

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.

CAUSE OF CONDITION BEING INVESTIGATED AND REMEDIATED

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

☐ Spill ☐ Complaint
☐ Inspection ☐ NOAV

Tracking No: _____

GENERAL INFORMATION

OGCC Operator Number: 47120		Contact Name and Telephone	
Name of Operator: Kerr-McGee Oil & Gas Onshore LP		Name: Phillip Hamlin	
Address: 1099 18th Street, Suite 1800		No: (970) 336-3500	
City: Denver State: CO Zip: 80202		Fax: (970) 336-3656	
API/Facility No: 332574		County: Weld	
Facility Name: HSR-Sharkey-64N67W/35SWNE		Facility Number: _____	
Well Name: _____		Well Number: _____	
Location (QtrQtr, Sec, Twp, Rng, Meridian): NWNE Sec 35-T4N-R67W		Latitude: 40.273035 Longitude: -104.855095	

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Condensate and Produced Water	
Site Conditions: Is location within a sensitive area (according to Rule 901e)? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N If yes, attach evaluation. Groundwater < 20 ft.	
Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Rangeland	
Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Well graded gravelly sands with inclusions of clay layers.	
Potential receptors (water wells within 1/4 mi, surface waters, etc.): Buildings approximately 1,910' NE, water well approximately 215' SW, surface water approximately 940' E, wetlands approximately 120' S, livestock approximately 1,400' NE, and groundwater approximately 3 feet below ground surface (bgs).	
Description of Impact (if previously provided, refer to that form or document):	
Impacted Media (check):	Extent of Impact:
<input checked="" type="checkbox"/> Soils	15' N-S x 15' E-W x 4' bgs
<input type="checkbox"/> Vegetation	_____
<input checked="" type="checkbox"/> Groundwater	See attached data
<input type="checkbox"/> Surface water	_____
How Determined:	
Collected soil samples for laboratory analysis	
Collected groundwater sample for laboratory analysis	

REMEDIALATION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document): <p>Following construction activities at the HSR-Sharkey-64N67W/35SWNE tank battery, historical petroleum hydrocarbon impacted groundwater was encountered beneath the 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 3 feet bgs. One groundwater sample was collected and submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX). Laboratory analytical results received on June 10, 2015, indicated that the benzene concentration exceeded the Colorado Groundwater Quality Standards (CGWQS) at a concentration of 66.5 micrograms per liter (µg/L). A topographic Site Location Map depicting the general location of the release is attached as Figure 1.</p>
Describe how source is to be removed: <p>Four sidewall soil samples (N01@2.5', E01@2.5', S01@2.5', and W01@2.5') were collected and submitted for the laboratory analysis of BTEX, total petroleum hydrocarbons (TPH), pH, and specific conductivity (EC). Laboratory analytical results received on June 11, 2015, indicated that BTEX, TPH, pH, and EC levels were in compliance with Colorado Oil and Gas Conservation Commission (COGCC) Table 910-1 allowable levels at the lateral extent of the excavation. Soils were excavated into the phreatic zone to address potential hydrocarbon impacts that may have been present below the current groundwater table due to seasonal fluctuations. Groundwater was encountered in the excavation at an approximate depth of 3 feet bgs. One groundwater sample (GW01) was collected from the open excavation and submitted for laboratory analysis of BTEX. Laboratory analytical results for the excavation groundwater sample received on June 10, 2015 indicated that the benzene concentration exceeded the CGWQS at a concentration of 66.5 µg/L. On June 10, 2015, approximately 5 barrels of impacted groundwater were removed from the excavation and transported to a licensed injection facility for disposal. Fifty pounds of COGAC®, a carbon-based bioremediation product, were applied to the open excavation. Approximately 34 cubic yards of soil were excavated and transported to a licensed disposal facility. The general site layout, excavation dimensions, and soil and groundwater sample locations are shown on the Excavation Site Map attached as Figure 2. The excavation soil and groundwater sample analytical results are summarized in Tables 1 and 2, respectively. The laboratory analytical report is attached.</p>
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.: <p>The impacted soil was transported to a licensed disposal facility. The impacted groundwater was removed from the excavation and transported to a licensed injection facility for disposal.</p>

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REMEDIATION WORKPLAN (CONT.)

