

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 and Gas Onshore, LP		Name: Phil Hamlin	
Address: 1099 18th Street, Suite 1800		No: 970-336-3500	
City: Denver State: CO Zip: 80202		Fax: 970-336-3656	
API/Facility No: 446413		County: Weld	
Facility Name: LORENZ L30-3, 5#2-30 O SA		Facility Number: 36149578	
Well Name: Lorenz Federal L		Well Number: 30-4, 30-3, and 30-5	
Location (QtrQtr, Sec, Twp, Rng, Meridian): NWNW S30 T3N R66W		Latitude: 40.199518 Longitude: -104.827126	

TECHNICAL CONDITIONS

Type of Waste Causing Impact (crude oil, condensate, produced water, etc.): Crude oil, 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.	
Adjacent land use (cultivated, irrigated, dry land farming, industrial, residential, etc.): Non-crop land	
Soil type, if not previously identified on Form 2A or Federal Surface Use Plan: Fat clay with some sand and gravel	
Potential receptors (water wells within 1/4 mi, surface waters, etc.): No surface water is located within 1/4-mile of the release area. The nearest water well is located approximately 390' north of the release area.	
Description of Impact (if previously provided, refer to that form or document):	
Impacted Media (check):	Extent of Impact:
<input checked="" type="checkbox"/> Soils	20' (E-W) x 13' (N-S) x 5' bgs
<input type="checkbox"/> Vegetation	
<input checked="" type="checkbox"/> Groundwater	See attached data
<input type="checkbox"/> Surface water	
How Determined:	
Excavation, soil sampling, and laboratory analysis	
Groundwater sampling and laboratory analysis	

REMEDIALATION WORKPLAN

Describe initial action taken (if previously provided, refer to that form or document): During routine operations, an operator discovered a release due to a corroded separator fire tube at the location associated with the Lorenz Federal L30-4, L30-3, and Lorenz L 30-5 wells. The facility was shut -in, associated underground infrastructure removed, and excavation activities commenced. Groundwater was encountered in the excavation area at approximately 5 feet below ground surface (bgs). An Initial/Supplemental Form 19 was submitted to the COGCC on August 26, 2016 (COGCC Document No. 401099740.) The COGCC has issued Spill Tracking number 447504 for this release.
Describe how source is to be removed: On August 24, 2016, excavation activities commenced and approximately 50 cubic yards of impacted material were removed and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado for disposal. Excavation activities were guided in the field using a photoionization detector (PID) to measure volatile organic compound (VOC) concentrations in soil. Four (4) confirmation soil samples were collected from the sidewalls of the final extent of the excavation area at approximately 4 feet below ground surface (bgs). The soil samples were submitted to Origins Laboratory for analysis of benzene, toluene, ethylbenzene, total xylenes (BTEX), total petroleum hydrocarbons (TPH) - gasoline range organics (GRO) by USEPA Method 8260C, TPH - diesel and oil range organics (DRO and ORO) by USEPA 8015, electrical conductivity (EC), and pH. Laboratory analytical results indicated that constituent concentrations in the soil samples collected from the final lateral extent of the excavation area were below the applicable COGCC Table 910-1 standards. 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 approximately 5 feet bgs. A groundwater sample (GW01) was collected and submitted to Origins Laboratory for analysis of BTEX by USEPA Method 8260. Groundwater analytical results indicated that the benzene and total xylenes concentrations in groundwater sample GW01 were above the applicable COGCC Table 910-1 groundwater standards. Approximately 80 barrels of groundwater were removed from the excavation via a vacuum truck. A second groundwater sample (GW02) was subsequently collected and submitted for analysis of BTEX. Analytical results indicated that the benzene concentration in sample GW02 remained above the COGCC Table 910-1 standard. Soil analytical results are summarized in Table 1 and groundwater analytical results are summarized in Table 2. Soil and excavation groundwater sample locations are illustrated on Figure 1 and laboratory analytical reports are included as Attachment A.
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.: Impacted soil was excavated and transported to the Buffalo Ridge Landfill in Keenesburg, Colorado for disposal. Impacted groundwater was transported to a licensed injection facility for disposal. Prior to backfilling the excavation, 165 pounds of activated carbon were added to the groundwater within the excavation to mitigate remaining hydrocarbon impacts in the groundwater table. Additional proposed groundwater monitoring and remediation measures are described on the following page.

State of Colorado
Oil and Gas Conservation Commission

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Page 2

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.):
Temporary groundwater monitoring wells will be installed at the site to further assess the extent of groundwater impacts. These wells will be sampled on a quarterly basis and submitted for laboratory analysis of BTEX until concentrations remain below COGCC groundwater standards for four consecutive quarters.

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 excavation has been backfilled with clean soil and graded to match the adjacent topography. The separator and associated lines have been removed and will not be replaced. Reclamation activities at the site will be compliant with COGCC regulations.

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:
Laboratory data indicate that impacted soils in the excavation have been remediated to below COGCC Table 910-1 standards. Temporary monitoring wells will be installed to further assess groundwater impacts. Groundwater samples will be collected from the temporary monitoring wells until BTEX concentrations remain below the applicable COGCC standards for four consecutive quarters. Soil and groundwater analytical results are summarized in Tables 1 and 2, respectively. The analytical laboratory reports are included as Attachment A.

