

State of Colorado  
Oil and Gas Conservation Commission

1120 Lincoln Street, Suite 801, Denver, Colorado 80203 (303) 894-2100 Fax 894-2109



FOR OGCC USE ONLY

**SITE INVESTIGATION AND REMEDIATION WORKPLAN**

This form shall be submitted to the Director for approval prior to the initiation of site investigation and remediation activities. Form 27 is intended to be used whenever possible. Additional documentation will be required when large volumes of soil and groundwater have been impacted or involve large facilities with multiple source areas. See Rule 910. Attach as many pages as needed to fully describe the proposed work.

OGCC Employee:

☐ Spill ☐ Complaint  
☐ Inspection ☐ NOAV

Tracking No:

**CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED**

☒ Spill or Release ☐ Plug & Abandon ☐ Central Facility Closure ☐ Site/Facility Closure ☐ Other (describe):

**GENERAL INFORMATION**

OGCC Operator Number: 47120		Contact Name and Telephone	
Name of Operator: Kerr-McGee Oil & Gas Onshore LP		Name: Phillip Hamlin	
Address: P.O. Box 173779		No: (970) 336-3500	
City: Denver State: CO Zip: 80217-3779		Fax: (970) 336-3656	
API/Facility No: 317980		County: Weld	
Facility Name: Harold R Mixon Gas Unit-62N67W/25SWSW		Facility Number:	
Well Name:		Well Number:	
Location (QtrQtr, Sec, Twp, Rng, Meridian): SWSW Sec 25-T2N-R67W		Latitude: 40.103566 Longitude: -104.845464	

**TECHNICAL CONDITIONS**

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Oil and Produced Water

Site Conditions: Is location within a sensitive area (according to Rule 901e)? ☒ Y ☐ N If yes, attach evaluation. Groundwater < 20 ft.

Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Rangeland and Pasture

Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Fine Grained Sand and Clayey Sand

Potential receptors (water wells within 1/4 mi, surface waters, etc.): Buildings approximately 350' northeast, water well approximately 350' northeast, surface water approximately 225' east, livestock approximately 390' southeast, and excavation groundwater approximately 5' below ground surface (bgs).

Description of Impact (if previously provided, refer to that form or document):

Impacted Media (check):	Extent of Impact:	How Determined:
<input checked="" type="checkbox"/> Soils	36' N-S x 35' E-W x 6' deep (Maximum Extent)	Collected soil samples for laboratory analysis
<input type="checkbox"/> Vegetation		
<input checked="" type="checkbox"/> Groundwater	See attached data	Collected groundwater samples for laboratory analysis
<input type="checkbox"/> Surface water		

**REMEDIALTION WORKPLAN**

Describe initial action taken (if previously provided, refer to that form or document):

During abandonment activities at the Harold R Mixon Gas Unit-62N67W/25SWSW tank battery, petroleum hydrocarbon impacted groundwater was encountered while removing a produced water sump. There were no indications that the dumphines or produced water sump were leaking. The volume of the release is unknown. Groundwater was encountered in the excavation at approximately 5 feet bgs. One groundwater sample was collected and submitted for laboratory analysis for benzene, toluene, ethylbenzene, and total xylenes (BTEX). Laboratory analytical results received on July 2, 2015 indicated that benzene and total xylenes concentrations exceeded the Colorado Groundwater Quality Standards (CGWQS). A topographic Site Location Map showing the general location of the release is attached as Figure 1.

