



May 9, 2018

Mike Bratcher
New Mexico Energy, Minerals and Natural Resources Department
Oil Conservation Division, District 2
811 S. First Street
Artesia, New Mexico 88210

Ryan Mann
District Resource Specialist
Field Operation Division
New Mexico State Land Office
2827 N. Dal Paso Suite 117
Hobbs, New Mexico 88240
rmann@slo.state.nm.us

Re: Soil Investigation Summary and Proposed Remediation Workplan
Houma State # 001 Release (2RP-4417)
GPS: N 32.8355064 W 103.978096
Unit Letter "F", Section 16, Township 17 South, Range 30 East, NMPM
Eddy County, New Mexico

Dear Mr. Bratcher and Mr. Mann,

2M Environmental Services, LLC. (2M), on behalf of COG Operating, LLC. (Concho), has prepared this Soil Investigation Summary and Proposed Remediation Workplan (Workplan) for the Houma State # 001H Release Site (Release Site). The purpose of this Workplan is to propose remediation activities designed to advance the Houma State # 001 Release Site toward a New Mexico Oil and Conservation District (NMOCD) approved Site Closure Status. The legal description of the Release Site is Unit Letter "F", Section 16, Township 17 South, Range 30 East, in Eddy County, New Mexico. The subject property is administered by the New Mexico State Land Office (NMSLO). The GPS coordinates for the site are N 32.8355064 W 103.978096. A Site Location Map and Site Detail and Soil Sample Locations Map are provided as Figure 1 and Figure 2, respectively.

On September 27, 2017, a crude oil release occurred at the Houma State # 001. The release was the result of corrosion on the circulation line. On September 27, 2017, Concho reported the release to the NMOCD District 2 Office located in Artesia, New Mexico and the release was assigned the incident number 2RP-4417. A Release Notification and Corrective Action Form (Form C-141) was subsequently submitted to the NMOCD on September 29, 2017. The release was reported as approximately thirteen (13) barrels of crude oil released with approximately ten (10) barrels of crude oil recovered, resulting in a net loss of approximately three (3) barrels. A copy of the NMOCD Release Notification and Corrective Action Form C-141 is attached to this Workplan.

A groundwater database maintained by The New Mexico Office of the State Engineer (NMOSE) did not identify any registered water wells in Section 16, Township 17 South, Range 30 East. A reference map utilized by the New Mexico Oil Conservation Division (NMOCD) Artesia District Office indicates groundwater should be encountered at approximately three hundred (300) feet below ground surface (bgs). Based on the NMOCD site classification system, zero (0) points will be assigned to the subject area ranking as a result of this criterion. No water wells were observed within one-thousand feet of the Release Site. Based on the NMOCD site classification system, zero (0) points will be assigned to the subject area ranking as a result of this criterion. No surface water was observed within one thousand (1,000) feet of the release. Based on the NMOCD site classification system, zero (0) points will be assigned to the subject area ranking as a result of this criterion.

Based on the NMOCD Site Classification criteria, the Release Site remediation levels are 10 mg/Kg for benzene, 50 mg/Kg for benzene, toluene, ethylbenzene and xylenes (BTEX) and 5,000 mg/Kg for total petroleum hydrocarbons (TPH). Chloride remediation levels for the Release Site will be 600 mg/Kg, per NMOCD request.

On October 16, 2017, Concho representatives utilized a hand auger and/or a backhoe to collect thirty-three (33) delineation soil samples (AH1- Surface through AH1-5', AH2-Surface through AH2-5', T1-1' through T1-6', T1-8', T1-10', T1-12', T1-14', T2-Surface through T2-6', T2-8', T2-10', T2-12', T2-14') from the stained surface soil. In addition to the soil samples described above, six (6) soil samples (North Surf, North 1', South Surf, South 1', East Surf, and East 1') were collected utilizing a hand auger and/or backhoe approximately five (5) feet from the outer perimeter of the stained surface soil. The soil samples were submitted to Xenco Laboratories in Midland, Texas for determination of concentrations of BTEX using Method SW 846-8021B, TPH using Method SW 846-8015M, and chloride using Method E-300.1. The analytical results are provided as an attachment (Table 1 Concentrations of Benzene, BTEX, TPH, and Chloride in Soil).

Based on the analytical results of the soil samples collected on October 16, 2017, Concho proposes the following field activities designed to remediate the Houma State # 001 Release:

- Utilizing a backhoe, if applicable, surface staining will be address in the area represented by sample point AH1.
- The area represented by sample point AH2, will be excavated to a depth of approximately four (4) feet bgs. where possible. Due to safety concerns, excavation activities inside the earthen firewall of the battery will be conducted in a manner that protects the structural integrity of the production equipment.

- Background soil samples will be collected outside the impacted area to determine if chloride concentrations at depths greater than four (4) feet in the area represented by sample points T1 and T2 is naturally occurring or impacted.
- If background soil samples indicate chloride concentrations in the areas represented by sample points T1 and T2 is higher than naturally occurring levels additional vertical delineation will be needed in the area represented by T1. Additionally, the areas represented by sample points T1 and T2 will be excavated to a depth of approximately four (4) feet bgs. and a 20-mil polyurethane liner will be installed.
- If background soil samples indicate chloride concentrations in the areas represented by sample points T1 and T2 is naturally occurring the data will be presented to the NMOCD and NMSLO. Additionally, permission will be requested will be requested to excavate T1 and T2 to two and one-half (2.5) feet below ground surface.
- Excavated soil will be stockpiled on a plastic liner adjacent to the excavation pending sample results.
- Collect composite stockpile samples every 50 cubic yards of excavated soil. Soil samples will be submitted to the laboratory for determination of concentrations of BTEX, TPH, and chloride.
- On receipt of analytical results, Concho will backfill the excavation as follows:
 - If laboratory analytical results indicate composite stockpile soil samples are below NMOCD limits for TPH, BTEX, and chloride concentrations, the stockpiled soil will be used to backfill the excavated area.
 - If laboratory analytical results indicate composite stockpile soil samples are above NMOCD limits for TPH, BTEX, and/or chloride concentrations, the excavation will be backfilled with locally purchased non-impacted “like” soil or caliche. In addition, impacted soil will be transported under manifest to a NMOCD approved disposal facility.
- The backfilled areas, not located on the caliche pad, will be seeded during the summer monsoon season in Southeastern New Mexico to aid in revegetation. The USDA Soil Map describes the soil at the Release Site as the Kermit-Berino fine sand. Based on this description, the NMSLO Shallow (SH) Sites Seed Mixture will be used to revegetate the Release Site and will be planted in the amount specified in the pounds pure live seed (PLS) per acre. The seed mixture will be spread by a hand-held broadcaster and raked. Since a hand-held broadcaster is used for dispersal, the pounds pure live seed per acre will be doubled as described in the Southeast New Mexico Revegetation Handbook. Site inspections will be performed to assess the revegetation progress and evaluate the site for the presence of primary or secondary noxious weeds. If noxious weeds are identified, the NMSLO will be contacted to determine an effective method for eradication. If the site does not show revegetation after one growing season, the area will be reseeded as appropriate. The NMSLO seed mixture details and corresponding pounds pure live seed per acre are included in this Workplan.
- Prepare and submit a “Remediation Summary and Site Closure Request” to the NMOCD and NMSLO.

Concho is prepared to begin the activities outlined in this Proposed Remediation Workplan on NMOCD and NMSLO approval.

If you have any questions, or if additional information is required, please feel free to call me at 432-614-6793 (office) or 432-230-3763 (cell).

Thank you,

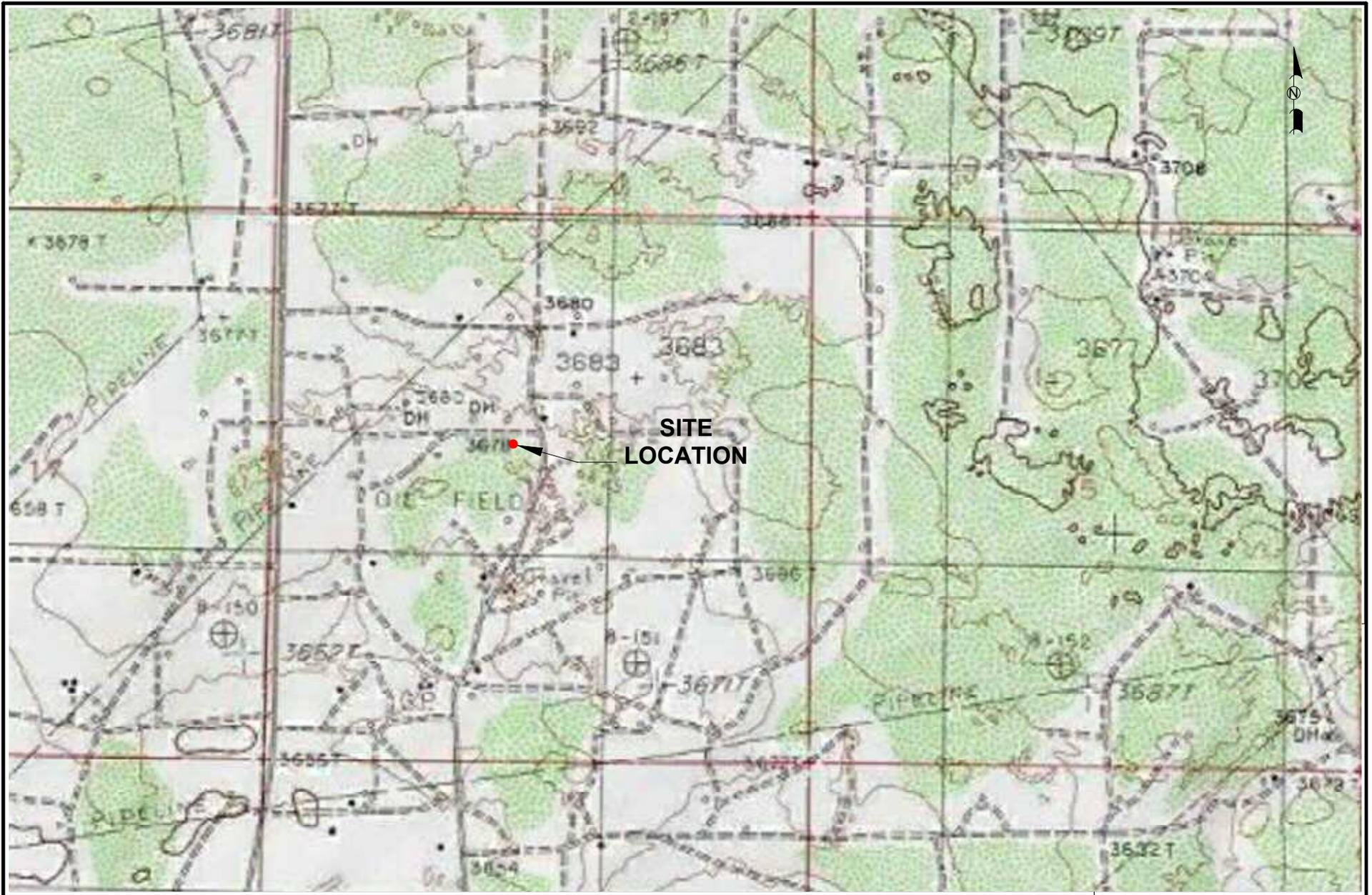


Matthew Green, P.G.
President
2M Environmental Services, LLC.

Attachments:

Figure 1 - Site Location Map
Figure 2 - Site Detail and Soil Sample Locations Map
Table 1 - Concentrations of Benzene, BTEX, TPH and Chloride in Soil
Laboratory Analytical Results
Release Notification and Corrective Action (Form C-141)
USDA Soil Description
NMSLO Seed Mixture

cc: File



LEGEND:

 Native Grassland

2000 1000 0 1000 2000



Distance in Feet

Figure 1
 Site Location Map
 COG Operating LLC
 Houma State #001 H Tank Battery
 Eddy County, TX

Scale: 1" = 2000'

CAD By: JR

Checked By: MG

Date: March 18, 2018

Lat. N 32.8355064°, Long. W 103.978096°





LEGEND:

- Excavate Area to 4' bgs
- Aesthetically Address Surface Staining
- Excavate Area to 4' bgs and install HDPE liner
- Horizontal Delineation Soil Sample Location
- Vertical Soil Sample Location

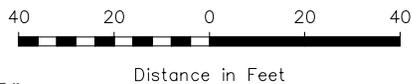


Figure 2
 Site Details &
 Soil Sample Location Map
 COG Operating LLC
 Houma State #001 Battery
 Eddy County, TX

Scale: 1" = 40'