Final disposition of E&P waste (land treated and disposed onsite, name of licensed disposal facility, recycling, reuse, etc.):
Impacted soil was transported to the Buffalo Ridge Landfill in Keenesburg, Colorado for disposal. Impacted groundwater was transported to a licensed injection facility for disposal.

IMPLEMENTATION SCHEDULE

Date Site Investigation Began: 8/24/2016	Date Site Investigation Completed: TBD	Remediation Plan Submitted: _____
Remediation Start Date: 8/24/2016	Anticipated Completion Date: 12/31/2017	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: [Signature] Title: Senior HSE Representative Date: 10/13/16

OGCC Approved: _____ Title: _____ Date: _____

FIGURE



DATE: August 8, 2016

DESIGNED BY: D. Arnold

DRAWN BY: D. Arnold



Kerr-McGee Oil and Gas Onshore, LP
Lorenz Federal L30-3; L30-3; Lorenz L 30-5
NWNW, Section 30, Township 3 North, Range 66 West
Weld County, Colorado

Sample Location
Map

FIGURE
1

TABLES

TABLE 1
LORENZ FEDERAL L30-3, L30-3; LORENZ L 30-5
SOIL SAMPLE RESULTS SUMMARY TABLE
KERR-McGEE OIL AND GAS ONSHORE LP

Sample Location	Date	Depth (ft. bgs)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	TVPH-GRO (mg/kg)	TEPH-DRO (mg/kg)	TEPH-ORO (mg/kg)	EC (mmhos/cm)	pH (units)
COGCC standards for soil (mg/kg) ⁽¹⁾			0.17	85	100	175	500			4 mmhos/cm or 2x BG	6-9
E01@4'	08/24/16	4	<0.050	<0.050	<0.050	0.436	197	267	<100	0.0220	7.08
S01@4'	08/24/16	4	<0.050	<0.050	<0.050	0.233	19.9	111	<100	0.0767	7.44
N01@4'	08/24/16	4	0.274	<0.050	0.286	0.688	23.6	171	<100	0.0979	7.32
W01@4'	08/24/16	4	<0.050	<0.050	0.186	<0.050	36.4	28.2	<100	0.0962	7.22
N02@4'	08/25/16	4	<0.050	<0.050	<0.050	<0.050	<5.00	27.4	<100	0.638	7.11

Notes:

1. Standards for soil are taken from 2 CCR 404-1, Table 910-1, effective January 30, 2015.

COGCC = Colorado Oil and Gas Conservation Commission

(<) = Analytical result is less than the indicated laboratory reporting limit.

TVPH - GRO = Total volatile petroleum hydrocarbons - gasoline range organics

TEPH - DRO = Total extractable petroleum hydrocarbons - diesel range organics

TEPH - ORO = Total extractable petroleum hydrocarbons - oil range organics

EC = Electrical conductivity

BG = Background

mmhos/cm = Millimhos per centimeter

mg/kg = Milligrams per kilogram.

ft. bgs = Feet below ground surface.

BOLD = Analytical result is in exceedance of COGCC Table 910-1 soil standards.

TABLE 2
LORENZ FEDERAL L30-3, L30-3; LORENZ L 30-5
GROUNDWATER SAMPLE RESULTS SUMMARY TABLE
KERR-McGEE OIL AND GAS ONSHORE LP

Sample Location	Date	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	Depth To Water (ft. bgs)
COGCC Standards for groundwater (µg/L) ⁽¹⁾		5	560	700	1,400	
GW01	8/24/2016	45.2	427	125	1,490	5
GW02	8/25/2016	18.4	6.44	121	981	5

Notes:

1. Standards for groundwater are taken from 2 CCR 404-1, Table 910-1, effective January 30, 2015.

COGCC = Colorado Oil and Gas Conservation Commission

(<) = Analytical result is less than the indicated laboratory reporting limit

µg/L = Micrograms per liter

ft. bgs = Feet below ground surface

BOLD = Analytical result is in exceedance of COGCC Table 910-1 groundwater standards

NM = Not measured

ATTACHMENT A
LABORATORY ANALYTICAL DATA



August 25, 2016

Tasman Geosciences

Bob Cornez

6899 Pecos Street, Unit C

Denver

CO 80211

Project Name - KMG - Lorenz L 30-3

Project Number - [none]

Attached are your analytical results for KMG - Lorenz L 30-3 received by Origins Laboratory, Inc. August 24, 2016. This project is associated with Origins project number X608258-01.

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

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
E01 @ 4'	X608258-01	Soil	August 24, 2016 15:57	08/24/2016 18:10
S01 @ 4'	X608258-02	Soil	August 24, 2016 15:59	08/24/2016 18:10
N01 @ 4'	X608258-03	Soil	August 24, 2016 16:03	08/24/2016 18:10
W01 @ 4'	X608258-04	Soil	August 24, 2016 16:07	08/24/2016 18:10
GW01	X608258-05	Water	August 24, 2016 16:05	08/24/2016 18:10

Origins Laboratory, Inc.