Describe how source is to be removed:

Six confirmation sidewall soil samples (N01@4', E01@4', E02@4', S01@4', W01@4', and W02@4') were collected from the excavation and submitted for laboratory analysis of total petroleum hydrocarbons (TPH), BTEX, pH, and specific conductivity (EC). Laboratory analytical results indicated that TPH, BTEX, pH, and EC levels were less than or within Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 allowable levels at the excavation extent. Groundwater was encountered in the excavation at approximately 5 feet bgs. Laboratory results for the excavation groundwater sample (GW01) indicated that the benzene and total xylenes concentrations exceeded the CGWQS at concentrations of 115 micrograms per liter (µg/L) and 1,840 µg/L, respectively. Approximately 280 cubic yards of impacted soil were removed from the excavation and transported to the Kerr-McGee land treatment facility in Weld County, Colorado for disposal. One hundred pounds of COGAC®, a carbon-based bioremediation product, were applied to the open excavation. The general site layout, excavation dimensions, and soil and groundwater sample locations are shown on the Excavation Site Map attached as Figure 2. The confirmation excavation soil and groundwater analytical results are summarized in Tables 1 and 2, respectively. The laboratory analytical reports are attached.

Describe how remediation of existing impacts is to be accomplished, including removal and disposal at an injection well or licensed facility, land treatment on site, removal of impacted groundwater, insitu bioremediation, burning of oily vegetation, etc.:

The impacted soil was transported to the Kerr McGee land treatment facility in Weld County, Colorado, for disposal.



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REMEDIATION WORKPLAN (CONT.)

OGCC Employee:

Tracking Number: \_\_\_\_\_  
Name of Operator: \_\_\_\_\_  
OGCC Operator No: \_\_\_\_\_  
Received Date: \_\_\_\_\_  
Well Name & No: \_\_\_\_\_  
Facility Name & No.: \_\_\_\_\_

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):

Four existing groundwater monitoring wells (MW01, MW03, MW04, and MW05) at the site from a previous groundwater investigation (COGCC Remediation #4352) were utilized for this assessment. On August 10, 2015, monitoring wells MW01, MW03, MW04, and MW05 were sampled and submitted for laboratory analysis of BTEX by United States Environmental Protection Agency Method 8260C. Monitoring well MW02 was destroyed as of the sampling event. Laboratory analytical results indicated that BTEX concentrations were less than the CGWQS and the laboratory reporting limit of 1.0 µg/L. The monitoring well locations are shown on Figure 2. The groundwater sample analytical results are summarized in Table 2 and the laboratory analytical report is attached.

The existing monitoring wells were surveyed on November 4, 2013 during the previous site investigation. The relative groundwater elevation data indicates that the groundwater flow direction is to the east. A Groundwater Elevation Contour Map for the August 2015 monitoring event is provided as Figure 3.

Based on the analytical results and groundwater flow direction, monitoring wells MW01, MW03, MW04, and MW05 have been designated as point of compliance (POC) wells. POC has been established at the site. Destroyed monitoring well MW02 will be replaced. Groundwater monitoring will continue on a quarterly basis.

Describe reclamation plan. Discuss existing and new grade recontouring; method and testing of compaction alleviation; and reseeding program, including location of new seed, seed mix and noxious weed prevention. Attach diagram or drawing. Use additional sheet for description if required.

The Kerr-McGee facility was deconstructed. The site was restored to its pre-release grade.

Attach samples and analytical results taken to verify remediation of impacts. Show locations of samples on an onsite schematic or drawing.

Is further site investigation required? ☐ Y ☒ N If yes, describe:

The relative groundwater elevation data indicates that the groundwater flow direction is to the east. Based on the analytical results, monitoring wells MW01, MW03, MW04, and MW05 have been designated as POC wells. POC has been established at the site. Destroyed monitoring well MW02 will be replaced. Groundwater monitoring will continue on a quarterly basis. The groundwater sample analytical results are summarized in Table 2 and the laboratory analytical report is attached. A Groundwater Elevation Contour Map is provided as Figure 3.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):

The impacted soil was transported to the Kerr McGee land treatment facility in Weld County, Colorado, for disposal.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began:	7/2/2015	Date Site Investigation Completed:	Active	Remediation Plan Submitted:	
Remediation Start Date:	7/2/2015	Anticipated Completion Date:	TBD	Actual Completion Date:	

I hereby certify that the statements made in this form are, to the best of my knowledge, true, correct, and complete.

