITH WELL LOG INFORMATION

APPENDIX C

Summary Report

Aaron Hale
Tetra Tech
1910 N. Big Spring Street
Midland, TX 79705

Report Date: February 18, 2013

Work Order: 13021103



Project Location: Lea Co., NM
Project Name: SM Energy/ESDU #11
Project Number: 112C05013

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
320696	AH-1 0-1'	soil	2013-02-07	00:00	2013-02-08
320697	AH-1 1-1.5'	soil	2013-02-07	00:00	2013-02-08
320698	AH-1 2-2.5'	soil	2013-02-07	00:00	2013-02-08
320699	AH-1 3-3.5'	soil	2013-02-07	00:00	2013-02-08
320700	AH-2 0-1'	soil	2013-02-07	00:00	2013-02-08
320701	AH-2 1-1.5'	soil	2013-02-07	00:00	2013-02-08
320702	AH-2 2-2.5'	soil	2013-02-07	00:00	2013-02-08
320703	AH-2 3-3.5'	soil	2013-02-07	00:00	2013-02-08
320704	AH-2 4-4.5'	soil	2013-02-07	00:00	2013-02-08
320705	AH-3 0-1'	soil	2013-02-07	00:00	2013-02-08
320706	AH-3 1-1.5'	soil	2013-02-07	00:00	2013-02-08
320707	AH-3 2-2.5'	soil	2013-02-07	00:00	2013-02-08
320708	AH-3 3-3.5'	soil	2013-02-07	00:00	2013-02-08

Sample - Field Code	BTEX				TPH DRO - NEW DRO	TPH GRO GRO
	Benzene (mg/Kg)	Toluene (mg/Kg)	Ethylbenzene (mg/Kg)	Xylene (mg/Kg)		
320696 - AH-1 0-1'	<0.0200	<0.0200	<0.0200	<0.0200	<50.0	<4.00
320700 - AH-2 0-1'	<0.100 ¹	<0.100	<0.100	<0.100	<50.0	<20.0 ²
320705 - AH-3 0-1'	<0.0400 ³	<0.0400	<0.0400	<0.0400	<50.0	<8.00 ⁴

Sample: 320696 - AH-1 0-1'

¹ Dilution due to surfactant.

² Dilution due to surfactant.

³ Dilution due to surfactant.

⁴ Dilution due to surfactant.

Report Date: February 18, 2013

Work Order: 13021103

Page Number: 2 of 3

Param	Flag	Result	Units	RL
Chloride		<20.0	mg/Kg	4

Sample: 320697 - AH-1 1-1.5'

Param	Flag	Result	Units	RL
Chloride		43.5	mg/Kg	4

Sample: 320698 - AH-1 2-2.5'

Param	Flag	Result	Units	RL
Chloride		87.0	mg/Kg	4

Sample: 320699 - AH-1 3-3.5'

Param	Flag	Result	Units	RL
Chloride		72.5	mg/Kg	4

Sample: 320700 - AH-2 0-1'

Param	Flag	Result	Units	RL
Chloride		<20.0	mg/Kg	4

Sample: 320701 - AH-2 1-1.5'

Param	Flag	Result	Units	RL
Chloride		<20.0	mg/Kg	4

Sample: 320702 - AH-2 2-2.5'

Param	Flag	Result	Units	RL
Chloride		<20.0	mg/Kg	4

Sample: 320703 - AH-2 3-3.5'

Param	Flag	Result	Units	RL
Chloride		280	mg/Kg	4

Sample: 320704 - AH-2 4-4.5'

Param	Flag	Result	Units	RL
Chloride		416	mg/Kg	4

Sample: 320705 - AH-3 0-1'

Param	Flag	Result	Units	RL
Chloride		<20.0	mg/Kg	4

Sample: 320706 - AH-3 1-1.5'

Param	Flag	Result	Units	RL
Chloride		24.5	mg/Kg	4

Sample: 320707 - AH-3 2-2.5'

Param	Flag	Result	Units	RL
Chloride		44.1	mg/Kg	4

Sample: 320708 - AH-3 3-3.5'

Param	Flag	Result	Units	RL
Chloride		<20.0	mg/Kg	4



6701 Aberdeen Avenue, Suite 9
200 East Sunset Road, Suite E
5002 Basin Street, Suite A1
(BioAquatic) 2501 Mayes Rd., Suite 100