CAD By: JR

Checked By: MG

Draft: March 18, 2018

Lat. N 32.8355064° Long. W 103.978096°



TABLE 1

CONCENTRATIONS OF BENZENE, BTEX, TPH AND CHLORIDE IN SOIL

COG OPERATING, LLC

HOUMA STATE #001H RELEASE SITE

EDDY COUNTY, NEW MEXICO

All concentrations are reported in mg/Kg

SAMPLE LOCATION	SAMPLE DATE	METHODS: SW 846-8021B						METHOD: SW 8015M					E 300.1
		BENZENE	TOLUENE	ETHYL-BENZENE	m, p - XYLENES	o - XYLENE	TOTAL XYLENES	TOTAL BTEX	TPH GRO C ₆ -C ₁₂	TPH DRO C ₁₂ -C ₂₈	TPH ORO C ₂₈ -C ₃₅	TOTAL TPH C ₆ -C ₃₅	CHLORIDE
Limits		10 mg/Kg						50 mg/Kg				5,000 mg/Kg	600
T2 - 14'	10/16/2017	<0.00200	<0.00200	<0.00200	<0.00399	<0.00200	<0.00399	<0.00399	<25.0	<25.0	<25.0	<25.0	197
North Surf	10/16/2017	0.00558	<0.00364	<0.00364	<0.00727	<0.00364	<0.00727	0.00558	<25.0	<25.0	<25.0	<25.0	<5.00
North 1'	10/16/2017	0.0233	0.0334	0.00385	<0.00707	<0.00353	<0.00707	0.06055	<24.9	<24.9	<24.9	<24.9	<4.98
South Surf	10/16/2017	<0.00345	<0.00345	<0.00345	<0.00690	<0.00345	<0.00690	<0.00345	<25.0	<25.0	<25.0	<25.0	<4.96
South 1'	10/16/2017	0.0110	0.0157	0.00446	0.00485	0.00262	0.0075	0.03863	<24.9	<24.9	<24.9	<24.9	<1.99
East Surf	10/16/2017	0.00880	<0.00199	<0.00199	<0.00398	0.00221	0.00221	0.01101	<25.0	<25.0	<25.0	<25.0	<1.97
East 1'	10/16/2017	0.00352	0.00806	<0.00199	<0.00398	<0.00199	<0.00398	0.01158	<25.0	<25.0	<25.0	<25.0	<1.96

Analytical Report 566220

for
COG Operating, LLC

Project Manager: Sheldon Hitchcock

Houma State #1

31-OCT-17

Collected By: Client



1211 W. Florida Ave, Midland TX 79701

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

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

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



31-OCT-17

Project Manager: **Sheldon Hitchcock**
COG Operating, LLC
600 W Illinois
Midland, TX 79701

Reference: XENCO Report No(s): **566220**
Houma State #1
Project Address: Houma State #1

Sheldon Hitchcock:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 566220. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

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

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 566220 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

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

Respectfully,

Kelsey Brooks

Project Manager

Recipient of the Prestigious Small Business Administration Award of Excellence in 1994.

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Houston - Dallas - Midland - San Antonio - Phoenix - Oklahoma - Latin America



Sample Cross Reference 566220



COG Operating, LLC, Midland, TX

Houma State #1

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
AH1 - Surface	S	10-16-17 12:30		566220-001
AH1 - 1'	S	10-16-17 12:30	1	566220-002
AH1 - 2'	S	10-16-17 12:30	2	566220-003
AH1 - 3'	S	10-16-17 12:30	3	566220-004
AH1 - 4'	S	10-16-17 12:30	4	566220-005
AH1 - 5'	S	10-16-17 12:30	5	566220-006
AH2 - Surface	S	10-16-17 12:45		566220-007
AH2 - 1'	S	10-16-17 12:45	1	566220-008
AH2 - 2'	S	10-16-17 12:45	2	566220-009
AH2 - 3'	S	10-16-17 12:45	3	566220-010
AH2 - 4'	S	10-16-17 12:45	4	566220-011
AH2 - 5'	S	10-16-17 12:45	5	566220-012



CASE NARRATIVE

Client Name: COG Operating, LLC

Project Name: Houma State #1

Project ID:
Work Order Number(s): 566220

Report Date: 31-OCT-17
Date Received: 10/19/2017

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-3031663 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3031744 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3031768 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.



Certificate of Analysis Summary 566220

COG Operating, LLC, Midland, TX

Project Name: Houma State #1



Project Id:
Contact: Sheldon Hitchcock
Project Location: Houma State #1

Date Received in Lab: Thu Oct-19-17 11:45 am
Report Date: 31-OCT-17
Project Manager: Kelsey Brooks

<i>Analysis Requested</i>	<i>Lab Id:</i>	566220-001	566220-002	566220-003	566220-004	566220-005	566220-006
	<i>Field Id:</i>	AH1 - Surface	AH1 - 1'	AH1 - 2'	AH1 - 3'	AH1 - 4'	AH1 - 5'
	<i>Depth:</i>		1-	2-	3-	4-	5-
	<i>Matrix:</i>	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	<i>Sampled:</i>	Oct-16-17 12:30	Oct-16-17 12:30	Oct-16-17 12:30	Oct-16-17 12:30	Oct-16-17 12:30	Oct-16-17 12:30
BTEX by EPA 8021B	<i>Extracted:</i>	Oct-27-17 10:00	Oct-26-17 16:00	Oct-26-17 16:00	Oct-26-17 16:00	Oct-26-17 16:00	Oct-27-17 10:00
	<i>Analyzed:</i>	Oct-27-17 15:44	Oct-27-17 10:04	Oct-27-17 09:26	Oct-27-17 08:10	Oct-27-17 08:29	Oct-27-17 15:25
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Benzene		0.00965 0.00202	<0.00998 0.00998	<0.0100 0.0100	<0.00202 0.00202	<0.00201 0.00201	<0.00198 0.00198
Toluene		0.00718 0.00202	0.0206 0.00998	<0.0100 0.0100	<0.00202 0.00202	<0.00201 0.00201	<0.00198 0.00198
Ethylbenzene		0.00293 0.00202	0.0608 0.00998	0.0203 0.0100	<0.00202 0.00202	<0.00201 0.00201	<0.00198 0.00198
m,p-Xylenes		0.00428 0.00403	0.157 0.0200	0.0425 0.0201	<0.00404 0.00404	<0.00402 0.00402	<0.00396 0.00396
o-Xylene		0.00436 0.00202	0.0712 0.00998	<0.0100 0.0100	<0.00202 0.00202	<0.00201 0.00201	<0.00198 0.00198
Total Xylenes		0.00864 0.00202	0.228 0.00998	0.0425 0.0100	<0.00202 0.00202	<0.00201 0.00201	<0.00198 0.00198
Total BTEX		0.0284 0.00202	0.310 0.00998	0.0628 0.0100	<0.00202 0.00202	<0.00201 0.00201	<0.00198 0.00198
Chloride by EPA 300	<i>Extracted:</i>	Oct-25-17 15:20	Oct-25-17 15:20	Oct-25-17 15:20	Oct-25-17 15:20	Oct-25-17 15:20	Oct-25-17 15:20
	<i>Analyzed:</i>	Oct-26-17 10:32	Oct-26-17 10:39	Oct-26-17 10:59	Oct-26-17 11:06	Oct-26-17 11:13	Oct-26-17 11:20
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Chloride		<1.98 1.98	43.5 1.98	6.43 1.99	11.5 1.96	64.5 2.00	49.4 4.95
TPH by Texas1005	<i>Extracted:</i>	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00
	<i>Analyzed:</i>	Oct-26-17 23:33	Oct-26-17 23:55	Oct-27-17 00:15	Oct-27-17 00:35	Oct-27-17 01:38	Oct-27-17 01:58
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
C6-C12 Range Hydrocarbons		45.2 24.9	<24.9 24.9	29.5 25.0	<25.0 25.0	<25.0 25.0	<25.0 25.0
C12-C28 Range Hydrocarbons		592 24.9	35.0 24.9	238 25.0	<25.0 25.0	<25.0 25.0	<25.0 25.0
C28-C35 Range Hydrocarbons		72.0 24.9	<24.9 24.9	28.1 25.0	<25.0 25.0	<25.0 25.0	<25.0 25.0
Total TPH		709 24.9	35.0 24.9	296 25.0	<25.0 25.0	<25.0 25.0	<25.0 25.0

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Houston - Dallas - San Antonio - Atlanta - Tampa - Boca Raton - Latin America - Odessa - Corpus Christi

Kelsey Brooks
Project Manager



Certificate of Analysis Summary 566220

COG Operating, LLC, Midland, TX

Project Name: Houma State #1



Project Id:
Contact: Sheldon Hitchcock
Project Location: Houma State #1

Date Received in Lab: Thu Oct-19-17 11:45 am
Report Date: 31-OCT-17
Project Manager: Kelsey Brooks

Analysis Requested	Lab Id:	566220-007	566220-008	566220-009	566220-010	566220-011	566220-012
	Field Id:	AH2 - Surface	AH2 - 1'	AH2 - 2'	AH2 - 3'	AH2 - 4'	AH2 - 5'
	Depth:		1-	2-	3-	4-	5-
	Matrix:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Sampled:	Oct-16-17 12:45					
BTEX by EPA 8021B	Extracted:	Oct-26-17 16:00	Oct-27-17 15:00	Oct-27-17 10:00	Oct-27-17 10:00	Oct-26-17 16:00	Oct-26-17 16:00
	Analyzed:	Oct-27-17 03:34	Oct-27-17 22:37	Oct-27-17 18:22	Oct-27-17 18:03	Oct-27-17 10:23	Oct-27-17 09:45
	Units/RL:	mg/kg RL					
Benzene		0.0352 0.00202	16.3 1.99	20.8 2.01	29.6 2.01	0.0120 0.00201	<0.00199 0.00199
Toluene		0.397 0.00202	107 1.99	145 2.01	157 2.01	0.0766 0.00201	<0.00199 0.00199
Ethylbenzene		0.359 0.00202	67.9 1.99	115 2.01	116 2.01	0.0675 0.00201	0.00336 0.00199
m,p-Xylenes		0.355 0.00403	73.2 3.98	121 4.02	118 4.02	0.0834 0.00402	0.00651 0.00398
o-Xylene		0.150 0.00202	31.9 1.99	50.4 2.01	48.5 2.01	0.0356 0.00201	0.00263 0.00199
Total Xylenes		0.505 0.00202	105 1.99	171 2.01	167 2.01	0.119 0.00201	0.00914 0.00199
Total BTEX		1.30 0.00202	296 1.99	452 2.01	469 2.01	0.275 0.00201	0.0125 0.00199
Chloride by EPA 300	Extracted:	Oct-25-17 15:20					
	Analyzed:	Oct-26-17 11:26	Oct-26-17 11:33	Oct-26-17 11:54	Oct-26-17 12:00	Oct-26-17 12:21	Oct-26-17 12:28
	Units/RL:	mg/kg RL					
Chloride		10.6 4.96	9.02 4.94	<4.94 4.94	11.3 5.00	<5.00 5.00	9.44 4.95
TPH by Texas1005	Extracted:	Oct-26-17 14:00					
	Analyzed:	Oct-27-17 02:18	Oct-27-17 02:40	Oct-27-17 03:00	Oct-27-17 03:21	Oct-27-17 04:23	Oct-27-17 04:43
	Units/RL:	mg/kg RL					
C6-C12 Range Hydrocarbons		3430 125	5190 125	5930 125	4590 125	27.3 25.0	31.0 24.9
C12-C28 Range Hydrocarbons		9930 125	8440 125	8230 125	6760 125	59.0 25.0	61.3 24.9
C28-C35 Range Hydrocarbons		1330 125	985 125	1040 125	700 125	<25.0 25.0	<24.9 24.9
Total TPH		14700 125	14600 125	15200 125	12100 125	86.3 25.0	92.3 24.9

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Houston - Dallas - San Antonio - Atlanta - Tampa - Boca Raton - Latin America - Odessa - Corpus Christi

Kelsey Brooks
Project Manager

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the quantitation limit and above the detection limit.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

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

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

DL Method Detection Limit

NC Non-Calculable

+ NELAC certification not offered for this compound.