Print Name: Phillip Hamlin

Signed: Title: Senior HSE Representative Date: 9/24/15

OGCC Approved: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_



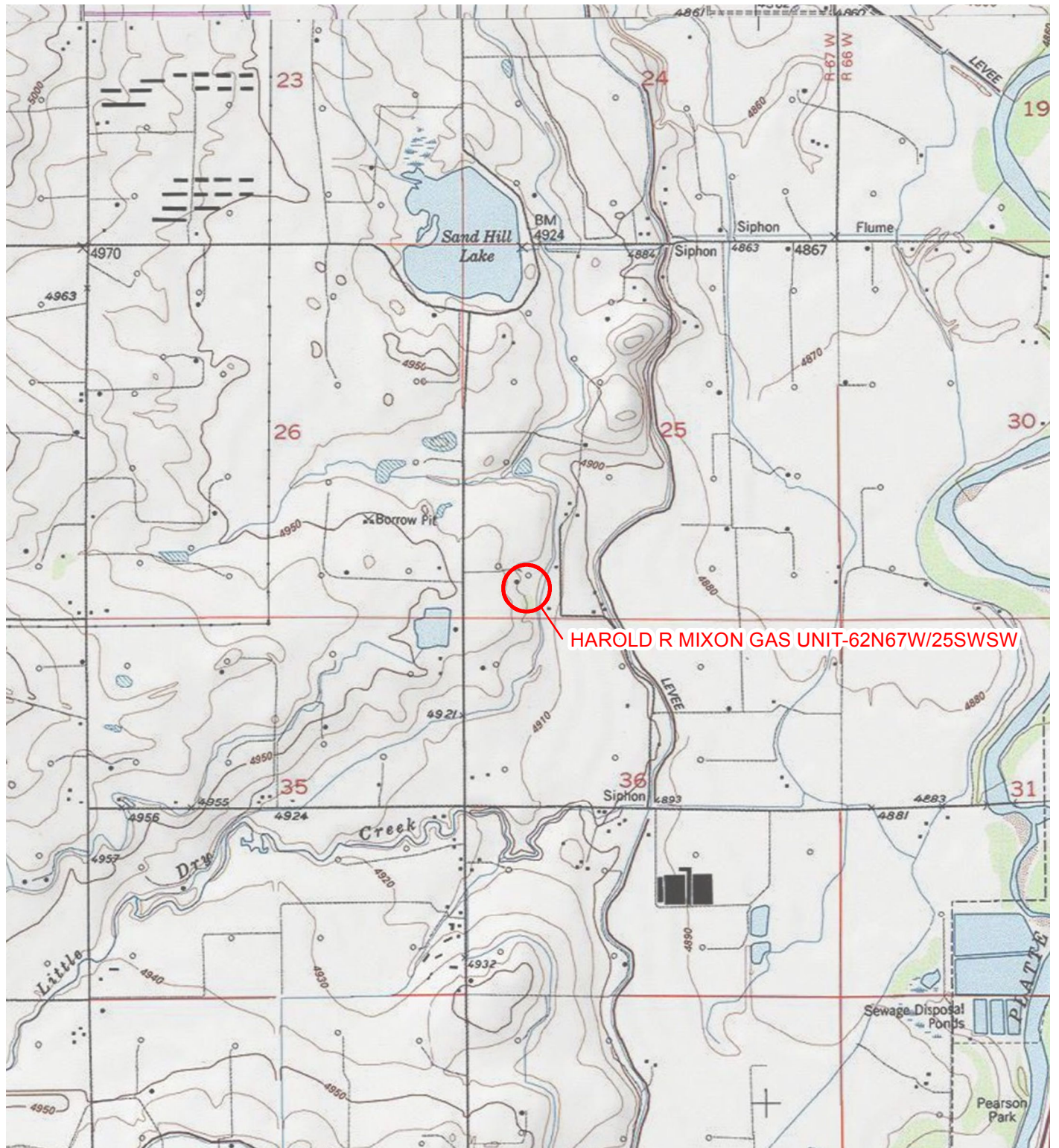
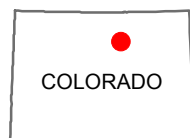
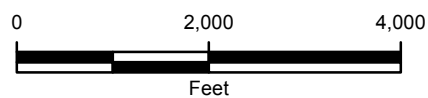