Lubbock, Texas 79424
El Paso, Texas 79922
Midland, Texas 79703
Carrollton, Texas 75006

800-378-1296

806-794-1296

915-585-3443

432-689-6301

972-242-7750

FAX 806-794-1298

FAX 915-585-4944

FAX 432-689-6313

E-Mail: lab@traceanalysis.com WEB: www.traceanalysis.com

Certifications

WBE HUB NCTRCA DBE NELAP DoD LELAP Kansas Oklahoma ISO 17025

Analytical and Quality Control Report

Aaron Hale
Tetra Tech
1910 N. Big Spring Street
Midland, TX, 79705

Report Date: February 18, 2013

Work Order: 13021103



Project Location: Lea Co., NM
Project Name: SM Energy/ESDU #11
Project Number: 112C05013

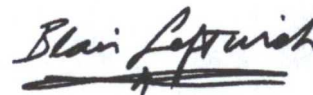
Enclosed are the Analytical Report and Quality Control Report for the following sample(s) submitted to TraceAnalysis, Inc.

Sample	Description	Matrix	Date Taken	Time Taken	Date Received
320696	AH-1 0-1'	soil	2013-02-07	00:00	2013-02-08
320697	AH-1 1-1.5'	soil	2013-02-07	00:00	2013-02-08
320698	AH-1 2-2.5'	soil	2013-02-07	00:00	2013-02-08
320699	AH-1 3-3.5'	soil	2013-02-07	00:00	2013-02-08
320700	AH-2 0-1'	soil	2013-02-07	00:00	2013-02-08
320701	AH-2 1-1.5'	soil	2013-02-07	00:00	2013-02-08
320702	AH-2 2-2.5'	soil	2013-02-07	00:00	2013-02-08
320703	AH-2 3-3.5'	soil	2013-02-07	00:00	2013-02-08
320704	AH-2 4-4.5'	soil	2013-02-07	00:00	2013-02-08
320705	AH-3 0-1'	soil	2013-02-07	00:00	2013-02-08
320706	AH-3 1-1.5'	soil	2013-02-07	00:00	2013-02-08
320707	AH-3 2-2.5'	soil	2013-02-07	00:00	2013-02-08
320708	AH-3 3-3.5'	soil	2013-02-07	00:00	2013-02-08

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

This report consists of a total of 26 pages and shall not be reproduced except in its entirety, without written approval of

TraceAnalysis, Inc.

A handwritten signature in black ink that reads "Blair Leftwich". The signature is written in a cursive style with a horizontal line underneath it.

Dr. Blair Leftwich, Director
Dr. Michael Abel, Project Manager

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Case Narrative

Samples for project SM Energy/ESDU #11 were received by TraceAnalysis, Inc. on 2013-02-08 and assigned to work order 13021103. Samples for work order 13021103 were received intact at a temperature of 2.2 C.

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

Test	Method	Prep Batch	Prep Date	QC Batch	Analysis Date
BTEX	S 8021B	83781	2013-02-12 at 15:00	98888	2013-02-12 at 15:00
Chloride (Titration)	SM 4500-Cl B	83792	2013-02-13 at 09:03	99022	2013-02-18 at 14:14
Chloride (Titration)	SM 4500-Cl B	83792	2013-02-13 at 09:03	99023	2013-02-18 at 14:15
TPH DRO - NEW	S 8015 D	83748	2013-02-11 at 10:00	98841	2013-02-12 at 09:47
TPH GRO	S 8015 D	83781	2013-02-12 at 15:00	98887	2013-02-12 at 15:00

Results for these samples are reported on a wet weight basis unless data package indicates otherwise.

A matrix spike (MS) and matrix spike duplicate (MSD) sample is chosen at random from each preparation batch. The MS and MSD will indicate if a site specific matrix problem is occurring, however, it may not pertain to the samples for work order 13021103 since the sample was chosen at random. Therefore, the validity of the analytical data reported has been determined by the laboratory control sample (LCS) and the method blank (MB). These quality control measures are performed with each preparation batch to ensure data integrity.

All other exceptions associated with this report have been footnoted on the appropriate analytical page to assist in general data comprehension. Please contact the laboratory directly if there are any questions regarding this project.