OGCC Employee:

Tracking Number: _____
Name of Operator: Kerr-McGee Oil & Gas Onshore LP
OGCC Operator No: 47120
Received Date: _____
Well Name & No: _____
Facility Name & No.: HSR-Sharkey-64N67W/35SWNE

If groundwater has been impacted, describe proposed monitoring plan (# of wells or sample points, sampling schedule, analytical methods, etc.):
Groundwater monitoring wells will be installed at the site to fully define the extent and magnitude of the release. The monitoring wells will be surveyed so that the groundwater flow direction can be accurately determined. Groundwater monitoring activities will be conducted on a quarterly basis and all groundwater samples will be submitted for laboratory analysis of BTEX.

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 produced water sump was replaced. 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:
After installing the monitoring wells and establishing point of compliance, groundwater monitoring will continue on a quarterly basis.

Final disposition of E&P waste (landtreated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):
The impacted soil was transported to a licensed disposal facility. The impacted groundwater was removed from the excavation and transported to a licensed injection facility for disposal.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began:	<u>6/10/15</u>	Date Site Investigation Completed:	<u>Active</u>	Remediation Plan Submitted:	_____
Remediation Start Date:	<u>6/10/15</u>	Anticipated Completion Date:	<u>TBD</u>	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: 8/27/15