IMAGE COURTESY OF ESRI/USGS

# LEGEND

○ SITE LOCATION

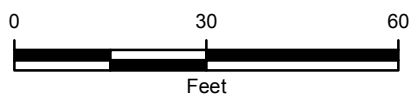


**FIGURE 1**  
**SITE LOCATION MAP**  
**HAROLD R MIXON GAS UNIT-62N67W/25SW**  
**SWSW SEC 25-T2N-R67W**  
**WELD COUNTY, COLORADO**  
**KERR-MCGEE OIL & GAS ONSHORE LP**





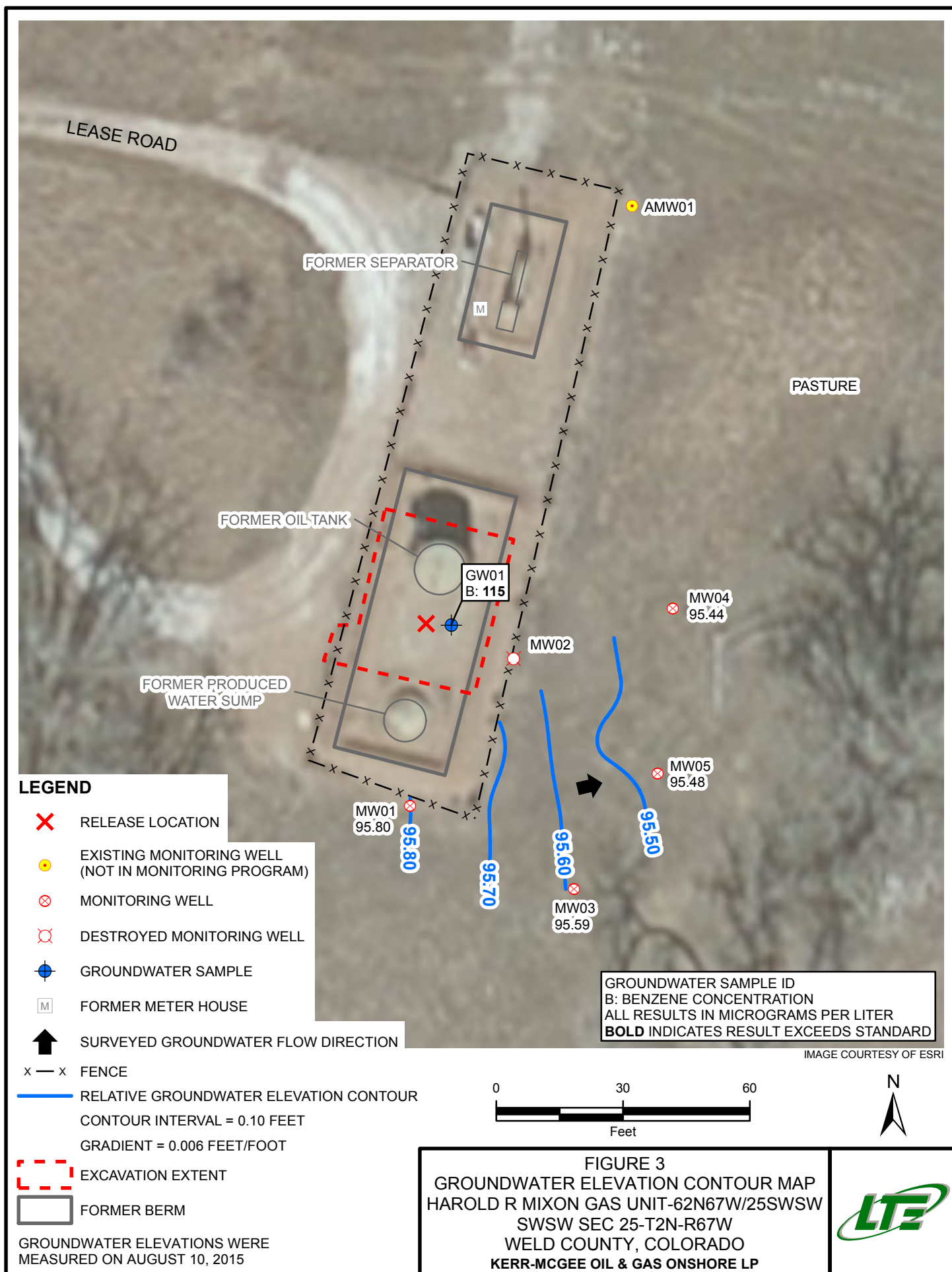
IMAGE COURTESY OF ESRI



**FIGURE 2**  
**EXCAVATION SITE MAP**  
 HAROLD R MIXON GAS UNIT-62N67W/25SWSW  
 SWSW SEC 25-T2N-R67W  
 WELD COUNTY, COLORADO  
**KERR-MCGEE OIL & GAS ONSHORE LP**







**TABLE 1**  
**SOIL SAMPLE ANALYTICAL RESULTS**  
**HAROLD R MIXON GAS UNIT-62N67W/25SWSW**  
**WELD COUNTY, COLORADO**  
**KERR-MCGEE OIL & GAS ONSHORE LP**

Soil Sample ID	Depth (bgs)	Date	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	DRO (mg/kg)	GRO (mg/kg)	ORO (mg/kg)	pH (su)	Specific Conductance (mmhos/cm)
E01 @ 4'	4'	07/01/2015	<0.002	<0.002	<0.002	<0.002	<25	<25	<100	7.49	0.154
N01 @ 4'	4'	07/01/2015	<0.050	<0.050	0.521	<0.050	<25	<25	<100	7.95	0.0908