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Analytical Report

Sample: 320696 - AH-1 0-1'

Laboratory: Midland
Analysis: BTEX
QC Batch: 98888
Prep Batch: 83781

Analytical Method: S 8021B
Date Analyzed: 2013-02-12
Sample Preparation: 2013-02-12

Prep Method: S 5035
Analyzed By: YG
Prepared By: YG

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	1	<0.0200	mg/Kg	1	0.0200
Toluene	U	1	<0.0200	mg/Kg	1	0.0200
Ethylbenzene	U	1	<0.0200	mg/Kg	1	0.0200
Xylene	U	1	<0.0200	mg/Kg	1	0.0200

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)	Qsr	Qsr	2.34	mg/Kg	1	2.00	117	79.5 - 108
4-Bromofluorobenzene (4-BFB)			2.11	mg/Kg	1	2.00	106	71.4 - 108

Sample: 320696 - AH-1 0-1'

Laboratory: Midland
Analysis: Chloride (Titration)
QC Batch: 99022
Prep Batch: 83792

Analytical Method: SM 4500-Cl B
Date Analyzed: 2013-02-18
Sample Preparation: 2013-02-13

Prep Method: N/A
Analyzed By: AR
Prepared By: AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	U		<20.0	mg/Kg	5	4.00

Sample: 320696 - AH-1 0-1'

Laboratory: Midland
Analysis: TPH DRO - NEW
QC Batch: 98841
Prep Batch: 83748

Analytical Method: S 8015 D
Date Analyzed: 2013-02-12
Sample Preparation: 2013-02-11

Prep Method: N/A
Analyzed By: CW
Prepared By: CW

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
DRO	jb	1	<50.0	mg/Kg	1	50.0

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Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
n-Tricosane			118	mg/Kg	1	100	118	70 - 130

Sample: 320696 - AH-1 0-1'

Laboratory: Midland
Analysis: TPH GRO
QC Batch: 98887
Prep Batch: 83781

Analytical Method: S 8015 D
Date Analyzed: 2013-02-12
Sample Preparation: 2013-02-12

Prep Method: S 5035
Analyzed By: YG
Prepared By: YG

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
GRO	u	i	<4.00	mg/Kg	1	4.00

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			1.75	mg/Kg	1	2.00	88	70 - 130
4-Bromofluorobenzene (4-BFB)			2.09	mg/Kg	1	2.00	104	70 - 130

Sample: 320697 - AH-1 1-1.5'

Laboratory: Midland
Analysis: Chloride (Titration)
QC Batch: 99022
Prep Batch: 83792

Analytical Method: SM 4500-Cl B
Date Analyzed: 2013-02-18
Sample Preparation: 2013-02-13

Prep Method: N/A
Analyzed By: AR
Prepared By: AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride			43.5	mg/Kg	5	4.00

Sample: 320698 - AH-1 2-2.5'

Laboratory: Midland
Analysis: Chloride (Titration)
QC Batch: 99022
Prep Batch: 83792

Analytical Method: SM 4500-Cl B
Date Analyzed: 2013-02-18
Sample Preparation: 2013-02-13

Prep Method: N/A
Analyzed By: AR
Prepared By: AR

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sample 320698 continued ...

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride			87.0	mg/Kg	5	4.00

Sample: 320699 - AH-1 3-3.5'

Laboratory:	Midland	Analytical Method:	SM 4500-Cl B	Prep Method:	N/A
Analysis:	Chloride (Titration)	Date Analyzed:	2013-02-18	Analyzed By:	AR
QC Batch:	99022	Sample Preparation:	2013-02-13	Prepared By:	AR
Prep Batch:	83792				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride			72.5	mg/Kg	5	4.00

Sample: 320700 - AH-2 0-1'

Laboratory:	Midland	Analytical Method:	S 8021B	Prep Method:	S 5035
Analysis:	BTEX	Date Analyzed:	2013-02-12	Analyzed By:	YG
QC Batch:	98888	Sample Preparation:	2013-02-12	Prepared By:	YG
Prep Batch:	83781				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Benzene	U	1	<0.100	mg/Kg	5	0.0200
Toluene	U	1	<0.100	mg/Kg	5	0.0200
Ethylbenzene	U	1	<0.100	mg/Kg	5	0.0200
Xylene	U	1	<0.100	mg/Kg	5	0.0200