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

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(602) 437-0330	



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Lab Batch #: 3031679

Sample: 566220-001 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 23:33

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	54.4	49.9	109	70-130	
1-Chlorooctane	112	99.7	112	70-130	

Lab Batch #: 3031679

Sample: 566220-002 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 23:55

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	48.1	49.9	96	70-130	
1-Chlorooctane	102	99.7	102	70-130	

Lab Batch #: 3031679

Sample: 566220-003 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:15

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	46.5	50.0	93	70-130	
1-Chlorooctane	97.8	99.9	98	70-130	

Lab Batch #: 3031679

Sample: 566220-004 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:35

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	49.5	49.9	99	70-130	
1-Chlorooctane	100	99.8	100	70-130	

Lab Batch #: 3031679

Sample: 566220-005 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 01:38

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	47.6	50.0	95	70-130	
1-Chlorooctane	96.9	99.9	97	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Lab Batch #: 3031679

Sample: 566220-006 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 01:58

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	49.7	49.9	100	70-130	
1-Chlorooctane	107	99.8	107	70-130	

Lab Batch #: 3031679

Sample: 566220-007 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 02:18

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	59.4	49.9	119	70-130	
1-Chlorooctane	111	99.8	111	70-130	

Lab Batch #: 3031679

Sample: 566220-008 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 02:40

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	54.9	50.0	110	70-130	
1-Chlorooctane	113	100	113	70-130	

Lab Batch #: 3031679

Sample: 566220-009 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 03:00

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	58.2	49.8	117	70-130	
1-Chlorooctane	110	99.6	110	70-130	

Lab Batch #: 3031679

Sample: 566220-010 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 03:21

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	55.7	49.8	112	70-130	
1-Chlorooctane	108	99.6	108	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Lab Batch #: 3031663

Sample: 566220-007 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 03:34

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0269	0.0300	90	80-120	
4-Bromofluorobenzene	0.0298	0.0300	99	80-120	

Lab Batch #: 3031679

Sample: 566220-011 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 04:23

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	47.3	50.0	95	70-130	
1-Chlorooctane	97.0	99.9	97	70-130	

Lab Batch #: 3031679

Sample: 566220-012 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 04:43

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	48.0	49.9	96	70-130	
1-Chlorooctane	99.3	99.7	100	70-130	

Lab Batch #: 3031663

Sample: 566220-004 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 08:10

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0270	0.0300	90	80-120	
4-Bromofluorobenzene	0.0299	0.0300	100	80-120	

Lab Batch #: 3031663

Sample: 566220-005 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 08:29

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0267	0.0300	89	80-120	
4-Bromofluorobenzene	0.0301	0.0300	100	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Lab Batch #: 3031663

Sample: 566220-003 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 09:26

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0270	0.0300	90	80-120	
4-Bromofluorobenzene	0.0298	0.0300	99	80-120	

Lab Batch #: 3031663

Sample: 566220-012 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 09:45

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0268	0.0300	89	80-120	
4-Bromofluorobenzene	0.0277	0.0300	92	80-120	

Lab Batch #: 3031663

Sample: 566220-002 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 10:04

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0267	0.0300	89	80-120	
4-Bromofluorobenzene	0.0323	0.0300	108	80-120	

Lab Batch #: 3031663

Sample: 566220-011 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 10:23

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0246	0.0300	82	80-120	
4-Bromofluorobenzene	0.0328	0.0300	109	80-120	

Lab Batch #: 3031744

Sample: 566220-006 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 15:25

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0259	0.0300	86	80-120	
4-Bromofluorobenzene	0.0270	0.0300	90	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Lab Batch #: 3031744

Sample: 566220-001 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 15:44

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0268	0.0300	89	80-120	
4-Bromofluorobenzene	0.0293	0.0300	98	80-120	

Lab Batch #: 3031744

Sample: 566220-010 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 18:03

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0260	0.0300	87	80-120	
4-Bromofluorobenzene	0.0306	0.0300	102	80-120	

Lab Batch #: 3031744

Sample: 566220-009 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 18:22

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0256	0.0300	85	80-120	
4-Bromofluorobenzene	0.0325	0.0300	108	80-120	

Lab Batch #: 3031768

Sample: 566220-008 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 22:37

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0274	0.0300	91	80-120	
4-Bromofluorobenzene	0.0261	0.0300	87	80-120	

Lab Batch #: 3031679

Sample: 7633287-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 22:32

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	53.6	50.0	107	70-130	
1-Chlorooctane	111	100	111	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Project ID:

Lab Batch #: 3031663

Sample: 7633348-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 01:41

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0272	0.0300	91	80-120	
4-Bromofluorobenzene	0.0264	0.0300	88	80-120	

Lab Batch #: 3031744

Sample: 7633415-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 13:32

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0271	0.0300	90	80-120	
4-Bromofluorobenzene	0.0246	0.0300	82	80-120	

Lab Batch #: 3031768

Sample: 7633435-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 19:59

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0337	0.0300	112	80-120	
4-Bromofluorobenzene	0.0352	0.0300	117	80-120	

Lab Batch #: 3031679

Sample: 7633287-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 22:52

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	53.6	50.0	107	70-130	
1-Chlorooctane	107	100	107	70-130	

Lab Batch #: 3031663

Sample: 7633348-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 23:47

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0283	0.0300	94	80-120	
4-Bromofluorobenzene	0.0334	0.0300	111	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Lab Batch #: 3031744

Sample: 7633415-1-BKS / BKS

Project ID:

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 11:38

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0296	0.0300	99	80-120	
4-Bromofluorobenzene	0.0331	0.0300	110	80-120	

Lab Batch #: 3031768

Sample: 7633435-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 18:25

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0301	0.0300	100	80-120	
4-Bromofluorobenzene	0.0357	0.0300	119	80-120	

Lab Batch #: 3031679

Sample: 7633287-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 23:13

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	52.7	50.0	105	70-130	
1-Chlorooctane	114	100	114	70-130	

Lab Batch #: 3031663

Sample: 7633348-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 00:06

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0284	0.0300	95	80-120	
4-Bromofluorobenzene	0.0322	0.0300	107	80-120	

Lab Batch #: 3031744

Sample: 7633415-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 11:57

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0277	0.0300	92	80-120	
4-Bromofluorobenzene	0.0305	0.0300	102	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Project ID:

Lab Batch #: 3031768

Sample: 7633435-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 18:43

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0296	0.0300	99	80-120	
4-Bromofluorobenzene	0.0341	0.0300	114	80-120	

Lab Batch #: 3031663

Sample: 566216-016 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:25

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0281	0.0300	94	80-120	
4-Bromofluorobenzene	0.0309	0.0300	103	80-120	

Lab Batch #: 3031679

Sample: 566220-005 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:56

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	50.5	49.9	101	70-130	
1-Chlorooctane	99.8	99.7	100	70-130	

Lab Batch #: 3031744

Sample: 566341-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 12:16

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0277	0.0300	92	80-120	
4-Bromofluorobenzene	0.0313	0.0300	104	80-120	

Lab Batch #: 3031768

Sample: 566146-004 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 19:01

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0340	0.0300	113	80-120	
4-Bromofluorobenzene	0.0359	0.0300	120	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566220,

Lab Batch #: 3031663

Sample: 566216-016 SD / MSD

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:44

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0282	0.0300	94	80-120	
4-Bromofluorobenzene	0.0313	0.0300	104	80-120	

Lab Batch #: 3031679

Sample: 566220-005 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 01:17

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	44.5	50.0	89	70-130	
1-Chlorooctane	88.7	99.9	89	70-130	

Lab Batch #: 3031744

Sample: 566341-001 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 12:35

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	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	0.0251	0.0300	84	80-120	

Lab Batch #: 3031768

Sample: 566146-004 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 19:20

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0315	0.0300	105	80-120	
4-Bromofluorobenzene	0.0355	0.0300	118	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.



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566220

Project ID:

Analyst: ALJ

Date Prepared: 10/26/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031663

Sample: 7633348-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.0901	89	0.101	0.0884	88	2	70-130	35	
Toluene	<0.00202	0.101	0.0949	94	0.101	0.0937	93	1	70-130	35	
Ethylbenzene	<0.00202	0.101	0.108	107	0.101	0.104	103	4	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.211	104	0.201	0.205	102	3	70-135	35	
o-Xylene	<0.00202	0.101	0.108	107	0.101	0.104	103	4	71-133	35	

Analyst: ALJ

Date Prepared: 10/27/2017

Date Analyzed: 10/27/2017

Lab Batch ID: 3031744

Sample: 7633415-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.103	102	0.100	0.0897	90	14	70-130	35	
Toluene	<0.00202	0.101	0.107	106	0.100	0.0932	93	14	70-130	35	
Ethylbenzene	<0.00202	0.101	0.119	118	0.100	0.104	104	13	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.221	109	0.201	0.201	100	9	70-135	35	
o-Xylene	<0.00202	0.101	0.113	112	0.100	0.102	102	10	71-133	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



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566220

Project ID:

Analyst: ALJ

Date Prepared: 10/27/2017

Date Analyzed: 10/27/2017

Lab Batch ID: 3031768

Sample: 7633435-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.0809	80	0.100	0.0812	81	0	70-130	35	
Toluene	<0.00202	0.101	0.0881	87	0.100	0.0911	91	3	70-130	35	
Ethylbenzene	<0.00202	0.101	0.0941	93	0.100	0.0971	97	3	71-129	35	
m,p-Xylenes	<0.00403	0.202	0.183	91	0.200	0.190	95	4	70-135	35	
o-Xylene	<0.00202	0.101	0.0911	90	0.100	0.0942	94	3	71-133	35	

Analyst: MNV

Date Prepared: 10/25/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031640

Sample: 7633224-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300	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
Analytes											
Chloride	<5.00	250	242	97	250	242	97	0	90-110	20	

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

Blank Spike Recovery [D] = 100*(C)/[B]

Blank Spike Duplicate Recovery [G] = 100*(F)/[E]

All results are based on MDL and Validated for QC Purposes



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566220

Project ID:

Analyst: ARM

Date Prepared: 10/26/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031679

Sample: 7633287-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH by Texas1005	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
Analytes											
C6-C12 Range Hydrocarbons	<25.0	1000	1070	107	1000	973	97	9	75-125	25	
C12-C28 Range Hydrocarbons	<25.0	1000	1080	108	1000	1020	102	6	75-125	25	

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

Blank Spike Recovery [D] = $100 * (C)/[B]$

Blank Spike Duplicate Recovery [G] = $100 * (F)/[E]$

All results are based on MDL and Validated for QC Purposes



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566220

Project ID:

Lab Batch ID: 3031663

QC- Sample ID: 566216-016 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/27/2017

Date Prepared: 10/26/2017

Analyst: ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00200	0.0998	0.119	119	0.0996	0.107	107	11	70-130	35	
Toluene	<0.00200	0.0998	0.110	110	0.0996	0.0972	98	12	70-130	35	
Ethylbenzene	<0.00200	0.0998	0.105	105	0.0996	0.0886	89	17	71-129	35	
m,p-Xylenes	<0.00399	0.200	0.212	106	0.199	0.188	94	12	70-135	35	
o-Xylene	<0.00200	0.0998	0.104	104	0.0996	0.0930	93	11	71-133	35	

Lab Batch ID: 3031744

QC- Sample ID: 566341-001 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/27/2017

Date Prepared: 10/27/2017

Analyst: ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	0.00630	0.101	0.0589	52	0.100	0.0644	58	9	70-130	35	X
Toluene	0.0546	0.101	0.0688	14	0.100	0.0685	14	0	70-130	35	X
Ethylbenzene	0.0235	0.101	0.0584	35	0.100	0.0668	43	13	71-129	35	X
m,p-Xylenes	0.124	0.202	0.132	4	0.200	0.141	9	7	70-135	35	X
o-Xylene	0.0410	0.101	0.0641	23	0.100	0.0714	30	11	71-133	35	X

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566220
Lab Batch ID: 3031768
Date Analyzed: 10/27/2017
Reporting Units: mg/kg

Project ID:
QC- Sample ID: 566146-004 S **Batch #:** 1 **Matrix:** Soil
Date Prepared: 10/27/2017 **Analyst:** ALJ

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00202	0.101	0.0656	65	0.101	0.0651	64	1	70-130	35	X
Toluene	<0.00202	0.101	0.0749	74	0.101	0.0712	70	5	70-130	35	
Ethylbenzene	<0.00202	0.101	0.0752	74	0.101	0.0759	75	1	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.147	73	0.201	0.149	74	1	70-135	35	
o-Xylene	<0.00202	0.101	0.0734	73	0.101	0.0751	74	2	71-133	35	

Lab Batch ID: 3031640 **QC- Sample ID:** 566219-004 S **Batch #:** 1 **Matrix:** Soil
Date Analyzed: 10/26/2017 **Date Prepared:** 10/25/2017 **Analyst:** MNV
Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	<1.99	99.6	101	101	99.6	101	101	0	90-110	20	

Lab Batch ID: 3031640 **QC- Sample ID:** 566220-008 S **Batch #:** 1 **Matrix:** Soil
Date Analyzed: 10/26/2017 **Date Prepared:** 10/25/2017 **Analyst:** MNV
Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	9.02	247	258	101	247	261	102	1	90-110	20	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
 N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566220

Project ID:

Lab Batch ID: 3031679

QC- Sample ID: 566220-005 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/27/2017

Date Prepared: 10/26/2017

Analyst: ARM

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TPH by Texas1005 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
C6-C12 Range Hydrocarbons	<24.9	997	1020	102	999	893	89	13	75-125	25	
C12-C28 Range Hydrocarbons	<24.9	997	1050	105	999	940	94	11	75-125	25	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



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CHAIN OF CUSTODY

Page 2 of 2

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 Midland, Texas (432-704-5251)

Phoenix, Arizona (480-355-0900)

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Xenco Quote #

Xenco Job #

566220

Client / Reporting Information		Project Information		Analytical Information		Matrix Codes											
Company Name / Branch: COG Operating LLC		Project Name/Number: Houma State #1		Xenco Quote #		Xenco Job #											
Company Address: 2407 PECOS AVENUE Artesia NM 88210		Project Location: Houma State #1		Date Time:		Received By:											
Email: alieb@concho.com dneel@concho.com thaskel@concho.com slitchock@concho.com		Invoice To: COG Operating LLC Attn: Robert McNeill 600 W. Illinois Midland TX 79701		Date Time:		Received By:											
Project Contact: Aaron Lieb		PO Number:		Date Time:		Received By:											
Sampler's Name: Aaron Lieb		Field ID / Point of Collection		Date Time:		Received By:											
No.	Field ID / Point of Collection	Sample Depth	Date	Time	Matrix	# of bottles	HCI	NaOH/Zn Acetate	HNO3	H2SO4	NaOH	NaHSO4	MEOH	TPH/ EXTENDED	BTEX	Chloride	Field Comments
1	AH2 - Surf	1'	10/16/17	12:45	S	1								X	X	X	
2	AH2 - 1'	2'				1								X	X	X	
3	AH2 - 2'	3'				1								X	X	X	
4	AH2 - 3'	4'				1								X	X	X	
5	AH2 - 4'	5'				1								X	X	X	
6	AH2 - 5'					1								X	X	X	
7																	
8																	
9																	
10																	
Turnaround Time (Business days)		Data Deliverable Information		Notes:													
<input type="checkbox"/> Same Day TAT		<input type="checkbox"/> 5 Day TAT		<input type="checkbox"/> Level II Std QC		<input type="checkbox"/> Level IV (Full Data Pkg /raw data)											
<input type="checkbox"/> Next Day EMERGENCY		<input checked="" type="checkbox"/> 7 Day TAT		<input type="checkbox"/> Level III Std QC+ Forms		<input type="checkbox"/> TRRP Level IV											
<input type="checkbox"/> 2 Day EMERGENCY		<input type="checkbox"/> Contract TAT		<input type="checkbox"/> Level 3 (CLP Forms)		<input type="checkbox"/> UST /RG -411											
<input type="checkbox"/> 3 Day EMERGENCY				<input type="checkbox"/> TRRP Checklist													
TAT Starts Day received by Lab, if received by 5:00 pm		SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION, INCLUDING COURIER DELIVERY															
Relinquished by Sampler:		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
1. <i>[Signature]</i>		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10					
Relinquished by:		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
3. <i>[Signature]</i>		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10					
Relinquished by:		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
5. <i>[Signature]</i>		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10		10/17/17 10:10					

Notice: Signature of this document and relinquishment of samples constitutes a valid purchase order from client company to Xenco, its affiliates and subcontractors. It assigns standard terms and conditions of service. Xenco will be liable only for the cost of samples and shall not assume any responsibility for any losses or expenses incurred by the Client if such losses are due to circumstances beyond the control of Xenco. A minimum charge of \$75 will be applied to each project. Xenco's liability will be limited to the cost of samples. Any samples received by Xenco but not analyzed will be invoiced at \$5 per sample. These terms will be enforced unless previously negotiated under a fully executed client contract.