W01 @ 4'	4'	07/01/2015	<0.050	<0.050	0.136	0.106	81	<25	<100	7.74	0.155
E02 @ 4'	4'	07/02/2015	<0.002	<0.002	<0.002	<0.002	<25	<25	<100	8.21	0.157
S01 @ 4'	4'	07/02/2015	<0.002	0.004	<0.002	0.007	<25	<25	<100	7.86	0.406
W02 @ 4'	4'	07/02/2015	<0.002	0.002	<0.002	0.007	<25	<25	<100	7.99	0.0955
<b>COGCC Allowable Levels</b>			<b>0.17</b>	<b>85</b>	<b>100</b>	<b>175</b>	<b>500*</b>	<b>500*</b>	<b>500*</b>	<b>6-9</b>	<b>4</b>

Notes: bgs - below ground surface  
COGCC - Colorado Oil and Gas Conservation Commission  
DRO - diesel range organics  
GRO - gasoline range organics  
mg/kg - milligrams per kilogram  
mmhos/cm - millimhos per centimeter

NA - not analyzed/not available  
ORO - oil range organics  
su - standard units  
\* - Standard applies to combined DRO-GRO-ORO  
< - less than laboratory reporting limit  
Bold indicates result exceeds allowable level



**TABLE 2**  
**GROUNDWATER ANALYTICAL AND FIELD RESULTS**  
**HAROLD R MIXON GAS UNIT-62N67W/25SSWSW**  
**WELD COUNTY, COLORADO**  
**KERR-MCGEE OIL & GAS ONSHORE LP**