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)	Q _{nr}	Q _{nr}	11.8	mg/Kg	5	10.0	118	79.5 - 108
4-Bromofluorobenzene (4-BFB)			10.4	mg/Kg	5	10.0	104	71.4 - 108

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Sample: 320700 - AH-2 0-1'

Laboratory:	Midland	Analytical Method:	SM 4500-Cl B	Prep Method:	N/A
Analysis:	Chloride (Titration)	Date Analyzed:	2013-02-18	Analyzed By:	AR
QC Batch:	99022	Sample Preparation:	2013-02-13	Prepared By:	AR
Prep Batch:	83792				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	u		<20.0	mg/Kg	5	4.00

Sample: 320700 - AH-2 0-1'

Laboratory:	Midland	Analytical Method:	S 8015 D	Prep Method:	N/A
Analysis:	TPH DRO - NEW	Date Analyzed:	2013-02-12	Analyzed By:	CW
QC Batch:	98841	Sample Preparation:	2013-02-11	Prepared By:	CW
Prep Batch:	83748				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
DRO	ub	1	<50.0	mg/Kg	1	50.0

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
n-Tricosane			120	mg/Kg	1	100	120	70 - 130

Sample: 320700 - AH-2 0-1'

Laboratory:	Midland	Analytical Method:	S 8015 D	Prep Method:	S 5035
Analysis:	TPH GRO	Date Analyzed:	2013-02-12	Analyzed By:	YG
QC Batch:	98887	Sample Preparation:	2013-02-12	Prepared By:	YG
Prep Batch:	83781				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
GRO	2 u	1	<20.0	mg/Kg	5	4.00

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			8.74	mg/Kg	5	10.0	87	70 - 130
4-Bromofluorobenzene (4-BFB)			10.4	mg/Kg	5	10.0	104	70 - 130

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Sample: 320701 - AH-2 1-1.5'

Laboratory:	Midland	Analytical Method:	SM 4500-Cl B	Prep Method:	N/A
Analysis:	Chloride (Titration)	Date Analyzed:	2013-02-18	Analyzed By:	AR
QC Batch:	99022	Sample Preparation:	2013-02-13	Prepared By:	AR
Prep Batch:	83792				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	u		<20.0	mg/Kg	5	4.00

Sample: 320702 - AH-2 2-2.5'

Laboratory:	Midland	Analytical Method:	SM 4500-Cl B	Prep Method:	N/A
Analysis:	Chloride (Titration)	Date Analyzed:	2013-02-18	Analyzed By:	AR
QC Batch:	99022	Sample Preparation:	2013-02-13	Prepared By:	AR
Prep Batch:	83792				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	u		<20.0	mg/Kg	5	4.00

Sample: 320703 - AH-2 3-3.5'

Laboratory:	Midland	Analytical Method:	SM 4500-Cl B	Prep Method:	N/A
Analysis:	Chloride (Titration)	Date Analyzed:	2013-02-18	Analyzed By:	AR
QC Batch:	99022	Sample Preparation:	2013-02-13	Prepared By:	AR
Prep Batch:	83792				

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride			280	mg/Kg	5	4.00

Sample: 320704 - AH-2 4-4.5'

Laboratory:	Midland	Analytical Method:	SM 4500-Cl B	Prep Method:	N/A
Analysis:	Chloride (Titration)	Date Analyzed:	2013-02-18	Analyzed By:	AR
QC Batch:	99022	Sample Preparation:	2013-02-13	Prepared By:	AR
Prep Batch:	83792				

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride			416	mg/Kg	5	4.00

Sample: 320705 - AH-3 0-1'

Laboratory: Midland
Analysis: BTEX
QC Batch: 98888
Prep Batch: 83781

Analytical Method: S 8021B
Date Analyzed: 2013-02-12
Sample Preparation: 2013-02-12

Prep Method: S 5035
Analyzed By: YG
Prepared By: YG

Parameter	Flag	Cert	RL	Units	Dilution	RL	
			Result				
Benzene	3	U	1	<0.0400	mg/Kg	2	0.0200
Toluene		U	1	<0.0400	mg/Kg	2	0.0200
Ethylbenzene		U	1	<0.0400	mg/Kg	2	0.0200
Xylene		U	1	<0.0400	mg/Kg	2	0.0200