Analytical Report 566216

for
COG Operating, LLC

Project Manager: Sheldon Hitchcock

Houma State #1

30-OCT-17

Collected By: Client



1211 W. Florida Ave, Midland TX 79701

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

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

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



30-OCT-17

Project Manager: **Sheldon Hitchcock**
COG Operating, LLC
600 W Illinois
Midland, TX 79701

Reference: XENCO Report No(s): **566216**
Houma State #1
Project Address: Houma State #1

Sheldon Hitchcock:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 566216. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

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

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 566216 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

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

Respectfully,

Kelsey Brooks

Project Manager

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COG Operating, LLC, Midland, TX

Houma State #1

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
T1 - Surf	S	10-16-17 13:00	0	566216-001
T1 - 1'	S	10-16-17 13:00	1	566216-002
T1 - 2'	S	10-16-17 13:00	2	566216-003
T1 - 3'	S	10-16-17 13:00	3	566216-004
T1 - 4'	S	10-16-17 13:00	4	566216-005
T1 - 5'	S	10-16-17 13:30	5	566216-006
T1 - 6'	S	10-16-17 13:30	6	566216-007
T1 - 8'	S	10-16-17 13:30	8	566216-008
T1 - 10'	S	10-16-17 13:30	10	566216-009
T1 - 12'	S	10-16-17 13:30	12	566216-010
T1 - 14'	S	10-16-17 13:30	14	566216-011
T2 - Surface	S	10-16-17 14:00	0	566216-012
T2 - 1'	S	10-16-17 14:00	1	566216-013
T2 - 2'	S	10-16-17 14:00	2	566216-014
T2 - 3'	S	10-16-17 14:00	3	566216-015
T2 - 4'	S	10-16-17 14:00	4	566216-016
T2 - 6'	S	10-16-17 14:00	6	566216-017
T2 - 8'	S	10-16-17 14:00	8	566216-018
T2 - 10'	S	10-16-17 14:00	10	566216-019
T2 - 12'	S	10-16-17 14:00	12	566216-020
T2 - 14'	S	10-16-17 14:05	14	566216-021



CASE NARRATIVE

Client Name: COG Operating, LLC

Project Name: Houma State #1

Project ID:
Work Order Number(s): 566216

Report Date: 30-OCT-17
Date Received: 10/19/2017

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-3031544 Chloride by EPA 300

Lab Sample ID 566216-015 was randomly selected for Matrix Spike/Matrix Spike Duplicate (MS/MSD). Chloride recovered below QC limits in the Matrix Spike and Matrix Spike Duplicate. Outlier/s are due to possible matrix interference. Samples in the analytical batch are: 566216-005, -006, -007, -008, -009, -010, -011, -012, -013, -014, -015, -016, -017, -018, -019, -020, -021.

The Laboratory Control Sample for Chloride is within laboratory Control Limits, therefore the data was accepted.

Batch: LBA-3031655 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3031663 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3031744 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3031768 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.



Certificate of Analysis Summary 566216

COG Operating, LLC, Midland, TX

Project Name: Houma State #1



Project Id:
Contact: Sheldon Hitchcock
Project Location: Houma State #1

Date Received in Lab: Thu Oct-19-17 11:45 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

<i>Analysis Requested</i>	<i>Lab Id:</i>	566216-001	566216-002	566216-003	566216-004	566216-005	566216-006
	<i>Field Id:</i>	T1 - Surf	T1 - 1'	T1 - 2'	T1 - 3'	T1 - 4'	T1 - 5'
	<i>Depth:</i>	0-	1-	2-	3-	4-	5-
	<i>Matrix:</i>	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	<i>Sampled:</i>	Oct-16-17 13:00	Oct-16-17 13:00	Oct-16-17 13:00	Oct-16-17 13:00	Oct-16-17 13:00	Oct-16-17 13:30
BTEX by EPA 8021B	<i>Extracted:</i>	Oct-27-17 15:00	Oct-27-17 10:00	Oct-26-17 11:00	Oct-26-17 16:00	Oct-26-17 11:00	
	<i>Analyzed:</i>	Oct-27-17 23:04	Oct-27-17 16:22	Oct-26-17 23:11	Oct-27-17 10:42	Oct-26-17 20:21	
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	
Benzene		0.0247 0.0200	<0.0200 0.0200	0.0215 0.00198	<0.00994 0.00994	<0.00200 0.00200	
Toluene		2.63 0.0200	<0.0200 0.0200	0.365 0.00198	<0.00994 0.00994	<0.00200 0.00200	
Ethylbenzene		3.69 0.0200	0.0613 0.0200	0.377 0.00198	0.101 0.00994	<0.00200 0.00200	
m,p-Xylenes		4.48 0.0400	0.102 0.0401	0.438 0.00397	0.225 0.0199	<0.00399 0.00399	
o-Xylene		2.13 0.0200	0.0302 0.0200	0.191 0.00198	0.0978 0.00994	<0.00200 0.00200	
Total Xylenes		6.61 0.0200	0.132 0.0200	0.629 0.00198	0.323 0.00994	<0.00200 0.00200	
Total BTEX		13.0 0.0200	0.194 0.0200	1.39 0.00198	0.424 0.00994	<0.00200 0.00200	
Chloride by EPA 300	<i>Extracted:</i>	Oct-25-17 11:00	Oct-25-17 11:00	Oct-25-17 11:00	Oct-25-17 11:00	Oct-25-17 13:00	Oct-25-17 13:00
	<i>Analyzed:</i>	Oct-26-17 01:32	Oct-26-17 01:39	Oct-26-17 01:46	Oct-26-17 01:53	Oct-26-17 02:33	Oct-26-17 02:54
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Chloride		<4.96 4.96	7.27 4.97	7.95 5.00	248 4.92	683 4.93	877 4.97
TPH by Texas1005	<i>Extracted:</i>	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	
	<i>Analyzed:</i>	Oct-26-17 23:27	Oct-26-17 23:47	Oct-27-17 00:07	Oct-27-17 00:27	Oct-27-17 01:27	
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	
C6-C12 Range Hydrocarbons		1050 125	94.7 25.0	2420 125	42.0 24.9	<24.9 24.9	
C12-C28 Range Hydrocarbons		10900 125	596 25.0	5820 125	215 24.9	<24.9 24.9	
C28-C35 Range Hydrocarbons		382 125	36.2 25.0	343 125	<24.9 24.9	<24.9 24.9	
Total TPH		12300 125	727 25.0	8580 125	257 24.9	<24.9 24.9	

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Kelsey Brooks
Project Manager



Certificate of Analysis Summary 566216

COG Operating, LLC, Midland, TX

Project Name: Houma State #1



Project Id:
Contact: Sheldon Hitchcock
Project Location: Houma State #1

Date Received in Lab: Thu Oct-19-17 11:45 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

<i>Analysis Requested</i>	<i>Lab Id:</i>	566216-007	566216-008	566216-009	566216-010	566216-011	566216-012
	<i>Field Id:</i>	T1 - 6'	T1 - 8'	T1 - 10'	T1 - 12'	T1 - 14'	T2 - Surface
	<i>Depth:</i>	6-	8-	10-	12-	14-	0-
	<i>Matrix:</i>	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	<i>Sampled:</i>	Oct-16-17 13:30	Oct-16-17 14:00				
BTEX by EPA 8021B	<i>Extracted:</i>					Oct-26-17 11:00	Oct-26-17 11:00
	<i>Analyzed:</i>					Oct-26-17 20:40	Oct-26-17 22:52
	<i>Units/RL:</i>					mg/kg RL	mg/kg RL
Benzene						<0.00201 0.00201	1.74 0.495
Toluene						<0.00201 0.00201	72.5 0.495
Ethylbenzene						<0.00201 0.00201	98.2 0.495
m,p-Xylenes						<0.00402 0.00402	118 0.990
o-Xylene						<0.00201 0.00201	52.0 0.495
Total Xylenes						<0.00201 0.00201	170 0.495
Total BTEX						<0.00201 0.00201	342 0.495
Chloride by EPA 300	<i>Extracted:</i>	Oct-25-17 13:00	Oct-25-17 13:00				
	<i>Analyzed:</i>	Oct-26-17 03:00	Oct-26-17 03:07	Oct-26-17 03:14	Oct-26-17 03:34	Oct-26-17 03:41	Oct-26-17 03:48
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL				
Chloride		3340 24.8	4190 24.8	2810 25.0	733 4.98	902 4.96	<4.95 4.95
TPH by Texas1005	<i>Extracted:</i>					Oct-26-17 14:00	Oct-26-17 14:00
	<i>Analyzed:</i>					Oct-27-17 01:47	Oct-27-17 02:07
	<i>Units/RL:</i>					mg/kg RL	mg/kg RL
C6-C12 Range Hydrocarbons						<25.0 25.0	4130 125
C12-C28 Range Hydrocarbons						<25.0 25.0	10500 125
C28-C35 Range Hydrocarbons						<25.0 25.0	267 125
Total TPH						<25.0 25.0	14900 125

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Kelsey Brooks
Project Manager



Certificate of Analysis Summary 566216

COG Operating, LLC, Midland, TX

Project Name: Houma State #1



Project Id:
Contact: Sheldon Hitchcock
Project Location: Houma State #1

Date Received in Lab: Thu Oct-19-17 11:45 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

<i>Analysis Requested</i>	<i>Lab Id:</i>	566216-013	566216-014	566216-015	566216-016	566216-017	566216-018
	<i>Field Id:</i>	T2 - 1'	T2 - 2'	T2 - 3'	T2 - 4'	T2 - 6'	T2 - 8'
	<i>Depth:</i>	1-	2-	3-	4-	6-	8-
	<i>Matrix:</i>	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	<i>Sampled:</i>	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00
BTEX by EPA 8021B	<i>Extracted:</i>	Oct-26-17 11:00	Oct-26-17 11:00	Oct-26-17 11:00	Oct-26-17 16:00		
	<i>Analyzed:</i>	Oct-26-17 18:28	Oct-26-17 18:46	Oct-26-17 20:59	Oct-27-17 02:00		
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL		
Benzene		4.59 0.498	6.45 0.505	<0.00199 0.00199	<0.00200 0.00200		
Toluene		96.2 0.498	101 0.505	<0.00199 0.00199	<0.00200 0.00200		
Ethylbenzene		94.8 0.498	95.7 0.505	<0.00199 0.00199	<0.00200 0.00200		
m,p-Xylenes		97.9 0.996	97.9 1.01	<0.00398 0.00398	<0.00401 0.00401		
o-Xylene		40.9 0.498	40.9 0.505	<0.00199 0.00199	<0.00200 0.00200		
Total Xylenes		139 0.498	139 0.505	<0.00199 0.00199	<0.00200 0.00200		
Total BTEX		334 0.498	342 0.505	<0.00199 0.00199	<0.00200 0.00200		
Chloride by EPA 300	<i>Extracted:</i>	Oct-25-17 13:00	Oct-25-17 13:00	Oct-25-17 13:00	Oct-25-17 13:00	Oct-25-17 13:00	Oct-25-17 13:00
	<i>Analyzed:</i>	Oct-26-17 03:55	Oct-26-17 04:01	Oct-26-17 04:08	Oct-26-17 04:29	Oct-26-17 04:35	Oct-26-17 04:56
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Chloride		15.2 4.96	<4.97 4.97	<5.00 5.00	1360 25.0	1740 24.6	925 4.96
TPH by Texas1005	<i>Extracted:</i>	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00		
	<i>Analyzed:</i>	Oct-27-17 02:27	Oct-27-17 02:46	Oct-27-17 03:06	Oct-27-17 03:25		
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL		
C6-C12 Range Hydrocarbons		3360 125	2660 125	<24.9 24.9	<25.0 25.0		
C12-C28 Range Hydrocarbons		6850 125	5310 125	<24.9 24.9	<25.0 25.0		
C28-C35 Range Hydrocarbons		256 125	220 125	<24.9 24.9	<25.0 25.0		
Total TPH		10500 125	8190 125	<24.9 24.9	<25.0 25.0		