Well Name	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth Water/ (Product Thickness) (ft bgs)	Relative GW Elev. (ft)
GW01	07/01/2015	<b>115</b>	<10.0	285	<b>1840</b>	5.00	NA
MW01	08/10/2015	<1.0	<1.0	<1.0	<1.0	4.00	95.80
MW02	08/10/2015	Damaged - Not Sampled MW02 destroyed as of 8/10/2015				Damaged	NA
MW03	08/10/2015	<1.0	<1.0	<1.0	<1.0	2.37	96.59
MW04	08/10/2015	<1.0	<1.0	<1.0	<1.0	4.01	95.44
MW05	08/10/2015	<1.0	<1.0	<1.0	<1.0	3.15	95.48
<b>CGWQS</b>		<b>5</b>	<b>1000</b>	<b>700</b>	<b>1400</b>		

Notes: CGWQS - Colorado Groundwater Quality Standards  
Elev. - elevation  
ft bgs - feet below ground surface  
GW - groundwater  
NA - not analyzed/not available

NM - not measured  
µg/L - micrograms per liter  
< - less than laboratory reporting limit  
Bold indicates result exceeds allowable level  
Excavation groundwater depth is approximate





August 14, 2015

LT Environmental, Inc.

John Cocroft

4600 West 60th Avenue

Arvada

CO 80003

**Project Name - KMG - Harold R Mixon Gas  
Unit-62N67W/25SWSW**

**Project Number - [none]**

Attached are your analytical results for KMG - Harold R Mixon Gas Unit-62N67W/25SWSW received by Origins Laboratory, Inc. August 10, 2015. This project is associated with Origins project number X508100-01.

The analytical results in the following report were analyzed under the guidelines of EPA Methods. These methods are identified as follows; "SW" are defined in SW-846, "EPA" are defined in 40CFR part 136 and "SM" are defined in the most current revision of Standard Methods For the Examination of Water and Wastewater.

The analytical results apply specifically to the samples and analyses specified per the attached Chain of Custody. As such, this report shall not be reproduced except in full, without the written approval of Origin's laboratory.

Unless otherwise noted, the analytical results for all soil samples are reported on a wet weight basis. All analytical analyses were performed under NELAP guidelines unless noted by a data qualifier.

Any holding time exceedances, deviations from the method specifications or deviations from Origins Laboratory's Standard Operating Procedures are outlined in the case narrative.

Thank you for selecting Origins for your analytical needs. Please contact us with any questions concerning this report, or if we can help with anything at all.

Origins Laboratory, Inc.  
303.433.1322  
o-squad@oelabinc.com



1725 Elk Place, Denver, CO 80211 | Phone: 303.433.1322 | Fax: 303.265.9645



LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SWWSW

## CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW01	X508100-01	Water	August 10, 2015 12:45	08/10/2015 17:21
MW03	X508100-02	Water	August 10, 2015 12:50	08/10/2015 17:21
MW04	X508100-03	Water	August 10, 2015 12:55	08/10/2015 17:21
MW05	X508100-04	Water	August 10, 2015 13:00	08/10/2015 17:21

Origins Laboratory, Inc.



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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SW

ORIGINS  
LABORATORY, INC

XSC8100

1725 Elk Place, Denver, CO 80211  
Laboratory # - 303.433.1322

Client: LT Environmental, Inc.			Project Manager: John Cocroft					
Project: KMG - Harold R Mixon Gas Unit-62N67W/25			Project Number: Inonel					
Number	Sample Identification	Matrix	Sample Date	Sample Time	Sampled By	Container	Qty	Analyses
01-001	MW01	Water	8/10/15	1245	JE	01_40mL Amber VOA Vial - HCL Clear Unpreserved	3	BTEX by EPA 8260C
02-001	MW02	Water				01_40mL Amber VOA Vial - HCL	3	BTEX by EPA 8260C
03-001	MW03	Water	8/10/15	1750	JE	01_40mL Amber VOA Vial - HCL Clear unpreserved	3	BTEX by EPA 8260C
04-001	MW04	Water		1755	✓	01_40mL Amber VOA Vial - HCL	3	BTEX by EPA 8260C
05-001	MW05	Water	✓	1300	✓	01_40mL Amber VOA Vial - HCL	3	BTEX by EPA 8260C

Relinquished By: [Signature] Date / Time: 8/10/15 1721

Received By: [Signature] Date / Time: 8/10/15 1721

Temperature on Receipt: 1.2

Ice present? (Yes) No

Turn Around Time: Same Day: [ ] 24-Hr: [ ] 72-Hr: [ ] Standard: [X]

Origins Laboratory, Inc.