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)	Qsr	Qsr	4.71	mg/Kg	2	4.00	118	79.5 - 108
4-Bromofluorobenzene (4-BFB)			4.28	mg/Kg	2	4.00	107	71.4 - 108

Sample: 320705 - AH-3 0-1'

Laboratory: Midland
Analysis: Chloride (Titration)
QC Batch: 99022
Prep Batch: 83792

Analytical Method: SM 4500-Cl B
Date Analyzed: 2013-02-18
Sample Preparation: 2013-02-13

Prep Method: N/A
Analyzed By: AR
Prepared By: AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	U		<20.0	mg/Kg	5	4.00

Sample: 320705 - AH-3 0-1'

Laboratory: Midland
Analysis: TPH DRO - NEW
QC Batch: 98841
Prep Batch: 83748

Analytical Method: S 8015 D
Date Analyzed: 2013-02-12
Sample Preparation: 2013-02-11

Prep Method: N/A
Analyzed By: CW
Prepared By: CW

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
DRO	JB	1	<50.0	mg/Kg	1	50.0

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
n-Tricosane			126	mg/Kg	1	100	126	70 - 130

Sample: 320705 - AH-3 0-1'

Laboratory: Midland
Analysis: TPH GRO
QC Batch: 98887
Prep Batch: 83781

Analytical Method: S 8015 D
Date Analyzed: 2013-02-12
Sample Preparation: 2013-02-12

Prep Method: S 5035
Analyzed By: YG
Prepared By: YG

Parameter	Flag	Cert	RL Result	Units	Dilution	RL	
GRO	4	U	1	<8.00	mg/Kg	2	4.00

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			3.53	mg/Kg	2	4.00	88	70 - 130
4-Bromofluorobenzene (4-BFB)			4.13	mg/Kg	2	4.00	103	70 - 130

Sample: 320706 - AH-3 1-1.5'

Laboratory: Midland
Analysis: Chloride (Titration)
QC Batch: 99023
Prep Batch: 83792

Analytical Method: SM 4500-Cl B
Date Analyzed: 2013-02-18
Sample Preparation: 2013-02-13

Prep Method: N/A
Analyzed By: AR
Prepared By: AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride			24.5	mg/Kg	5	4.00

Sample: 320707 - AH-3 2-2.5'

Laboratory: Midland
Analysis: Chloride (Titration)
QC Batch: 99023
Prep Batch: 83792

Analytical Method: SM 4500-Cl B
Date Analyzed: 2013-02-18
Sample Preparation: 2013-02-13

Prep Method: N/A
Analyzed By: AR
Prepared By: AR

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Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride			44.1	mg/Kg	5	4.00

Sample: 320708 - AH-3 3-3.5'

Laboratory: Midland
Analysis: Chloride (Titration)
QC Batch: 99023
Prep Batch: 83792

Analytical Method: SM 4500-Cl B
Date Analyzed: 2013-02-18
Sample Preparation: 2013-02-13

Prep Method: N/A
Analyzed By: AR
Prepared By: AR

Parameter	Flag	Cert	RL Result	Units	Dilution	RL
Chloride	u		<20.0	mg/Kg	5	4.00

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Method Blanks

Method Blank (1) QC Batch: 98841

QC Batch: 98841
Prep Batch: 83748

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-11

Analyzed By: CW
Prepared By: CW

Parameter	Flag	Cert	MDL Result	Units	RL
DRO		1	8.97	mg/Kg	50

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
n-Tricosane			108	mg/Kg	1	100	108	70 - 130

Method Blank (1) QC Batch: 98887

QC Batch: 98887
Prep Batch: 83781

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-12

Analyzed By: YG
Prepared By: YG

Parameter	Flag	Cert	MDL Result	Units	RL
GRO		1	<2.32	mg/Kg	4

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)			1.94	mg/Kg	1	2.00	97	70 - 130
4-Bromofluorobenzene (4-BFB)			1.75	mg/Kg	1	2.00	88	70 - 130

Method Blank (1) QC Batch: 98888

QC Batch: 98888
Prep Batch: 83781

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-12

Analyzed By: YG
Prepared By: YG

Parameter	Flag	Cert	MDL Result	Units	RL
Benzene		1	<0.00810	mg/Kg	0.02
Toluene		1	<0.00750	mg/Kg	0.02

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method blank continued ...