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Kelsey Brooks
Project Manager



Certificate of Analysis Summary 566216

COG Operating, LLC, Midland, TX

Project Name: Houma State #1



Project Id:
Contact: Sheldon Hitchcock
Project Location: Houma State #1

Date Received in Lab: Thu Oct-19-17 11:45 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

<i>Analysis Requested</i>	<i>Lab Id:</i>	566216-019	566216-020	566216-021			
	<i>Field Id:</i>	T2 - 10'	T2 - 12'	T2 - 14'			
	<i>Depth:</i>	10-	12-	14-			
	<i>Matrix:</i>	SOIL	SOIL	SOIL			
	<i>Sampled:</i>	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:05			
BTEX by EPA 8021B	<i>Extracted:</i>			Oct-26-17 16:00			
	<i>Analyzed:</i>			Oct-27-17 07:51			
	<i>Units/RL:</i>			mg/kg RL			
Benzene				<0.00200 0.00200			
Toluene				<0.00200 0.00200			
Ethylbenzene				<0.00200 0.00200			
m,p-Xylenes				<0.00399 0.00399			
o-Xylene				<0.00200 0.00200			
Total Xylenes				<0.00200 0.00200			
Total BTEX				<0.00200 0.00200			
Chloride by EPA 300	<i>Extracted:</i>	Oct-25-17 13:00	Oct-25-17 13:00	Oct-25-17 13:00			
	<i>Analyzed:</i>	Oct-26-17 05:02	Oct-26-17 05:09	Oct-26-17 05:16			
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL			
Chloride		555 4.95	121 4.93	197 4.98			
TPH by Texas1005	<i>Extracted:</i>			Oct-26-17 14:00			
	<i>Analyzed:</i>			Oct-27-17 03:45			
	<i>Units/RL:</i>			mg/kg RL			
C6-C12 Range Hydrocarbons				<25.0 25.0			
C12-C28 Range Hydrocarbons				<25.0 25.0			
C28-C35 Range Hydrocarbons				<25.0 25.0			
Total TPH				<25.0 25.0			

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Kelsey Brooks
Project Manager

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the quantitation limit and above the detection limit.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

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

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

DL Method Detection Limit

NC Non-Calculable

+ NELAC certification not offered for this compound.

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

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1211 W Florida Ave, Midland, TX 79701	(210) 509-3334	(210) 509-3335
2525 W. Huntington Dr. - Suite 102, Tempe AZ 85282	(432) 563-1800	(432) 563-1713
	(602) 437-0330	



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Project ID:

Lab Batch #: 3031655

Sample: 566216-013 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 18:28

SURROGATE RECOVERY STUDY					
BTEX by EPA 8021B Analytes	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	0.0352	0.0300	117	80-120	

Lab Batch #: 3031655

Sample: 566216-014 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 18:46

SURROGATE RECOVERY STUDY					
BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0256	0.0300	85	80-120	
4-Bromofluorobenzene	0.0346	0.0300	115	80-120	

Lab Batch #: 3031655

Sample: 566216-005 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 20:21

SURROGATE RECOVERY STUDY					
BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0274	0.0300	91	80-120	
4-Bromofluorobenzene	0.0288	0.0300	96	80-120	

Lab Batch #: 3031655

Sample: 566216-011 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 20:40

SURROGATE RECOVERY STUDY					
BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0272	0.0300	91	80-120	
4-Bromofluorobenzene	0.0278	0.0300	93	80-120	

Lab Batch #: 3031655

Sample: 566216-015 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 20:59

SURROGATE RECOVERY STUDY					
BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0280	0.0300	93	80-120	
4-Bromofluorobenzene	0.0294	0.0300	98	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Lab Batch #: 3031655

Sample: 566216-012 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 22:52

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0284	0.0300	95	80-120	
4-Bromofluorobenzene	0.0331	0.0300	110	80-120	

Lab Batch #: 3031655

Sample: 566216-003 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 23:11

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0242	0.0300	81	80-120	
4-Bromofluorobenzene	0.0271	0.0300	90	80-120	

Lab Batch #: 3031676

Sample: 566216-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 23:27

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	61.5	49.9	123	70-130	
1-Chlorooctane	113	99.8	113	70-130	

Lab Batch #: 3031676

Sample: 566216-002 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 23:47

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	57.7	50.0	115	70-130	
1-Chlorooctane	98.8	100	99	70-130	

Lab Batch #: 3031676

Sample: 566216-003 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:07

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	39.3	49.9	79	70-130	
1-Chlorooctane	113	99.7	113	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Project ID:

Lab Batch #: 3031676

Sample: 566216-004 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:27

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	46.4	49.8	93	70-130	
1-Chlorooctane	82.0	99.6	82	70-130	

Lab Batch #: 3031676

Sample: 566216-005 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 01:27

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	47.2	49.9	95	70-130	
1-Chlorooctane	84.5	99.7	85	70-130	

Lab Batch #: 3031676

Sample: 566216-011 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 01:47

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	51.2	50.0	102	70-130	
1-Chlorooctane	92.7	99.9	93	70-130	

Lab Batch #: 3031663

Sample: 566216-016 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 02:00

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	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	0.0302	0.0300	101	80-120	

Lab Batch #: 3031676

Sample: 566216-012 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 02:07

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	63.7	50.0	127	70-130	
1-Chlorooctane	128	99.9	128	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Lab Batch #: 3031676

Sample: 566216-013 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 02:27

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	42.9	50.0	86	70-130	
1-Chlorooctane	124	100	124	70-130	

Lab Batch #: 3031676

Sample: 566216-014 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 02:46

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	44.0	49.8	88	70-130	
1-Chlorooctane	107	99.6	107	70-130	

Lab Batch #: 3031676

Sample: 566216-015 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 03:06

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	51.8	49.8	104	70-130	
1-Chlorooctane	93.0	99.6	93	70-130	

Lab Batch #: 3031676

Sample: 566216-016 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 03:25

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	52.1	50.0	104	70-130	
1-Chlorooctane	94.2	99.9	94	70-130	

Lab Batch #: 3031676

Sample: 566216-021 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 03:45

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	51.2	49.9	103	70-130	
1-Chlorooctane	92.4	99.8	93	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Lab Batch #: 3031663

Sample: 566216-021 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 07:51

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0267	0.0300	89	80-120	
4-Bromofluorobenzene	0.0301	0.0300	100	80-120	

Lab Batch #: 3031663

Sample: 566216-004 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 10:42

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	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	0.0349	0.0300	116	80-120	

Lab Batch #: 3031744

Sample: 566216-002 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 16:22

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0273	0.0300	91	80-120	
4-Bromofluorobenzene	0.0353	0.0300	118	80-120	

Lab Batch #: 3031768

Sample: 566216-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 23:04

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0277	0.0300	92	80-120	
4-Bromofluorobenzene	0.0290	0.0300	97	80-120	

Lab Batch #: 3031655

Sample: 7633345-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 15:27

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0288	0.0300	96	80-120	
4-Bromofluorobenzene	0.0264	0.0300	88	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Project ID:

Lab Batch #: 3031676

Sample: 7633285-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 19:49

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	58.3	50.0	117	70-130	
1-Chlorooctane	105	100	105	70-130	

Lab Batch #: 3031663

Sample: 7633348-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 01:41

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0272	0.0300	91	80-120	
4-Bromofluorobenzene	0.0264	0.0300	88	80-120	

Lab Batch #: 3031744

Sample: 7633415-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 13:32

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0271	0.0300	90	80-120	
4-Bromofluorobenzene	0.0246	0.0300	82	80-120	

Lab Batch #: 3031768

Sample: 7633435-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 19:59

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0337	0.0300	112	80-120	
4-Bromofluorobenzene	0.0352	0.0300	117	80-120	

Lab Batch #: 3031655

Sample: 7633345-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 13:17

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0279	0.0300	93	80-120	
4-Bromofluorobenzene	0.0312	0.0300	104	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Project ID:

Lab Batch #: 3031676

Sample: 7633285-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 20:09

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	60.7	50.0	121	70-130	
1-Chlorooctane	112	100	112	70-130	

Lab Batch #: 3031663

Sample: 7633348-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 23:47

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0283	0.0300	94	80-120	
4-Bromofluorobenzene	0.0334	0.0300	111	80-120	

Lab Batch #: 3031744

Sample: 7633415-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 11:38

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0296	0.0300	99	80-120	
4-Bromofluorobenzene	0.0331	0.0300	110	80-120	

Lab Batch #: 3031768

Sample: 7633435-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 18:25

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0301	0.0300	100	80-120	
4-Bromofluorobenzene	0.0357	0.0300	119	80-120	

Lab Batch #: 3031655

Sample: 7633345-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 13:36

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0288	0.0300	96	80-120	
4-Bromofluorobenzene	0.0294	0.0300	98	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Project ID:

Lab Batch #: 3031676

Sample: 7633285-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 20:29

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	63.5	50.0	127	70-130	
1-Chlorooctane	110	100	110	70-130	

Lab Batch #: 3031663

Sample: 7633348-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 00:06

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0284	0.0300	95	80-120	
4-Bromofluorobenzene	0.0322	0.0300	107	80-120	

Lab Batch #: 3031744

Sample: 7633415-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 11:57

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0277	0.0300	92	80-120	
4-Bromofluorobenzene	0.0305	0.0300	102	80-120	

Lab Batch #: 3031768

Sample: 7633435-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/27/17 18:43

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0296	0.0300	99	80-120	
4-Bromofluorobenzene	0.0341	0.0300	114	80-120	

Lab Batch #: 3031655

Sample: 566321-002 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 13:55

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0283	0.0300	94	80-120	
4-Bromofluorobenzene	0.0318	0.0300	106	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Lab Batch #: 3031676

Sample: 566219-001 S / MS

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 21:08

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	57.9	50.0	116	70-130	
1-Chlorooctane	108	99.9	108	70-130	

Lab Batch #: 3031663

Sample: 566216-016 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:25

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0281	0.0300	94	80-120	
4-Bromofluorobenzene	0.0309	0.0300	103	80-120	

Lab Batch #: 3031744

Sample: 566341-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 12:16

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0277	0.0300	92	80-120	
4-Bromofluorobenzene	0.0313	0.0300	104	80-120	

Lab Batch #: 3031768

Sample: 566146-004 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 19:01

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0340	0.0300	113	80-120	
4-Bromofluorobenzene	0.0359	0.0300	120	80-120	

Lab Batch #: 3031655

Sample: 566321-002 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 14:13

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0337	0.0300	112	80-120	
4-Bromofluorobenzene	0.0355	0.0300	118	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566216,

Project ID:

Lab Batch #: 3031676

Sample: 566219-001 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 21:28

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	59.0	49.9	118	70-130	
1-Chlorooctane	111	99.8	111	70-130	

Lab Batch #: 3031663

Sample: 566216-016 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 00:44

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0282	0.0300	94	80-120	
4-Bromofluorobenzene	0.0313	0.0300	104	80-120	

Lab Batch #: 3031744

Sample: 566341-001 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 12:35

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	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	0.0251	0.0300	84	80-120	

Lab Batch #: 3031768

Sample: 566146-004 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/27/17 19:20

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0315	0.0300	105	80-120	
4-Bromofluorobenzene	0.0355	0.0300	118	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.