Jefe Pellegrini

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SWSW

MW01

8/10/2015 12:45:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X508100-01 (Water)**

**BTEX by EPA 8260C**

Benzene	ND	1.0	ug/L	1	5H11015	08/11/2015	08/12/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	102 %	84-121			"	"	"
Surrogate: Toluene-d8	100 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	95.9 %	84-114			"	"	"

Origins Laboratory, Inc.



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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SWSW

## MW03

8/10/2015 12:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## Origins Laboratory, Inc. X508100-02 (Water)

### BTEX by EPA 8260C

Benzene	ND	1.0	ug/L	1	5H11015	08/11/2015	08/12/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	99.9 %	84-121			"	"	"
Surrogate: Toluene-d8	100 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	94.4 %	84-114			"	"	"

Origins Laboratory, Inc.



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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SWWSW

**MW04**

**8/10/2015 12:55:00PM**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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**Origins Laboratory, Inc.**  
**X508100-03 (Water)**

**BTEX by EPA 8260C**

Benzene	ND	1.0	ug/L	1	5H11015	08/11/2015	08/12/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	99.9 %	84-121			"	"	"
Surrogate: Toluene-d8	101 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	95.1 %	84-114			"	"	"

Origins Laboratory, Inc.



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LT Environmental, Inc.  
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Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SWSW

## MW05

8/10/2015 1:00:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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## Origins Laboratory, Inc. X508100-04 (Water)

### BTEX by EPA 8260C

Benzene	ND	1.0	ug/L	1	5H11015	08/11/2015	08/12/2015
Toluene	ND	1.0	"	"	"	"	"
Ethylbenzene	ND	1.0	"	"	"	"	"
Xylenes, total	ND	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	100 %	84-121			"	"	"
Surrogate: Toluene-d8	101 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	95.9 %	84-114			"	"	"

Origins Laboratory, Inc.



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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SW

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

**Blank (5H11015-BLK1)**

Prepared: 08/11/2015 Analyzed: 08/12/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5		99.1	84-121			
Surrogate: Toluene-d8	63		"	62.5		100	85-115			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.6	84-114			

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SW

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

**Blank (5H11015-BLK2)**

Prepared: 08/11/2015 Analyzed: 08/12/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	70		"	62.5	112		84-121			
Surrogate: Toluene-d8	61		"	62.5	98.4		85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5	99.7		84-114			

Origins Laboratory, Inc.



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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SW

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

**LCS (5H11015-BS1)**

Prepared: 08/11/2015 Analyzed: 08/12/2015

Benzene	51.8	1.0	ug/L	50.0		104	75-126			
Toluene	52.6	1.0	"	50.0		105	78.7-126			
Ethylbenzene	53.0	1.0	"	50.0		106	80-130			
m,p-Xylene	104	2.0	"	100		104	77.2-133			
o-Xylene	52.5	1.0	"	50.0		105	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	58		"	62.5		93.5	84-121			
Surrogate: Toluene-d8	63		"	62.5		100	85-115			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.3	84-114			

Origins Laboratory, Inc.



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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SWSW

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

**LCS (5H11015-BS2)**

Prepared: 08/11/2015 Analyzed: 08/12/2015

Benzene	48.7	1.0	ug/L	50.0		97.5	75-126			
Toluene	46.5	1.0	"	50.0		93.0	78.7-126			
Ethylbenzene	48.2	1.0	"	50.0		96.4	80-130			
m,p-Xylene	95.8	2.0	"	100		95.8	77.2-133			
o-Xylene	50.0	1.0	"	50.0		99.9	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	67		"	62.5		106	84-121			
Surrogate: Toluene-d8	61		"	62.5		98.3	85-115			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		96.9	84-114			