Parameter	Flag	Cert	MDL Result	Units	RL
Ethylbenzene		1	<0.00730	mg/Kg	0.02
Xylene		1	<0.00700	mg/Kg	0.02

Surrogate	Flag	Cert	Result	Units	Dilution	Spike Amount	Percent Recovery	Recovery Limits
Trifluorotoluene (TFT)	Q _{sr}	Q _{sr}	2.31	mg/Kg	1	2.00	116	79.5 - 108
4-Bromofluorobenzene (4-BFB)			2.01	mg/Kg	1	2.00	100	71.4 - 108

Method Blank (1) QC Batch: 99022

QC Batch: 99022
Prep Batch: 83792

Date Analyzed: 2013-02-18
QC Preparation: 2013-02-13

Analyzed By: AR
Prepared By: AR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride			<3.85	mg/Kg	4

Method Blank (1) QC Batch: 99023

QC Batch: 99023
Prep Batch: 83792

Date Analyzed: 2013-02-18
QC Preparation: 2013-02-13

Analyzed By: AR
Prepared By: AR

Parameter	Flag	Cert	MDL Result	Units	RL
Chloride			<3.85	mg/Kg	4

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Laboratory Control Spikes

Laboratory Control Spike (LCS-1)

QC Batch: 98841
Prep Batch: 83748

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-11

Analyzed By: CW
Prepared By: CW

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
DRO		1	292	mg/Kg	1	250	8.97	113	70 - 130

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
DRO		1	272	mg/Kg	1	250	8.97	105	70 - 130	7	20

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

Surrogate			LCS Result	LCSD Result	Units	Dil.	Spike Amount	LCS Rec.	LCSD Rec.	Rec. Limit
n-Tricosane	Q _{sr}	Q _{sr}	144	112	mg/Kg	1	100	144	112	70 - 130

Laboratory Control Spike (LCS-1)

QC Batch: 98887
Prep Batch: 83781

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-12

Analyzed By: YG
Prepared By: YG

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
GRO		1	20.1	mg/Kg	1	20.0	<2.32	100	70 - 130

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
GRO		1	19.6	mg/Kg	1	20.0	<2.32	98	70 - 130	2	20

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

Surrogate			LCS Result	LCSD Result	Units	Dil.	Spike Amount	LCS Rec.	LCSD Rec.	Rec. Limit
Trifluorotoluene (TFT)			2.37	2.36	mg/Kg	1	2.00	118	118	70 - 130
4-Bromofluorobenzene (4-BFB)			2.10	2.12	mg/Kg	1	2.00	105	106	70 - 130

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Laboratory Control Spike (LCS-1)

QC Batch: 98888
Prep Batch: 83781

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-12

Analyzed By: YG
Prepared By: YG

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		1	1.81	mg/Kg	1	2.00	<0.00810	90	72.4 - 120
Toluene		1	1.89	mg/Kg	1	2.00	<0.00750	94	77 - 120
Ethylbenzene		1	2.06	mg/Kg	1	2.00	<0.00730	103	71.8 - 120
Xylene		1	6.42	mg/Kg	1	6.00	<0.00700	107	78.3 - 120

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Benzene		1	1.91	mg/Kg	1	2.00	<0.00810	96	72.4 - 120	5	20
Toluene		1	1.97	mg/Kg	1	2.00	<0.00750	98	77 - 120	4	20
Ethylbenzene		1	2.16	mg/Kg	1	2.00	<0.00730	108	71.8 - 120	5	20
Xylene		1	6.70	mg/Kg	1	6.00	<0.00700	112	78.3 - 120	4	20

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

Surrogate			LCS Result	LCSD Result	Units	Dil.	Spike Amount	LCS Rec.	LCSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	Q _{sr}	Q _{sr}	2.36	2.38	mg/Kg	1	2.00	118	119	79.5 - 108
4-Bromofluorobenzene (4-BFB)	Q _{sr}	Q _{sr}	2.19	2.15	mg/Kg	1	2.00	110	108	71.4 - 108

Laboratory Control Spike (LCS-1)