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566216

Project ID:

Analyst: ALJ

Date Prepared: 10/26/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031655

Sample: 7633345-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00200	0.100	0.0958	96	0.0998	0.0867	87	10	70-130	35	
Toluene	<0.00200	0.100	0.101	101	0.0998	0.0908	91	11	70-130	35	
Ethylbenzene	<0.00200	0.100	0.110	110	0.0998	0.0997	100	10	71-129	35	
m,p-Xylenes	<0.00401	0.200	0.216	108	0.200	0.196	98	10	70-135	35	
o-Xylene	<0.00200	0.100	0.108	108	0.0998	0.0977	98	10	71-133	35	

Analyst: ALJ

Date Prepared: 10/26/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031663

Sample: 7633348-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.0901	89	0.101	0.0884	88	2	70-130	35	
Toluene	<0.00202	0.101	0.0949	94	0.101	0.0937	93	1	70-130	35	
Ethylbenzene	<0.00202	0.101	0.108	107	0.101	0.104	103	4	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.211	104	0.201	0.205	102	3	70-135	35	
o-Xylene	<0.00202	0.101	0.108	107	0.101	0.104	103	4	71-133	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



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566216

Project ID:

Analyst: ALJ

Date Prepared: 10/27/2017

Date Analyzed: 10/27/2017

Lab Batch ID: 3031744

Sample: 7633415-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.103	102	0.100	0.0897	90	14	70-130	35	
Toluene	<0.00202	0.101	0.107	106	0.100	0.0932	93	14	70-130	35	
Ethylbenzene	<0.00202	0.101	0.119	118	0.100	0.104	104	13	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.221	109	0.201	0.201	100	9	70-135	35	
o-Xylene	<0.00202	0.101	0.113	112	0.100	0.102	102	10	71-133	35	

Analyst: ALJ

Date Prepared: 10/27/2017

Date Analyzed: 10/27/2017

Lab Batch ID: 3031768

Sample: 7633435-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.0809	80	0.100	0.0812	81	0	70-130	35	
Toluene	<0.00202	0.101	0.0881	87	0.100	0.0911	91	3	70-130	35	
Ethylbenzene	<0.00202	0.101	0.0941	93	0.100	0.0971	97	3	71-129	35	
m,p-Xylenes	<0.00403	0.202	0.183	91	0.200	0.190	95	4	70-135	35	
o-Xylene	<0.00202	0.101	0.0911	90	0.100	0.0942	94	3	71-133	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



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566216

Project ID:

Analyst: MNV

Date Prepared: 10/25/2017

Date Analyzed: 10/25/2017

Lab Batch ID: 3031539

Sample: 7633172-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300	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
Analytes											
Chloride	<5.00	250	248	99	250	246	98	1	90-110	20	

Analyst: MNV

Date Prepared: 10/25/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031544

Sample: 7633220-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300	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
Analytes											
Chloride	<5.00	250	248	99	250	253	101	2	90-110	20	

Analyst: ARM

Date Prepared: 10/26/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031676

Sample: 7633285-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH by Texas1005	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
Analytes											
C6-C12 Range Hydrocarbons	<25.0	1000	965	97	1000	981	98	2	75-125	25	
C12-C28 Range Hydrocarbons	<25.0	1000	1000	100	1000	1010	101	1	75-125	25	

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

Blank Spike Recovery [D] = 100*(C)/[B]

Blank Spike Duplicate Recovery [G] = 100*(F)/[E]

All results are based on MDL and Validated for QC Purposes



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566216

Project ID:

Lab Batch ID: 3031655

QC- Sample ID: 566321-002 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/26/2017

Date Prepared: 10/26/2017

Analyst: ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	0.00211	0.100	0.111	109	0.101	0.113	110	2	70-130	35	
Toluene	0.00542	0.100	0.0991	94	0.101	0.0928	87	7	70-130	35	
Ethylbenzene	<0.00201	0.100	0.0881	88	0.101	0.0768	76	14	71-129	35	
m,p-Xylenes	<0.00402	0.201	0.176	88	0.202	0.152	75	15	70-135	35	
o-Xylene	<0.00201	0.100	0.0847	85	0.101	0.0753	75	12	71-133	35	

Lab Batch ID: 3031663

QC- Sample ID: 566216-016 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/27/2017

Date Prepared: 10/26/2017

Analyst: ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00200	0.0998	0.119	119	0.0996	0.107	107	11	70-130	35	
Toluene	<0.00200	0.0998	0.110	110	0.0996	0.0972	98	12	70-130	35	
Ethylbenzene	<0.00200	0.0998	0.105	105	0.0996	0.0886	89	17	71-129	35	
m,p-Xylenes	<0.00399	0.200	0.212	106	0.199	0.188	94	12	70-135	35	
o-Xylene	<0.00200	0.0998	0.104	104	0.0996	0.0930	93	11	71-133	35	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566216
Lab Batch ID: 3031744
Date Analyzed: 10/27/2017
Reporting Units: mg/kg

Project ID:
QC- Sample ID: 566341-001 S **Batch #:** 1 **Matrix:** Soil
Date Prepared: 10/27/2017 **Analyst:** ALJ

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	0.00630	0.101	0.0589	52	0.100	0.0644	58	9	70-130	35	X
Toluene	0.0546	0.101	0.0688	14	0.100	0.0685	14	0	70-130	35	X
Ethylbenzene	0.0235	0.101	0.0584	35	0.100	0.0668	43	13	71-129	35	X
m,p-Xylenes	0.124	0.202	0.132	4	0.200	0.141	9	7	70-135	35	X
o-Xylene	0.0410	0.101	0.0641	23	0.100	0.0714	30	11	71-133	35	X

Lab Batch ID: 3031768
Date Analyzed: 10/27/2017
Reporting Units: mg/kg

QC- Sample ID: 566146-004 S **Batch #:** 1 **Matrix:** Soil
Date Prepared: 10/27/2017 **Analyst:** ALJ

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00202	0.101	0.0656	65	0.101	0.0651	64	1	70-130	35	X
Toluene	<0.00202	0.101	0.0749	74	0.101	0.0712	70	5	70-130	35	
Ethylbenzene	<0.00202	0.101	0.0752	74	0.101	0.0759	75	1	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.147	73	0.201	0.149	74	1	70-135	35	
o-Xylene	<0.00202	0.101	0.0734	73	0.101	0.0751	74	2	71-133	35	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
 N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566216

Project ID:

Lab Batch ID: 3031539

QC- Sample ID: 566212-008 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/26/2017

Date Prepared: 10/25/2017

Analyst: MNV

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	47.3	249	310	106	249	310	106	0	90-110	20	

Lab Batch ID: 3031539

QC- Sample ID: 566215-002 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/25/2017

Date Prepared: 10/25/2017

Analyst: MNV

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	5.80	248	266	105	248	269	106	1	90-110	20	

Lab Batch ID: 3031544

QC- Sample ID: 566216-005 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/26/2017

Date Prepared: 10/25/2017

Analyst: MNV

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	683	247	892	85	247	873	77	2	90-110	20	X

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566216
Lab Batch ID: 3031544
Date Analyzed: 10/26/2017
Reporting Units: mg/kg

Project ID:
QC- Sample ID: 566216-015 S **Batch #:** 1 **Matrix:** Soil
Date Prepared: 10/25/2017 **Analyst:** MNV

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300	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
Analytes											
Chloride	<5.00	250	269	108	250	269	108	0	90-110	20	

Lab Batch ID: 3031676
Date Analyzed: 10/26/2017
Reporting Units: mg/kg

QC- Sample ID: 566219-001 S **Batch #:** 1 **Matrix:** Soil
Date Prepared: 10/26/2017 **Analyst:** ARM

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TPH by Texas1005	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
Analytes											
C6-C12 Range Hydrocarbons	<25.0	999	941	94	998	957	96	2	75-125	25	
C12-C28 Range Hydrocarbons	<25.0	999	977	98	998	967	97	1	75-125	25	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
 N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



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CHAIN OF CUSTODY

Page 1 of 3

San Antonio, Texas (210-509-3334)
 Midland, Texas (432-704-5251)

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Phoenix, Arizona (480-355-0900)

Client / Reporting Information		Project Information		Xenco Quote #		Xenco Job #		Matrix Codes									
Company Name / Branch: COG Operating LLC		Project Name/Number: Houma State #1		5600216				W = Water S = Soil/Seed/Solid GW = Ground Water DW = Drinking Water P = Product SW = Surface water SL = Sludge OW = Ocean/Sea Water WI = Wipe O = Oil WW = Waste Water A = Air									
Company Address: 2407 PECOS AVENUE Artesia NM 88210		Project Location: Houma State #1															
Email: alieb@concho.com dneeiz@concho.com raskell@concho.com slitchcock@concho.com		Invoice To: COG Operating LLC Attn: Robert McNeill 600 W. Illinois Midland TX 79701															
Project Contact: Aaron Lieb		PO Number:															
Sampler's Name: Aaron Lieb																	
No.	Field ID / Point of Collection	Collection			Number of preserved bottles						TPH/ EXTENDED	BTEX	Chloride	Field Comments			
		Sample Depth	Date	Time	Matrix	# of bottles	HCl	NaOH/Zn Acetate	HNO3	H2SO4					NaOH	NaHSO4	MEOH
1	T1 - Surf	2	10/16/17	1:00pm	S	1											
2	T1 - 1'	2															
3	T1 - 2'	2															
4	T1 - 3'	2															
5	T1 - 4'	2															
6	T1 - 5'	2															
7	T1 - 6'	2															
8	T1 - 8'	2															
9	T1 - 10'	2															
10	T1 - 12'	2															
Turnaround Time (Business days)																	
<input type="checkbox"/> Same Day TAT <input type="checkbox"/> Next Day EMERGENCY <input type="checkbox"/> 2 Day EMERGENCY <input type="checkbox"/> 3 Day EMERGENCY		<input type="checkbox"/> 5 Day TAT <input checked="" type="checkbox"/> Day TAT <input type="checkbox"/> Contract TAT		<input type="checkbox"/> Level II Std QC <input type="checkbox"/> Level III Std QC + Forms <input type="checkbox"/> Level 3 (CLP Forms) <input type="checkbox"/> TRRP Checklist		<input type="checkbox"/> Level IV (Full Data Pkg /raw data) <input type="checkbox"/> TRRP Level IV <input type="checkbox"/> UST / RG -411		Temp: 3.2 CF: (0-6: -0.2°C) (6-23: +0.2°C) Corrected Temp: 3		IR ID: R-8							
TAT Starts Day received by Lab, if received by 5:00 pm																	
SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION, INCLUDING COURIER DELIVERY										FED-EX / UPS: Tracking #							
Relinquished by Sampler:		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
1		10/24/17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
3		10/24/17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
5		10/24/17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
Relinquished by:		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
3		10/24/17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
5		10/24/17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
Custody Seal #		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
4		10-19-17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
On Ice		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
13		10-19-17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
Cooler Temp.		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
13		10-19-17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					
Thermo. Corr. Factor		Date Time:		Received By:		Date Time:		Relinquished By:		Date Time:		Received By:					
13		10-19-17		Ariel Butler		10-19-17		Ariel Butler		10-19-17		Ariel Butler					

Notice: Signature of this document and relinquishment of samples constitutes a valid purchase order from client company to Xenco, its affiliates and subcontractors. It assigns standard terms and conditions of service. Xenco will be liable only for the cost of samples and shall not assume any responsibility for any losses or expenses incurred by the client if such losses are due to circumstances beyond the control of Xenco. A minimum charge of \$75 will be applied to each project. Xenco's liability will be limited to the cost of samples. Any samples received by Xenco but not analyzed will be invoiced at \$5 per sample. These terms will be enforced unless previously negotiated under a fully executed client contract.



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CHAIN OF CUSTODY

Page 2 of 3

San Antonio, Texas (210-509-3334)
 Midland, Texas (432-704-5251)

Phoenix, Arizona (480-355-0900)

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Client / Reporting Information		Project Information		Xenco Quote #		Xenco Job #		Matrix Codes								
Company Name / Branch: COG Operating LLC Company Address: 2407 PECOS AVENUE Aftersia NM 88210		Project Name/Number: Houston State #1 Project Location: Houston State #1		Xenco Quote #		Xenco Job #		Matrix Codes								
Email: aileb@concho.com Phone No: 575-748-1553 slitlichcock@concho.com Project Contact: Aaron Lieb		Invoice To: COG Operating LLC Attn: Robert McNeill 600 W. Illinois Midland TX 79701		5106216				W = Water S = Soil/Sed/Solid GW = Ground Water DW = Drinking Water P = Product SW = Surface water SL = Sludge OW = Ocean/Sea Water WI = Wipe O = Oil WW = Waste Water A = Air								
Sampler's Name: Aaron Lieb		PO Number:														
No.	Field ID / Point of Collection	Collection			Number of preserved bottles						TPH/ EXTENDED	BTEX	Chloride	Field Comments		
		Sample Depth	Date	Time	Matrix	# of bottles	HCl	NaOH/Zn Acetate	HNO3	H2SO4					NaOH	NaHSO4
1	T1-14'	14'	10/17	1:30pm	S	1										
2	T2-50RF	0		2:00pm	S	1										
3	T2-1'															
4	T2-2'															
5	T2-3'															
6	T2-4'															
7	T2-6'															
8	T2-8'															
9	T2-10'															
10	T2-12'															
Turnaround Time (Business days)																
Data Deliverable Information																
Notes:																
<input type="checkbox"/> Same Day TAT <input type="checkbox"/> 5 Day TAT <input type="checkbox"/> Next Day EMERGENCY <input checked="" type="checkbox"/> 7 Day TAT <input type="checkbox"/> 2 Day EMERGENCY <input type="checkbox"/> Contract TAT <input type="checkbox"/> 3 Day EMERGENCY <input type="checkbox"/> TRRP Checklist																
TAT Starts Day received by Lab, if received by 5:00 pm																
SAMPLE CUSTODY MUST BE DOCUMENTED BELOW EACH TIME SAMPLES CHANGE POSSESSION, INCLUDING COURIER DELIVERY																
Relinquished by Sampler:		Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	
1				10-14-17		10-14-17		10-14-17		10-14-17		10-14-17		10-14-17		
3																
5																
Relinquished by:		Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	
3																
5																
Custody Seal #		Preserved where applicable		On Ice		Cooler Temp.		Thermo. Corr. Factor		Temp: 3.2		CF: (0-6: -0.2°C)		IR ID: R-8		
4						15°C				Corrected Temp: 3						

Analytical Report 566219

for
COG Operating, LLC

Project Manager: Sheldon Hitchcock

Houma State #1

30-OCT-17

Collected By: Client



1211 W. Florida Ave, Midland TX 79701

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

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

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



30-OCT-17

Project Manager: **Sheldon Hitchcock**
COG Operating, LLC
600 W Illinois
Midland, TX 79701

Reference: XENCO Report No(s): **566219**
Houma State #1
Project Address: Houma State #1

Sheldon Hitchcock:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 566219. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

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

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 566219 will be filed for 45 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

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

Respectfully,

Kelsey Brooks

Project Manager

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Houston - Dallas - Midland - San Antonio - Phoenix - Oklahoma - Latin America



Sample Cross Reference 566219



COG Operating, LLC, Midland, TX

Houma State #1

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
North Surf	S	10-16-17 14:00	0	566219-001
North 1'	S	10-16-17 14:00	1	566219-002
South Surf	S	10-16-17 14:00	0	566219-003
South 1'	S	10-16-17 14:00	1	566219-004
East Surf	S	10-16-17 14:00	0	566219-005
East 1'	S	10-16-17 14:00	1	566219-006



CASE NARRATIVE

Client Name: COG Operating, LLC

Project Name: Houma State #1

Project ID:
Work Order Number(s): 566219

Report Date: 30-OCT-17
Date Received: 10/19/2017

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-3031638 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.