OGCC Approved: _____ Title: _____ Date: _____

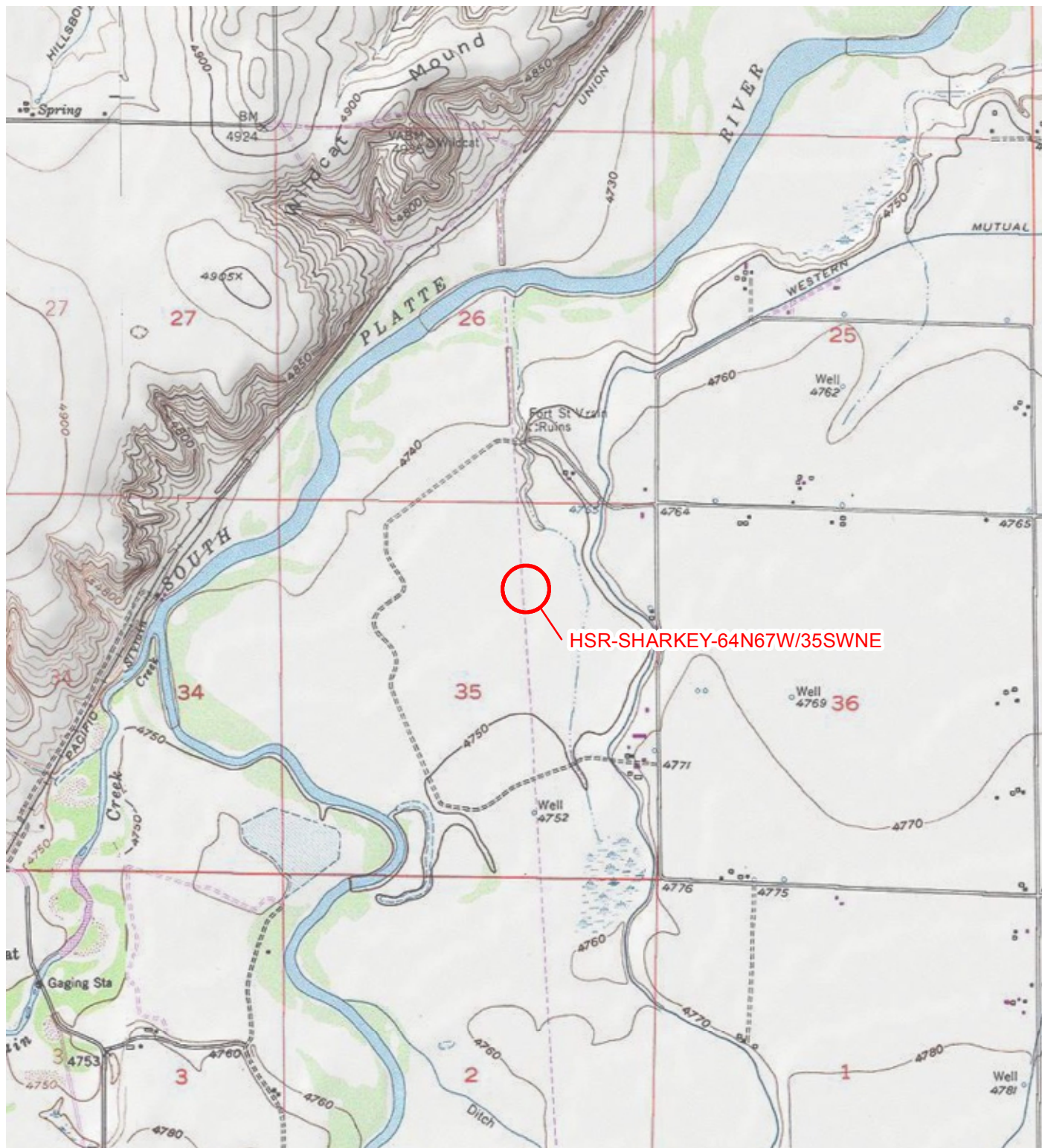


IMAGE COURTESY OF ESRI/USGS

LEGEND

○ SITE LOCATION

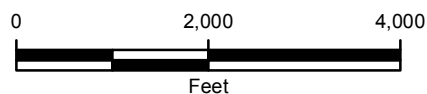


FIGURE 1
SITE LOCATION MAP
 HSR-SHARKEY-64N67W/35SWNE
 NWNE SEC 35-T4N-R67W
 WELD COUNTY, COLORADO
 KERR-MCGEE OIL & GAS ONSHORE LP





GROUNDWATER SAMPLE ID
B: BENZENE CONCENTRATION
ALL RESULTS IN MICROGRAMS PER LITER
BOLD INDICATES RESULT EXCEEDS STANDARD

LEGEND

- X RELEASE LOCATION
- SOIL SAMPLE
- + GROUNDWATER SAMPLE
- EXCAVATION EXTENT
- FORMER BERM

AST: ABOVEGROUND STORAGE TANK

IMAGE COURTESY OF ESRI

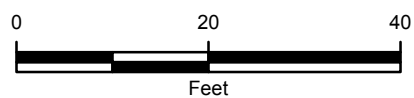


FIGURE 2
EXCAVATION SITE MAP
HSR-SHARKEY-64N67W/35SWNE
NWNE SEC 35-T4N-R67W
WELD COUNTY, COLORADO
KERR-MCGEE OIL & GAS ONSHORE LP



TABLE 1
SOIL SAMPLE ANALYTICAL RESULTS
HSR-SHARKEY-64N67W/35SWNE
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 @ 2.5'	2.5'	06/09/2015	0.023	<0.002	<0.002	<0.002	<25	<25	<100	7.33	0.104
N01 @ 2.5'	2.5'	06/09/2015	<0.002	<0.002	<0.002	<0.002	<25	<25	<100	8.09	0.0974
S01 @ 2.5'	2.5'	06/09/2015	<0.002	<0.002	<0.002	<0.002	<25	<25	<100	8.09	0.112
W01 @ 2.5'	2.5'	06/09/2015	<0.002	<0.002	<0.002	<0.002	<25	<25	<100	8.15	0.0481
COGCC Allowable Levels			0.17	85	100	175	500*	500*	500*	6-9	4

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
HSR-SHARKEY-64N67W/35SWNE
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)
GW01	06/09/2015	66.5	101	19.8	238	3.00
CGWQS		5	1000	700	1400	

Notes: CGWQS - Colorado Groundwater Quality Standards
ft bgs - feet below ground surface
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





June 11, 2015

LT Environmental, Inc.

John Cocroft

4600 West 60th Avenue

Arvada CO 80003

**Project Name - KMG - HSR-Sharkey-64N67W
/35SWNE**

Project Number - 014215131

Attached are your analytical results for KMG - HSR-Sharkey-64N67W /35SWNE received by Origins Laboratory, Inc. June 09, 2015. This project is associated with Origins project number X506112-01.

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: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GW01	X506112-01	Water	June 9, 2015 14:00	06/09/2015 17:05
N01 @ 2.5'	X506112-02	Soil	June 9, 2015 14:10	06/09/2015 17:05
S01 @ 2.5'	X506112-03	Soil	June 9, 2015 14:15	06/09/2015 17:05
E01 @ 2.5'	X506112-04	Soil	June 9, 2015 14:20	06/09/2015 17:05
W01 @ 2.5'	X506112-05	Soil	June 9, 2015 14:25	06/09/2015 17:05

Origins Laboratory, Inc.