QC Batch: 99022
Prep Batch: 83792

Date Analyzed: 2013-02-18
QC Preparation: 2013-02-13

Analyzed By: AR
Prepared By: AR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride			2430	mg/Kg	1	2500	<3.85	97	85 - 115

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride			2620	mg/Kg	1	2500	<3.85	105	85 - 115	8	20

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

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Laboratory Control Spike (LCS-1)

QC Batch: 99023
Prep Batch: 83792

Date Analyzed: 2013-02-18
QC Preparation: 2013-02-13

Analyzed By: AR
Prepared By: AR

Param	F	C	LCS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride			2600	mg/Kg	1	2500	<3.85	104	85 - 115

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

Param	F	C	LCSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride			2460	mg/Kg	1	2500	<3.85	98	85 - 115	6	20

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

Matrix Spike (MS-1) Spiked Sample: 320672

QC Batch: 98841
Prep Batch: 83748

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-11

Analyzed By: CW
Prepared By: CW

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
DRO		1	338	mg/Kg	1	250	111	91	70 - 130

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
DRO		1	331	mg/Kg	1	250	111	88	70 - 130	2	20

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

Surrogate	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
n-Tricosane	117	118	mg/Kg	1	100	117	118	70 - 130

Matrix Spike (MS-1) Spiked Sample: 320696

QC Batch: 98887
Prep Batch: 83781

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-12

Analyzed By: YG
Prepared By: YG

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Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
GRO		1	23.2	mg/Kg	1	20.0	<2.32	116	70 - 130

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
GRO		1	24.3	mg/Kg	1	20.0	<2.32	122	70 - 130	5	20

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

Surrogate	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	2.40	2.40	mg/Kg	1	2	120	120	70 - 130
4-Bromofluorobenzene (4-BFB)	2.13	2.09	mg/Kg	1	2	106	104	70 - 130

Matrix Spike (MS-1) Spiked Sample: 320696

QC Batch: 98888
Prep Batch: 83781

Date Analyzed: 2013-02-12
QC Preparation: 2013-02-12

Analyzed By: YG
Prepared By: YG

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Benzene		1	2.02	mg/Kg	1	2.00	<0.00810	101	66.3 - 138
Toluene		1	2.12	mg/Kg	1	2.00	<0.00750	106	64.8 - 142
Ethylbenzene		1	2.33	mg/Kg	1	2.00	<0.00730	116	72 - 132
Xylene		1	7.27	mg/Kg	1	6.00	<0.00700	121	60.8 - 148

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Benzene		1	2.08	mg/Kg	1	2.00	<0.00810	104	66.3 - 138	3	20
Toluene		1	2.19	mg/Kg	1	2.00	<0.00750	110	64.8 - 142	3	20
Ethylbenzene		1	2.40	mg/Kg	1	2.00	<0.00730	120	72 - 132	3	20
Xylene		1	7.47	mg/Kg	1	6.00	<0.00700	124	60.8 - 148	3	20

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

Surrogate	MS Result	MSD Result	Units	Dil.	Spike Amount	MS Rec.	MSD Rec.	Rec. Limit
Trifluorotoluene (TFT)	2.34	2.34	mg/Kg	1	2	117	117	79.5 - 108
4-Bromofluorobenzene (4-BFB)	2.13	2.12	mg/Kg	1	2	106	106	71.4 - 108

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Matrix Spike (MS-1) Spiked Sample: 320705

QC Batch: 99022
Prep Batch: 83792

Date Analyzed: 2013-02-18
QC Preparation: 2013-02-13

Analyzed By: AR
Prepared By: AR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride			2720	mg/Kg	5	2500	<19.2	109	78.9 - 121

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride			2890	mg/Kg	5	2500	<19.2	116	78.9 - 121	6	20

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

Matrix Spike (MS-1) Spiked Sample: 320735

QC Batch: 99023
Prep Batch: 83792

Date Analyzed: 2013-02-18
QC Preparation: 2013-02-13

Analyzed By: AR
Prepared By: AR

Param	F	C	MS Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit
Chloride			2490	mg/Kg	5	2500	<19.2	100	78.9 - 121

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

Param	F	C	MSD Result	Units	Dil.	Spike Amount	Matrix Result	Rec.	Rec. Limit	RPD	RPD Limit
Chloride			2710	mg/Kg	5	2500	<19.2	108	78.9 - 121	8	20