Batch: LBA-3031732 BTEX by EPA 8021B

Soil samples were not received in Terracore kits and therefore were prepared by method 5030.



Certificate of Analysis Summary 566219

COG Operating, LLC, Midland, TX

Project Name: Houma State #1



Project Id:
Contact: Sheldon Hitchcock
Project Location: Houma State #1

Date Received in Lab: Thu Oct-19-17 11:45 am
Report Date: 30-OCT-17
Project Manager: Kelsey Brooks

<i>Analysis Requested</i>	<i>Lab Id:</i>	566219-001	566219-002	566219-003	566219-004	566219-005	566219-006
	<i>Field Id:</i>	North Surf	North 1'	South Surf	South 1'	East Surf	East 1'
	<i>Depth:</i>	0-	1-	0-	1-	0-	1-
	<i>Matrix:</i>	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	<i>Sampled:</i>	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00	Oct-16-17 14:00
BTEX by EPA 8021B	<i>Extracted:</i>	Oct-26-17 10:30	Oct-26-17 10:30	Oct-26-17 10:30	Oct-25-17 10:30	Oct-25-17 10:30	Oct-25-17 10:30
	<i>Analyzed:</i>	Oct-26-17 12:24	Oct-26-17 12:42	Oct-26-17 13:04	Oct-26-17 04:58	Oct-26-17 07:41	Oct-26-17 08:01
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Benzene		0.00558 0.00364	0.0233 0.00353	<0.00345 0.00345	0.0110 0.00201	0.00880 0.00199	0.00352 0.00199
Toluene		<0.00364 0.00364	0.0334 0.00353	<0.00345 0.00345	0.0157 0.00201	<0.00199 0.00199	0.00806 0.00199
Ethylbenzene		<0.00364 0.00364	0.00385 0.00353	<0.00345 0.00345	0.00446 0.00201	<0.00199 0.00199	<0.00199 0.00199
m,p-Xylenes		<0.00727 0.00727	<0.00707 0.00707	<0.00690 0.00690	0.00485 0.00402	<0.00398 0.00398	<0.00398 0.00398
o-Xylene		<0.00364 0.00364	<0.00353 0.00353	<0.00345 0.00345	0.00262 0.00201	0.00221 0.00199	<0.00199 0.00199
Total Xylenes		<0.00364 0.00364	<0.00353 0.00353	<0.00345 0.00345	0.00747 0.00201	0.00221 0.00199	<0.00199 0.00199
Total BTEX		0.00558 0.00364	0.0606 0.00353	<0.00345 0.00345	0.0386 0.00201	0.0110 0.00199	0.0116 0.00199
Chloride by EPA 300	<i>Extracted:</i>	Oct-25-17 13:00	Oct-25-17 13:00	Oct-25-17 13:00	Oct-25-17 15:20	Oct-25-17 15:20	Oct-25-17 15:20
	<i>Analyzed:</i>	Oct-26-17 05:23	Oct-26-17 05:30	Oct-26-17 05:36	Oct-26-17 09:58	Oct-26-17 10:19	Oct-26-17 10:25
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
Chloride		<5.00 5.00	<4.98 4.98	<4.96 4.96	<1.99 1.99	<1.97 1.97	<1.96 1.96
TPH by Texas1005	<i>Extracted:</i>	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00	Oct-26-17 14:00
	<i>Analyzed:</i>	Oct-26-17 20:48	Oct-26-17 21:48	Oct-26-17 22:08	Oct-26-17 22:28	Oct-26-17 22:47	Oct-26-17 23:07
	<i>Units/RL:</i>	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL	mg/kg RL
C6-C12 Range Hydrocarbons		<25.0 25.0	<24.9 24.9	<25.0 25.0	<24.9 24.9	<25.0 25.0	<25.0 25.0
C12-C28 Range Hydrocarbons		<25.0 25.0	<24.9 24.9	<25.0 25.0	<24.9 24.9	<25.0 25.0	<25.0 25.0
C28-C35 Range Hydrocarbons		<25.0 25.0	<24.9 24.9	<25.0 25.0	<24.9 24.9	<25.0 25.0	<25.0 25.0
Total TPH		<25.0 25.0	<24.9 24.9	<25.0 25.0	<24.9 24.9	<25.0 25.0	<25.0 25.0

This analytical report, and the entire data package it represents, has been made for your exclusive and confidential use. The interpretations and results expressed throughout this analytical report represent the best judgment of XENCO Laboratories. XENCO Laboratories assumes no responsibility and makes no warranty to the end use of the data hereby presented. Our liability is limited to the amount invoiced for this work order unless otherwise agreed to in writing.

Houston - Dallas - San Antonio - Atlanta - Tampa - Boca Raton - Latin America - Odessa - Corpus Christi

Kelsey Brooks
Project Manager

- X** In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.
- B** A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.
- D** The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.
- E** The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.
- F** RPD exceeded lab control limits.
- J** The target analyte was positively identified below the quantitation limit and above the detection limit.
- U** Analyte was not detected.
- L** The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.
- H** The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.
- K** Sample analyzed outside of recommended hold time.
- JN** A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

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

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

DL Method Detection Limit

NC Non-Calculable

+ NELAC certification not offered for this compound.

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

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	(602) 437-0330	



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566219,

Lab Batch #: 3031732

Sample: 566219-004 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 04:58

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0272	0.0300	91	80-120	
4-Bromofluorobenzene	0.0313	0.0300	104	80-120	

Lab Batch #: 3031732

Sample: 566219-005 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 07:41

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0252	0.0300	84	80-120	
4-Bromofluorobenzene	0.0284	0.0300	95	80-120	

Lab Batch #: 3031732

Sample: 566219-006 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 08:01

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0247	0.0300	82	80-120	
4-Bromofluorobenzene	0.0277	0.0300	92	80-120	

Lab Batch #: 3031638

Sample: 566219-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 12:24

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0304	0.0300	101	80-120	
4-Bromofluorobenzene	0.0354	0.0300	118	80-120	

Lab Batch #: 3031638

Sample: 566219-002 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 12:42

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0354	0.0300	118	80-120	
4-Bromofluorobenzene	0.0351	0.0300	117	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566219,

Lab Batch #: 3031638

Sample: 566219-003 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 13:04

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0282	0.0300	94	80-120	
4-Bromofluorobenzene	0.0331	0.0300	110	80-120	

Lab Batch #: 3031676

Sample: 566219-001 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 20:48

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	54.2	49.9	109	70-130	
1-Chlorooctane	97.6	99.8	98	70-130	

Lab Batch #: 3031676

Sample: 566219-002 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 21:48

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	53.2	49.8	107	70-130	
1-Chlorooctane	96.1	99.6	96	70-130	

Lab Batch #: 3031676

Sample: 566219-003 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 22:08

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	52.4	50.0	105	70-130	
1-Chlorooctane	94.4	99.9	94	70-130	

Lab Batch #: 3031676

Sample: 566219-004 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 22:28

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	51.6	49.9	103	70-130	
1-Chlorooctane	94.3	99.7	95	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566219,

Lab Batch #: 3031676

Sample: 566219-005 / SMP

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 22:47

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	53.4	49.9	107	70-130	
1-Chlorooctane	96.4	99.8	97	70-130	

Lab Batch #: 3031676

Sample: 566219-006 / SMP

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 23:07

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	49.9	49.9	100	70-130	
1-Chlorooctane	92.6	99.8	93	70-130	

Lab Batch #: 3031732

Sample: 7633241-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/25/17 22:59

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0255	0.0300	85	80-120	
4-Bromofluorobenzene	0.0264	0.0300	88	80-120	

Lab Batch #: 3031638

Sample: 7633352-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 11:18

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0311	0.0300	104	80-120	
4-Bromofluorobenzene	0.0346	0.0300	115	80-120	

Lab Batch #: 3031676

Sample: 7633285-1-BLK / BLK

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 19:49

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	58.3	50.0	117	70-130	
1-Chlorooctane	105	100	105	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566219,

Project ID:

Lab Batch #: 3031732

Sample: 7633241-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/25/17 21:07

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0274	0.0300	91	80-120	
4-Bromofluorobenzene	0.0294	0.0300	98	80-120	

Lab Batch #: 3031638

Sample: 7633352-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 09:43

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0295	0.0300	98	80-120	
4-Bromofluorobenzene	0.0351	0.0300	117	80-120	

Lab Batch #: 3031676

Sample: 7633285-1-BKS / BKS

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 20:09

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	60.7	50.0	121	70-130	
1-Chlorooctane	112	100	112	70-130	

Lab Batch #: 3031732

Sample: 7633241-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/25/17 21:25

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0278	0.0300	93	80-120	
4-Bromofluorobenzene	0.0297	0.0300	99	80-120	

Lab Batch #: 3031638

Sample: 7633352-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 10:01

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0302	0.0300	101	80-120	
4-Bromofluorobenzene	0.0354	0.0300	118	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566219,

Project ID:

Lab Batch #: 3031676

Sample: 7633285-1-BSD / BSD

Batch: 1 Matrix: Solid

Units: mg/kg

Date Analyzed: 10/26/17 20:29

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	63.5	50.0	127	70-130	
1-Chlorooctane	110	100	110	70-130	

Lab Batch #: 3031732

Sample: 566212-007 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/25/17 21:43

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0291	0.0300	97	80-120	
4-Bromofluorobenzene	0.0327	0.0300	109	80-120	

Lab Batch #: 3031638

Sample: 566321-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 10:19

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0352	0.0300	117	80-120	
4-Bromofluorobenzene	0.0352	0.0300	117	80-120	

Lab Batch #: 3031676

Sample: 566219-001 S / MS

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 21:08

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	57.9	50.0	116	70-130	
1-Chlorooctane	108	99.9	108	70-130	

Lab Batch #: 3031732

Sample: 566212-007 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/25/17 22:02

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0291	0.0300	97	80-120	
4-Bromofluorobenzene	0.0320	0.0300	107	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.



Form 2 - Surrogate Recoveries

Project Name: Houma State #1

Work Orders : 566219,

Lab Batch #: 3031638

Sample: 566321-001 SD / MSD

Project ID:

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 10:37

SURROGATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
1,4-Difluorobenzene	0.0336	0.0300	112	80-120	
4-Bromofluorobenzene	0.0356	0.0300	119	80-120	

Lab Batch #: 3031676

Sample: 566219-001 SD / MSD

Batch: 1 Matrix: Soil

Units: mg/kg

Date Analyzed: 10/26/17 21:28

SURROGATE RECOVERY STUDY

TPH by Texas1005 Analytes	Amount Found [A]	True Amount [B]	Recovery %R [D]	Control Limits %R	Flags
o-Terphenyl	59.0	49.9	118	70-130	
1-Chlorooctane	111	99.8	111	70-130	

* Surrogate outside of Laboratory QC limits

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

*** Poor recoveries due to dilution

Surrogate Recovery [D] = 100 * A / B

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



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566219

Project ID:

Analyst: ALJ

Date Prepared: 10/25/2017

Date Analyzed: 10/25/2017

Lab Batch ID: 3031732

Sample: 7633241-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.126	125	0.101	0.125	124	1	70-130	35	
Toluene	<0.00202	0.101	0.124	123	0.101	0.124	123	0	70-130	35	
Ethylbenzene	<0.00202	0.101	0.119	118	0.101	0.121	120	2	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.239	118	0.201	0.242	120	1	70-135	35	
o-Xylene	<0.00202	0.101	0.116	115	0.101	0.118	117	2	71-133	35	

Analyst: ALJ

Date Prepared: 10/26/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031638

Sample: 7633352-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B	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
Analytes											
Benzene	<0.00202	0.101	0.0831	82	0.100	0.0804	80	3	70-130	35	
Toluene	<0.00202	0.101	0.0941	93	0.100	0.0894	89	5	70-130	35	
Ethylbenzene	<0.00202	0.101	0.0997	99	0.100	0.0943	94	6	71-129	35	
m,p-Xylenes	<0.00404	0.202	0.196	97	0.200	0.185	93	6	70-135	35	
o-Xylene	<0.00202	0.101	0.0958	95	0.100	0.0907	91	5	71-133	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



BS / BSD Recoveries



Project Name: Houma State #1

Work Order #: 566219

Project ID:

Analyst: MNV

Date Prepared: 10/25/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031544

Sample: 7633220-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300	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
Analytes											
Chloride	<5.00	250	248	99	250	253	101	2	90-110	20	

Analyst: MNV

Date Prepared: 10/25/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031640

Sample: 7633224-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300	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
Analytes											
Chloride	<5.00	250	242	97	250	242	97	0	90-110	20	