Jen Pellegrini For Noelle Doyle Mathis, President

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

Origins Laboratory

F-012207-01-R1
Effective Date: 01/09/12

Sample Receipt Checklist

Origins Work Order: X50612

Client: LTE

Client Project ID: Sharkey 7-35 Simp

Checklist Completed by: JH Smith

Shipped Via: H&D

(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 6/9/15

Airbill #: NA

Matrix(s) Received: (Check all that apply): X Soil/Solid X Water Other:

Cooler Number/Temperature: 1 / 14.4 °C 1 °C 1 °C (Describe) 1 °C

Thermometer ID: T003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	<u>X</u>			
Is there ice present (document if blue ice is used)	<u>X</u>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<u>X</u>		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		<u>X</u>		
Were all samples received intact ⁽¹⁾ ?	<u>X</u>			
Was adequate sample volume provided ⁽¹⁾ ?	<u>X</u>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<u>X</u>			
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<u>X</u>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<u>X</u>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<u>X</u>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<u>X</u>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.		<u>X</u>		
Are samples preserved that require preservation and was it checked ⁽¹⁾ ? (note ID of confirmation instrument used in comments) / (preservation is not confirmed for subcontracted analyses in order to insure sample integrity)/(pH < 2 for samples preserved with HNO ₃ , HCL, H ₂ SO ₄) / (pH > 10 for samples preserved with NaAsO ₂ +NaOH, ZnAc+NaOH)		<u>X</u>		
Additional Comments (if any):				

⁽¹⁾If NO, then contact the client before proceeding with analysis and note date/time and person contacted as well as the corrective action to in the additional comments (above) and the case narrative.

Reviewed by (Project Manager) JH Smith

Date/Time Reviewed 6/9/15

Origins Laboratory, Inc.

Jen Pellegrini

Jen Pellegrini For Noelle Doyle Mathis, President

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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

GW01

6/9/2015 2:00:00PM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X506112-01 (Water)

BTEX by EPA 8260C

Benzene	66.5	1.0	ug/L	1	5F09009	06/09/2015	06/09/2015
Toluene	101	1.0	"	"	"	"	"
Ethylbenzene	19.8	1.0	"	"	"	"	"
Xylenes, total	238	1.0	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	106 %	87.3-113	"	"	"
Surrogate: Toluene-d8	105 %	90.9-108	"	"	"
Surrogate: 4-Bromofluorobenzene	100 %	88.6-111	"	"	"

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

N01 @ 2.5'

6/9/2015 2:10:00PM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X506112-02 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.002	mg/kg	1	5F09010	06/09/2015	06/10/2015
Toluene	ND	0.002	"	"	"	"	"
Ethylbenzene	ND	0.002	"	"	"	"	"
Xylenes, total	ND	0.002	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	114 %	70-130	"	"	"
Surrogate: Toluene-d8	98.6 %	70-130	"	"	"
Surrogate: 4-Bromofluorobenzene	99.6 %	70-130	"	"	"

pH in Soil by EPA 9045D

pH	8.09	pH Units	1	5F09013	06/09/2015	06/09/2015
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0974	mmhos/cm	"	5F09014	06/09/2015	06/09/2015
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	8.4	25	mg/kg	1	5F09006	06/09/2015	06/09/2015
Diesel (C10-C28)	9.9	6.5	25	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	2.3	100	"	"	"	"	"
Surrogate: o-Terphenyl	83.7 %	65-146	"	"	"	"	"	"

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

S01 @ 2.5'

6/9/2015 2:15:00PM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X506112-03 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.002	mg/kg	1	5F09010	06/09/2015	06/10/2015
Toluene	ND	0.002	"	"	"	"	"
Ethylbenzene	ND	0.002	"	"	"	"	"
Xylenes, total	ND	0.002	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	111 %	70-130	"	"	"
Surrogate: Toluene-d8	97.1 %	70-130	"	"	"
Surrogate: 4-Bromofluorobenzene	97.2 %	70-130	"	"	"

pH in Soil by EPA 9045D

pH	8.09	pH Units	1	5F09013	06/09/2015	06/09/2015
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.112	mmhos/cm	"	5F09014	06/09/2015	06/09/2015
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	8.4	25	mg/kg	1	5F09006	06/09/2015	06/09/2015
Diesel (C10-C28)	8.6	6.5	25	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	2.3	100	"	"	"	"	"
Surrogate: o-Terphenyl	87.1 %	65-146	"	"	"	"	"	"

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

E01 @ 2.5'

6/9/2015 2:20:00PM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X506112-04 (Soil)