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

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Calibration Standards

Standard (CCV-1)

QC Batch: 98841

Date Analyzed: 2013-02-12

Analyzed By: CW

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
DRO		1	mg/Kg	250	263	105	80 - 120	2013-02-12

Standard (CCV-2)

QC Batch: 98841

Date Analyzed: 2013-02-12

Analyzed By: CW

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
DRO		1	mg/Kg	250	275	110	80 - 120	2013-02-12

Standard (CCV-1)

QC Batch: 98887

Date Analyzed: 2013-02-12

Analyzed By: YG

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
GRO		1	mg/Kg	1.00	0.965	96	80 - 120	2013-02-12

Standard (CCV-2)

QC Batch: 98887

Date Analyzed: 2013-02-12

Analyzed By: YG

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
GRO		1	mg/Kg	1.00	1.01	101	80 - 120	2013-02-12

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Standard (CCV-3)

QC Batch: 98887

Date Analyzed: 2013-02-12

Analyzed By: YG

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
GRO		1	mg/Kg	1.00	0.993	99	80 - 120	2013-02-12

Standard (CCV-1)

QC Batch: 98888

Date Analyzed: 2013-02-12

Analyzed By: YG

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		1	mg/kg	0.100	0.104	104	80 - 120	2013-02-12
Toluene		1	mg/kg	0.100	0.106	106	80 - 120	2013-02-12
Ethylbenzene		1	mg/kg	0.100	0.111	111	80 - 120	2013-02-12
Xylene		1	mg/kg	0.300	0.345	115	80 - 120	2013-02-12

Standard (CCV-2)

QC Batch: 98888

Date Analyzed: 2013-02-12

Analyzed By: YG

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		1	mg/kg	0.100	0.0993	99	80 - 120	2013-02-12
Toluene		1	mg/kg	0.100	0.105	105	80 - 120	2013-02-12
Ethylbenzene		1	mg/kg	0.100	0.112	112	80 - 120	2013-02-12
Xylene		1	mg/kg	0.300	0.349	116	80 - 120	2013-02-12

Standard (CCV-3)

QC Batch: 98888

Date Analyzed: 2013-02-12

Analyzed By: YG

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Benzene		1	mg/kg	0.100	0.103	103	80 - 120	2013-02-12

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standard continued ...

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Toluene		1	mg/kg	0.100	0.107	107	80 - 120	2013-02-12
Ethylbenzene		1	mg/kg	0.100	0.113	113	80 - 120	2013-02-12
Xylene		1	mg/kg	0.300	0.351	117	80 - 120	2013-02-12

Standard (CCV-1)

QC Batch: 99022

Date Analyzed: 2013-02-18

Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride			mg/Kg	100	99.0	99	85 - 115	2013-02-18

Standard (CCV-2)

QC Batch: 99022

Date Analyzed: 2013-02-18

Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride			mg/Kg	100	101	101	85 - 115	2013-02-18

Standard (CCV-1)

QC Batch: 99023

Date Analyzed: 2013-02-18

Analyzed By: AR

Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride			mg/Kg	100	102	102	85 - 115	2013-02-18

Standard (CCV-2)

QC Batch: 99023

Date Analyzed: 2013-02-18

Analyzed By: AR

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Param	Flag	Cert	Units	CCVs True Conc.	CCVs Found Conc.	CCVs Percent Recovery	Percent Recovery Limits	Date Analyzed
Chloride			mg/Kg	100	97.6	98	85 - 115	2013-02-18

Appendix

Report Definitions

Name	Definition
MDL	Method Detection Limit
MQL	Minimum Quantitation Limit
SDL	Sample Detection Limit

Laboratory Certifications

	Certifying Authority	Certification Number	Laboratory Location
-	NCTRCA	WFWB384444Y0909	TraceAnalysis
-	DBE	VN 20657	TraceAnalysis
-	HUB	1752439743100-86536	TraceAnalysis
-	WBE	237019	TraceAnalysis
1	NELAP	T104704392-12-4	Midland

Standard Flags

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

Result Comments

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- 1 Dilution due to surfactant.
- 2 Dilution due to surfactant.
- 3 Dilution due to surfactant.
- 4 Dilution due to surfactant.

Attachments

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