Analyst: ARM

Date Prepared: 10/26/2017

Date Analyzed: 10/26/2017

Lab Batch ID: 3031676

Sample: 7633285-1-BKS

Batch #: 1

Matrix: Solid

Units: mg/kg

BLANK /BLANK SPIKE / BLANK SPIKE DUPLICATE RECOVERY STUDY

TPH by Texas1005	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
Analytes											
C6-C12 Range Hydrocarbons	<25.0	1000	965	97	1000	981	98	2	75-125	25	
C12-C28 Range Hydrocarbons	<25.0	1000	1000	100	1000	1010	101	1	75-125	25	

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

Blank Spike Recovery [D] = 100*(C)/[B]

Blank Spike Duplicate Recovery [G] = 100*(F)/[E]

All results are based on MDL and Validated for QC Purposes



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566219

Project ID:

Lab Batch ID: 3031638

QC- Sample ID: 566321-001 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/26/2017

Date Prepared: 10/26/2017

Analyst: ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00199	0.0996	0.118	118	0.0992	0.117	118	1	70-130	35	
Toluene	0.00315	0.0996	0.112	109	0.0992	0.103	101	8	70-130	35	
Ethylbenzene	<0.00199	0.0996	0.0959	96	0.0992	0.0847	85	12	71-129	35	
m,p-Xylenes	<0.00398	0.199	0.190	95	0.198	0.167	84	13	70-135	35	
o-Xylene	<0.00199	0.0996	0.0904	91	0.0992	0.0786	79	14	71-133	35	

Lab Batch ID: 3031732

QC- Sample ID: 566212-007 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/25/2017

Date Prepared: 10/25/2017

Analyst: ALJ

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

BTEX by EPA 8021B Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Benzene	<0.00199	0.0996	0.123	123	0.100	0.112	112	9	70-130	35	
Toluene	<0.00199	0.0996	0.110	110	0.100	0.0992	99	10	70-130	35	
Ethylbenzene	<0.00199	0.0996	0.104	104	0.100	0.0924	92	12	71-129	35	
m,p-Xylenes	<0.00398	0.199	0.213	107	0.200	0.189	95	12	70-135	35	
o-Xylene	<0.00199	0.0996	0.106	106	0.100	0.0953	95	11	71-133	35	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566219

Project ID:

Lab Batch ID: 3031544

QC- Sample ID: 566216-005 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/26/2017

Date Prepared: 10/25/2017

Analyst: MNV

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	683	247	892	85	247	873	77	2	90-110	20	X

Lab Batch ID: 3031544

QC- Sample ID: 566216-015 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/26/2017

Date Prepared: 10/25/2017

Analyst: MNV

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	<5.00	250	269	108	250	269	108	0	90-110	20	

Lab Batch ID: 3031640

QC- Sample ID: 566219-004 S

Batch #: 1 **Matrix:** Soil

Date Analyzed: 10/26/2017

Date Prepared: 10/25/2017

Analyst: MNV

Reporting Units: mg/kg

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300 Analytes	Parent Sample Result [A]	Spike Added [B]	Spiked Sample Result [C]	Spiked Sample %R [D]	Spike Added [E]	Duplicate Spiked Sample Result [F]	Spiked Dup. %R [G]	RPD %	Control Limits %R	Control Limits %RPD	Flag
Chloride	<1.99	99.6	101	101	99.6	101	101	0	90-110	20	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Form 3 - MS / MSD Recoveries



Project Name: Houma State #1

Work Order # : 566219
Lab Batch ID: 3031640
Date Analyzed: 10/26/2017
Reporting Units: mg/kg

Project ID:
QC- Sample ID: 566220-008 S **Batch #:** 1 **Matrix:** Soil
Date Prepared: 10/25/2017 **Analyst:** MNV

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

Chloride by EPA 300	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
Analytes											
Chloride	9.02	247	258	101	247	261	102	1	90-110	20	

Lab Batch ID: 3031676
Date Analyzed: 10/26/2017
Reporting Units: mg/kg

QC- Sample ID: 566219-001 S **Batch #:** 1 **Matrix:** Soil
Date Prepared: 10/26/2017 **Analyst:** ARM

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY STUDY

TPH by Texas1005	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
Analytes											
C6-C12 Range Hydrocarbons	<25.0	999	941	94	998	957	96	2	75-125	25	
C12-C28 Range Hydrocarbons	<25.0	999	977	98	998	967	97	1	75-125	25	

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

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

ND = Not Detected, J = Present Below Reporting Limit, B = Present in Blank, NR = Not Requested, I = Interference, NA = Not Applicable
 N = See Narrative, EQL = Estimated Quantitation Limit, NC = Non Calculable - Sample amount is > 4 times the amount spiked.



Setting the Standard since 1990
 Stafford, Texas (281-240-4200)
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CHAIN OF CUSTODY

Page 7 of 7

San Antonio, Texas (210-509-3334)
 Midland, Texas (432-704-5251)

Phoenix, Arizona (480-355-0900)

www.xenco.com

Xenco Quote #

Xenco Job #

566219

Matrix Codes

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

Client / Reporting Information

Company Name / Branch: COG Operating LLC
 Company Address: 2407 PECOS AVENUE Afton, NM 88210

Project Information

Project Name/Number: Houma State #1
 Project Location: Houma State #1

Email: alieb@concho.com Phone No: 575-748-1553
 slitchcock@concho.com
 Project Contact: Aaron Lieb

Invoice To: COG Operating LLC
 Attn: Robert McNeill
 600 W. Illinois
 Midland TX 79701

Sampler's Name: Aaron Lieb

PO Number:

No. Field ID / Point of Collection

No.	Field ID / Point of Collection	Sample Depth	Collection			Number of preserved bottles							TPH/ EXTENDED	BTEX	Chloride	Notes	Field Comments
			Date	Time	Matrix	# of bottles	HCl	NaOH/Zn Acetate	HNO3	H2SO4	NaOH	NaHSO4					
1	Noeth- Surf	0	10/16/17	2:00pm	S	1											
2	Noeth- 1'	0															
3	South- Surf	0															
4	South- 1'	0															
5	East- Surf	0															
6	East- 1'	0															
7																	
8																	
9																	
10																	

Data Deliverable Information

Turnaround Time (Business days) _____

Same Day TAT 5 Day TAT Level II Std QC Level IV (Full Data Pkg /raw data)

Next Day EMERGENCY 7 Day TAT Level III Std QC+ Forms TRRP Level IV

2 Day EMERGENCY Contract TAT Level 3 (CLP Forms) UST / RG -411

3 Day EMERGENCY TRRP Checklist

TAT Starts Day received by Lab, if received by 5:00 pm

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

Relinquished by Sampler:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:	Received By:	Date Time:	Relinquished By:	Date Time:
1. Steve P...	10/19/17	Steve P...	10-19-17	Steve P...	10-19-17	Steve P...	10-19-17	Steve P...	10-19-17	Steve P...	10-19-17	Steve P...	10-19-17	Steve P...	10-19-17	Steve P...	10-19-17
2. [Signature]	10/19/17	[Signature]	10-19-17	[Signature]	10-19-17												
3. [Signature]	10/19/17	[Signature]	10-19-17	[Signature]	10-19-17												
4. [Signature]	10/19/17	[Signature]	10-19-17	[Signature]	10-19-17												

FED-EX / UPS: Tracking #

Preserved where applicable

On Ice

Cooler Temp. 13°C

Thermo. Corr. Factor

Temp: 3.2 IR ID: R-8
 CF: (0-6: -0.2°C)
 (6-23: +0.2°C)
 Corrected Temp: 3

Notice: Signature of this document and relinquishment of samples constitutes a valid purchase order from client company to Xenco. Its affiliates and subcontractors. It assigns standard terms and conditions of service. Xenco will be liable only for the cost of samples and shall not assume any responsibility for any losses or expenses incurred by the client if such losses are due to circumstances beyond the control of Xenco. A minimum charge of \$75 will be applied to each project. Xenco's liability will be limited to the cost of samples. Any samples received by Xenco but not analyzed will be invoiced at \$5 per sample. These terms will be enforced unless previously negotiated under a fully executed client contract.

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

SEP 29 2017

Form C-141
Revised August 8, 2011

Submitted to appropriate District Office in accordance with 19.15.29 NMAC.

Release Notification and Corrective Action

NAB1727251108

OPERATOR

Initial Report Final Report

Name of Company: COG Operating LLC [OGRID] 229137	Contact: Robert McNeill
Address: 600 West Illinois Avenue, Midland TX 79701	Telephone No. 432-230-0077
Facility Name: HOUMA STATE #001	Facility Type: Battery

Surface Owner: State	Mineral Owner: State	API No. 30-015-31491
----------------------	----------------------	----------------------

LOCATION OF RELEASE

Unit Letter	Section	Township	Range	Feet from the	North/South Line	Feet from the	East/West Line	County
F	16	17S	30E	2310	North	2310	West	Eddy

Latitude 32.8355064 Longitude - 103.978096

NATURE OF RELEASE

Type of Release: Oil	Volume of Release: 13 bbls Oil	Volume Recovered: 10 bbls Oil
Source of Release: Flowline	Date and Hour of Occurrence: 9-27-2017 9:00 am	Date and Hour of Discovery: 9-27-2017 9:00 am

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.*

Please refer to the New Mexico Oil Conservation Division Website for updated form(s) at:
<http://www.emnrd.state.nm.us/OCD/forms.html> Thank you

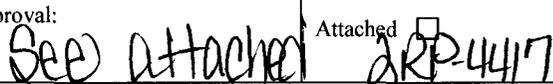
Describe Cause of Problem and Remedial Action Taken.*

The release occurred when the circulation line inside the firewall began to leak from corrosion. The circulation line was isolated and will be replaced.

Describe Area Affected and Cleanup Action Taken.*

The release occurred within the unlined facility and impacted the adjacent pasture to the east of the facility. Vacuum trucks were dispatched to recover all standing fluid. Concho will have the spill area evaluated for any possible impact from the release and we will present a remediation work plan to the NMOCD for approval prior to any significant remediation activities.

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	
	Approved by Environmental Specialist:	
Printed Name: Dakota Neel	Signed By 	
Title: HSE Coordinator	Approval Date: 9/29/17	Expiration Date: N/A
E-mail Address: dneel2@concho.com	Conditions of Approval:	
Date: September 29, 2017 Phone: 575-746-2010	See Attached Attached <input type="checkbox"/> 	

* Attach Additional Sheets If Necessary

Map Unit Description

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this report, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

Most of the soils similar to the major components have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Some minor components, however, have properties and behavior characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Eddy Area, New Mexico

KM—Kermit-Berino fine sands, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 1w4q

Elevation: 3,100 to 4,200 feet

Mean annual precipitation: 10 to 14 inches

Mean annual air temperature: 60 to 64 degrees F

Frost-free period: 190 to 230 days

Farmland classification: Not prime farmland

Map Unit Composition

Kermit and similar soils: 50 percent

Berino and similar soils: 35 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kermit

Setting

Landform: Alluvial fans, plains

Landform position (three-dimensional): Rise, talf

Down-slope shape: Linear, convex

Across-slope shape: Linear

Parent material: Mixed alluvium and/or eolian sands

Typical profile

H1 - 0 to 7 inches: fine sand

H2 - 7 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Excessively drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Very high (20.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline (0.0 to 1.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 1.0

Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: A

Ecological site: Deep Sand (R042XC005NM)

Hydric soil rating: No

Description of Berino

Setting

Landform: Fan piedmonts, plains

Landform position (three-dimensional): Riser

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Mixed alluvium and/or eolian sands

Typical profile

H1 - 0 to 17 inches: fine sand

H2 - 17 to 50 inches: fine sandy loam

H3 - 50 to 58 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat):

Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 40 percent

*Salinity, maximum in profile: Very slightly saline to slightly saline
(2.0 to 4.0 mmhos/cm)*

Sodium adsorption ratio, maximum in profile: 1.0

Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Ecological site: Loamy Sand (R042XC003NM)

Hydric soil rating: No

Minor Components

Active dune land

Percent of map unit:

Hydric soil rating: No

Data Source Information

Soil Survey Area: Eddy Area, New Mexico

Survey Area Data: Version 13, Sep 9, 2017

NMSLO Seed Mix

Shallow (SH)

SHALLOW (SH) SITES SEED MIXTURE:

COMMON NAME	VARIETY	APPLICATION RATE (PLS/Acre)	DRILL BOX
Grasses:			
Sideoats grama	Vaughn, El Reno	4.0	F
Blue grama	Lovington, Hachita	3.0	D
Little bluestem	Pastura, Cimmaron	1.5	F
Green sprangletop	VNS, Southern	1.0	D
Plains bristlegrass	VNS, Southern	1.0	D
Forbs:			
Firewheel (<i>Gaillardia</i>)	VNS, Southern	1.0	D
Shrubs:			
Fourwing saltbush	Marana, Santa Rita	1.0	D
Common winterfat	VNS, Southern	0.5	F
Total PLS/acre		13.0	

S = Small seed drill box, D = Standard seed drill box, F = Fluffy seed drill box

VNS = Variety Not Stated, PLS = Pure Live Seed

- Seed mixes should be provided in bags separating seed types into the three categories: small (S), standard (D) and fluffy (F).
- VNS, Southern – Seed should be from a southern latitude collection of this species.
- Double seed application rate for broadcast or hydroseeding.
- If one species is not available, contact the SLO for an approved substitute; alternatively the SLO may require other species proportionately increased.
- Additional information on these seed species can be found on the USDA Plants Database website at <http://plants.usda.gov>.