BTEX by EPA 8260C

Benzene	0.023	0.002	mg/kg	1	5F09010	06/09/2015	06/10/2015
Toluene	ND	0.002	"	"	"	"	"
Ethylbenzene	ND	0.002	"	"	"	"	"
Xylenes, total	ND	0.002	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	114 %	70-130	"	"	"
Surrogate: Toluene-d8	98.2 %	70-130	"	"	"
Surrogate: 4-Bromofluorobenzene	100 %	70-130	"	"	"

pH in Soil by EPA 9045D

pH	7.33	pH Units	1	5F09013	06/09/2015	06/09/2015
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.104	mmhos/cm	"	5F09014	06/09/2015	06/09/2015
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	8.4	25	mg/kg	1	5F09006	06/09/2015	06/09/2015
Diesel (C10-C28)	9.5	6.5	25	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	2.3	100	"	"	"	"	"
Surrogate: o-Terphenyl	83.6 %	65-146	"	"	"	"	"	"

Origins Laboratory, Inc.



Jen Pellegrini For Noelle Doyle Mathis, President

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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

W01 @ 2.5'

6/9/2015 2:25:00PM

Analyte	Result	Min Detection Limit	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X506112-05 (Soil)

BTEX by EPA 8260C

Benzene	ND	0.002	mg/kg	1	5F09010	06/09/2015	06/10/2015
Toluene	ND	0.002	"	"	"	"	"
Ethylbenzene	ND	0.002	"	"	"	"	"
Xylenes, total	ND	0.002	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	114 %	70-130	"	"	"
Surrogate: Toluene-d8	93.5 %	70-130	"	"	"
Surrogate: 4-Bromofluorobenzene	94.9 %	70-130	"	"	"

pH in Soil by EPA 9045D

pH	8.15	pH Units	1	5F09013	06/09/2015	06/09/2015
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0481	mmhos/cm	"	5F09014	06/09/2015	06/09/2015
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TPH-Carbon Chain by EPA Method 8015C

Gasoline (C6-C10)	ND	8.4	25	mg/kg	1	5F09006	06/09/2015	06/09/2015
Diesel (C10-C28)	9.9	6.5	25	"	"	"	"	"
Residual Range Organics (C28-C36)	ND	2.3	100	"	"	"	"	"
Surrogate: o-Terphenyl	87.8 %	65-146	"	"	"	"	"	"

Origins Laboratory, Inc.



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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

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 5F09009 - EPA 5030B (Water)

Blank (5F09009-BLK1)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	69		"	62.5	110		87.3-113			
Surrogate: Toluene-d8	63		"	62.5	101		90.9-108			
Surrogate: 4-Bromofluorobenzene	63		"	62.5	101		88.6-111			

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

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

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 5F09009 - EPA 5030B (Water)

Blank (5F09009-BLK2)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Benzene	ND	1.0	ug/L							
Toluene	ND	1.0	"							
Ethylbenzene	ND	1.0	"							
Xylenes, total	ND	1.0	"							
Surrogate: 1,2-Dichloroethane-d4	68		"	62.5	109		87.3-113			
Surrogate: Toluene-d8	63		"	62.5	100		90.9-108			
Surrogate: 4-Bromofluorobenzene	61		"	62.5	98.3		88.6-111			

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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 5F09009 - EPA 5030B (Water)

LCS (5F09009-BS1)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Benzene	52.0	1.0	ug/L	50.0		104	75-126			
Toluene	52.5	1.0	"	50.0		105	78.7-126			
Ethylbenzene	53.5	1.0	"	50.0		107	80-130			
m,p-Xylene	106	2.0	"	100		106	77.2-133			
o-Xylene	52.8	1.0	"	50.0		106	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5		102	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		102	90.9-108			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		100	88.6-111			

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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 5F09009 - EPA 5030B (Water)

LCS (5F09009-BS2)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Benzene	50.5	1.0	ug/L	50.0		101	75-126			
Toluene	51.2	1.0	"	50.0		102	78.7-126			
Ethylbenzene	51.0	1.0	"	50.0		102	80-130			
m,p-Xylene	103	2.0	"	100		103	77.2-133			
o-Xylene	51.3	1.0	"	50.0		103	77.9-126			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	87.3-113			
Surrogate: Toluene-d8	64		"	62.5		102	90.9-108			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	88.6-111			

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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 5F09009 - EPA 5030B (Water)