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LT Environmental, Inc.  
4600 West 60th Avenue  
Arvada CO 80003

John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SW

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

Matrix Spike (5H11015-MS1)		Source: X508082-01			Prepared: 08/11/2015 Analyzed: 08/12/2015					
Benzene	54.9	1.0	ug/L	50.0	ND	110	74-130			
Toluene	53.2	1.0	"	50.0	ND	106	73-131			
Ethylbenzene	55.9	1.0	"	50.0	ND	112	76-132			
m,p-Xylene	112	2.0	"	100	ND	112	69-139			
o-Xylene	54.7	1.0	"	50.0	ND	109	74-131			
Surrogate: 1,2-Dichloroethane-d4	66		"	62.5		105	84-121			
Surrogate: Toluene-d8	61		"	62.5		98.3	85-115			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.4	84-114			

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John Cocroft  
Project Number: [none]  
Project: KMG - Harold R Mixon Gas  
Unit-62N67W/25SW

**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

Matrix Spike (5H11015-MS2)		Source: X508082-02			Prepared: 08/11/2015 Analyzed: 08/12/2015					
Benzene	1180	1.0	ug/L	50.0	1380	NR	74-130			QM-4X
Toluene	51.3	1.0	"	50.0	ND	103	73-131			
Ethylbenzene	138	1.0	"	50.0	72.0	132	76-132			
m,p-Xylene	113	2.0	"	100	4.8	108	69-139			
o-Xylene	53.4	1.0	"	50.0	ND	107	74-131			
Surrogate: 1,2-Dichloroethane-d4	66		"	62.5		106	84-121			
Surrogate: Toluene-d8	61		"	62.5		96.8	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.5	84-114			

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**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

Matrix Spike Dup (5H11015-MSD1)		Source: X508082-01			Prepared: 08/11/2015 Analyzed: 08/12/2015					
Benzene	53.8	1.0	ug/L	50.0	ND	108	74-130	2.15	20	
Toluene	52.6	1.0	"	50.0	ND	105	73-131	1.02	20	
Ethylbenzene	55.5	1.0	"	50.0	ND	111	76-132	0.628	20	
m,p-Xylene	110	2.0	"	100	ND	110	69-139	1.99	20	
o-Xylene	54.9	1.0	"	50.0	ND	110	74-131	0.365	20	
Surrogate: 1,2-Dichloroethane-d4	67		"	62.5		107	84-121			
Surrogate: Toluene-d8	61		"	62.5		97.7	85-115			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.1	84-114			

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**Volatile Organic Compounds by GC/MS SW846 8260C - Quality Control**  
**Origins Laboratory, Inc.**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 5H11015 - EPA 5030B (Water)**

Matrix Spike Dup (5H11015-MSD2)		Source: X508082-02			Prepared: 08/11/2015 Analyzed: 08/12/2015					
Benzene	1230	1.0	ug/L	50.0	1380	NR	74-130	4.42	20	QM-4X
Toluene	53.4	1.0	"	50.0	ND	107	73-131	3.99	20	
Ethylbenzene	140	1.0	"	50.0	72.0	136	76-132	1.50	20	QM-07
m,p-Xylene	117	2.0	"	100	4.8	112	69-139	3.56	20	
o-Xylene	56.2	1.0	"	50.0	ND	112	74-131	5.18	20	
Surrogate: 1,2-Dichloroethane-d4	67		"	62.5		107	84-121			
Surrogate: Toluene-d8	60		"	62.5		96.4	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.7	84-114			

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Unit-62N67W/25SWWSW

## Notes and Definitions

- QM-4X The spike recovery was outside of QC acceptance limits for the MS and/or MSD due to analyte concentration at 4 times or greater the spike concentration. The QC batch was accepted based on LCS and/or LCSD recoveries within the acceptance limits.
- QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.
- ND Analyte NOT DETECTED at or above the reporting limit
- RPD Relative Percent Difference
- All soil results are reported at a wet weight basis.

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