Matrix Spike (5F09009-MS1)		Source: X506104-13			Prepared: 06/09/2015 Analyzed: 06/09/2015					
Benzene	55.7	1.0	ug/L	50.0	ND	111	74-130			
Toluene	56.4	1.0	"	50.0	ND	113	73-131			
Ethylbenzene	57.6	1.0	"	50.0	ND	115	76-132			
m,p-Xylene	115	2.0	"	100	ND	115	69-139			
o-Xylene	56.0	1.0	"	50.0	ND	112	74-131			
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5		102	87.3-113			
Surrogate: Toluene-d8	64		"	62.5		102	90.9-108			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.2	88.6-111			

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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 5F09009 - EPA 5030B (Water)

Matrix Spike (5F09009-MS2)		Source: X506104-01			Prepared: 06/09/2015 Analyzed: 06/09/2015					
Benzene	56.0	1.0	ug/L	50.0	ND	112	74-130			
Toluene	57.8	1.0	"	50.0	ND	116	73-131			
Ethylbenzene	59.3	1.0	"	50.0	ND	119	76-132			
m,p-Xylene	119	2.0	"	100	ND	119	69-139			
o-Xylene	58.0	1.0	"	50.0	ND	116	74-131			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	87.3-113			
Surrogate: Toluene-d8	64		"	62.5		102	90.9-108			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.4	88.6-111			

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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 5F09009 - EPA 5030B (Water)

Matrix Spike Dup (5F09009-MSD1)		Source: X506104-13			Prepared: 06/09/2015 Analyzed: 06/09/2015					
Benzene	56.2	1.0	ug/L	50.0	ND	112	74-130	0.930	20	
Toluene	56.7	1.0	"	50.0	ND	113	73-131	0.636	20	
Ethylbenzene	58.0	1.0	"	50.0	ND	116	76-132	0.761	20	
m,p-Xylene	116	2.0	"	100	ND	116	69-139	1.14	20	
o-Xylene	56.3	1.0	"	50.0	ND	113	74-131	0.659	20	
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	87.3-113			
Surrogate: Toluene-d8	62		"	62.5		99.9	90.9-108			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		100	88.6-111			

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Project: KMG - HSR-Sharkey-64N67W /35SWNE

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 5F09009 - EPA 5030B (Water)

Matrix Spike Dup (5F09009-MSD2)		Source: X506104-01			Prepared: 06/09/2015 Analyzed: 06/09/2015					
Benzene	51.9	1.0	ug/L	50.0	ND	104	74-130	7.58	20	
Toluene	52.2	1.0	"	50.0	ND	104	73-131	10.2	20	
Ethylbenzene	53.2	1.0	"	50.0	ND	106	76-132	10.9	20	
m,p-Xylene	106	2.0	"	100	ND	106	69-139	11.5	20	
o-Xylene	52.0	1.0	"	50.0	ND	104	74-131	10.8	20	
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		100	87.3-113			
Surrogate: Toluene-d8	63		"	62.5		100	90.9-108			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	88.6-111			

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Project: KMG - HSR-Sharkey-64N67W /35SWNE

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 5F09010 - EPA 5030 (soil)

Blank (5F09010-BLK1)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Benzene	ND	0.002	mg/kg							
Toluene	ND	0.002	"							
Ethylbenzene	ND	0.002	"							
Xylenes, total	ND	0.002	"							
Surrogate: 1,2-Dichloroethane-d4	69		ug/kg	62.5		111	70-130			
Surrogate: Toluene-d8	58		"	62.5		93.4	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		100	70-130			

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Project: KMG - HSR-Sharkey-64N67W /35SWNE

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 5F09010 - EPA 5030 (soil)

LCS (5F09010-BS1)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Benzene	0.101	0.002	mg/kg	0.100		101	77.1-124			
Toluene	0.090	0.002	"	0.100		89.6	74.5-128			
Ethylbenzene	0.086	0.002	"	0.100		86.3	66.4-127			
m,p-Xylene	0.176	0.004	"	0.200		87.9	76.6-124			
o-Xylene	0.090	0.002	"	0.100		90.3	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	65		ug/kg	62.5		104	70-130			
Surrogate: Toluene-d8	58		"	62.5		93.1	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.6	70-130			

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Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

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 5F09010 - EPA 5030 (soil)

Matrix Spike (5F09010-MS1)		Source: X506108-01			Prepared: 06/09/2015 Analyzed: 06/09/2015					
Benzene	0.104	0.002	mg/kg	0.100	ND	104	71.8-126			
Toluene	0.093	0.002	"	0.100	ND	93.0	65.1-130			
Ethylbenzene	0.088	0.002	"	0.100	ND	88.2	62.2-130			
m,p-Xylene	0.177	0.004	"	0.200	ND	88.6	46.5-137			
o-Xylene	0.094	0.002	"	0.100	ND	93.6	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	65		ug/kg	62.5		104	70-130			
Surrogate: Toluene-d8	58		"	62.5		93.1	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.1	70-130			

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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
Batch 5F09010 - EPA 5030 (soil)										
Matrix Spike Dup (5F09010-MSD1)		Source: X506108-01			Prepared: 06/09/2015 Analyzed: 06/09/2015					
Benzene	0.103	0.002	mg/kg	0.100	ND	103	71.8-126	1.32	11.3	
Toluene	0.092	0.002	"	0.100	ND	91.5	65.1-130	1.54	15.4	
Ethylbenzene	0.087	0.002	"	0.100	ND	87.4	62.2-130	0.934	19.6	
m,p-Xylene	0.173	0.004	"	0.200	ND	86.4	46.5-137	2.51	19.2	
o-Xylene	0.092	0.002	"	0.100	ND	92.0	54.2-134	1.72	17.9	
Surrogate: 1,2-Dichloroethane-d4	64		ug/kg	62.5		102	70-130			
Surrogate: Toluene-d8	58		"	62.5		93.4	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.0	70-130			

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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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Extractable Petroleum Hydrocarbons by 8015C - 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 5F09006 - EPA 3580

Blank (5F09006-BLK1)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Gasoline (C6-C10)	ND	50	mg/kg
Diesel (C10-C28)	17	50	"
Residual Range Organics (C28-C36)	ND	200	"

Surrogate: o-Terphenyl

42.9

"

50.0

85.8

65-146

LCS (5F09006-BS1)

Prepared: 06/09/2015 Analyzed: 06/09/2015

Gasoline (C6-C10)	900	50	mg/kg	1000		90.3	66.7-119
Diesel (C10-C28)	920	50	"	1000		91.6	70.1-127
Residual Range Organics (C28-C36)	1100	200	"	1000		113	54.5-139

Surrogate: o-Terphenyl

48.7

"

50.0

97.5

65-146

Matrix Spike (5F09006-MS1)

Source: X506099-01

Prepared: 06/09/2015 Analyzed: 06/09/2015

Gasoline (C6-C10)	890	50	mg/kg	1000	ND	89.3	56.4-132
Diesel (C10-C28)	890	50	"	1000	10	89.1	57.4-138
Residual Range Organics (C28-C36)	1100	200	"	1000	ND	110	47.7-129

Surrogate: o-Terphenyl

48.7

"

50.0

97.3

65-146

Matrix Spike Dup (5F09006-MSD1)

Source: X506099-01

Prepared: 06/09/2015 Analyzed: 06/09/2015

Gasoline (C6-C10)	890	50	mg/kg	1000	ND	89.1	56.4-132	0.167	22
Diesel (C10-C28)	900	50	"	1000	10	90.1	57.4-138	1.18	18.3
Residual Range Organics (C28-C36)	1100	200	"	1000	ND	111	47.7-129	1.11	30.1

Surrogate: o-Terphenyl

49.9

"

50.0

99.8

65-146

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Arvada CO 80003

John Cocroft
Project Number: 014215131
Project: KMG - HSR-Sharkey-64N67W /35SWNE

Classical Chemistry Parameters - Quality Control Origins Laboratory, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 5F09013 - NO PREP										
Duplicate (5F09013-DUP1)		Source: X506112-02			Prepared: 06/09/2015 Analyzed: 06/09/2015					
pH	7.90		pH Units		8.09			2.38	25	
Batch 5F09014 - NO PREP										
Blank (5F09014-BLK1)		Prepared: 06/09/2015 Analyzed: 06/09/2015								
Specific Conductance (EC)	0.00300		mmhos/cm							
Duplicate (5F09014-DUP1)		Source: X506112-02			Prepared: 06/09/2015 Analyzed: 06/09/2015					
Specific Conductance (EC)	0.111		mmhos/cm		0.0974			12.9	25	

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Arvada CO 80003

John Cocroft
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Project: KMG - HSR-Sharkey-64N67W /35SWNE

Notes and Definitions

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported on a wet weight basis.

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