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.

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

ORIGINS
LABORATORY, INC

X608258

www.originslaboratory.com

page 1 of 1

Client: APC
Address: -
Telephone Number: 303-889-9525
Email Address: rlorenz@tasman-geo.com

Project Manager: Robert Cornez
Project Name: Lorenz L 30-3
Project Number: 303-889-9525
Samples Collected By: Zach Mathis

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis	Sample Instructions
				Unpreserved	HCl	HNO ₃	Other	Groundwater	Soil	Air Summa #		
E01e4'	8/24/16	1557	2	X								1
S01e4'		1554	2	X								2
N01e4'		1605	2	X								3
W01e4'		1607	2	X								4
GW01		1605	3	X								5
												6
												7
												8
												9
												10

Relinquished By: Zach Mathis Date: 8/24/16 Time: 1910

Relinquished By: Date: Time:

Turnaround Time: Same Day ☒ 24 Hr ☐ 48 Hr ☐ 72 Hr ☐ Standard ☐

Date Results Needed: 8/24/16

Temp Received: 3.7

Origins Laboratory, Inc.

Jefe Pellegrini

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.

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: X608258

Client: Tasman

Client Project ID: Lorenz L 30-3

Checklist Completed by: Jefo Sm. L.

Shipped Via: HTD
(UPS, FedEx, Hand Delivered, Pick-up, etc.)

Date/time completed: 8/24/12

Airbill #: NA

Matrix(s) Received: (Check all that apply): ☒ Soil/Solid ☒ Water ☐ Other: _____

Cooler Number/Temperature: 1 / 3.3 °C 1 / _____ °C 1 / _____ °C (Describe)

Thermometer ID: 7003

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input checked="" type="checkbox"/>			<u>DL</u>
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water — is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.		<input checked="" type="checkbox"/>		
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)		<input checked="" type="checkbox"/>		
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) Jefo Sm. L.

Date/Time Reviewed 8/24/12

Origins Laboratory, Inc.

Jefo Pellegrini

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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

E01 @ 4'
8/24/2016 3:57:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X608258-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	267	25.0	mg/kg	1	B6H2408	08/24/2016	08/25/2016	
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 80.6 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	197	5.00	mg/kg	25	B6H2407	08/24/2016	08/25/2016	
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	0.436	0.050	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4 105 % 70-130 " " "
Surrogate: Toluene-d8 129 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 98.0 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.08		pH Units	1	B6H2405	08/24/2016	08/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0220		mmhos/cm	"	B6H2406	"	08/24/2016	
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Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

S01 @ 4'
8/24/2016 3:59:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X608258-02 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	111	25.0	mg/kg	1	B6H2408	08/24/2016	08/25/2016	
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 68.4 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	19.9	5.00	mg/kg	25	B6H2407	08/24/2016	08/25/2016	
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	0.233	0.050	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4 102 % 70-130 " " "
Surrogate: Toluene-d8 106 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 92.8 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.44		pH Units	1	B6H2405	08/24/2016	08/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0767		mmhos/cm	"	B6H2406	"	08/24/2016	
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6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

N01 @ 4'
8/24/2016 4:03:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X608258-03 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	171	25.0	mg/kg	1	B6H2408	08/24/2016	08/25/2016	
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 72.2 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	23.6	5.00	mg/kg	25	B6H2407	08/24/2016	08/25/2016	
Benzene	0.274	0.050	"	"	"	"	"	
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	0.286	0.050	"	"	"	"	"	
Xylenes, total	0.688	0.050	"	"	"	"	"	

Surrogate: 1,2-Dichloroethane-d4 103 % 70-130 " " "
Surrogate: Toluene-d8 105 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 97.5 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.32		pH Units	1	B6H2405	08/24/2016	08/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0979		mmhos/cm	"	B6H2406	"	08/24/2016	
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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

W01 @ 4'
8/24/2016 4:07:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X608258-04 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	28.2	25.0	mg/kg	1	B6H2408	08/24/2016	08/25/2016	
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 76.2 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	36.4	5.00	mg/kg	25	B6H2407	08/24/2016	08/25/2016	
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	0.186	0.050	"	"	"	"	"	
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 107 % 70-130 " " "
Surrogate: Toluene-d8 98.2 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 105 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.22		pH Units	1	B6H2405	08/24/2016	08/24/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0962		mmhos/cm	"	B6H2406	"	08/24/2016	
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Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

GW01

8/24/2016 4:05:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X608258-05 (Water)

BTEX by EPA 8260C

Benzene	45.2	4.00	ug/L	4	B6H2409	08/24/2016	08/24/2016
Toluene	427	4.00	"	"	"	"	"
Ethylbenzene	125	4.00	"	"	"	"	"
Xylenes, total	1490	4.00	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	100 %	84-121			"	"	"
Surrogate: Toluene-d8	104 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	95.5 %	84-114			"	"	"

Origins Laboratory, Inc.



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.

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2407 - EPA 5030 (soil)										
Blank (B6H2407-BLK1)					Prepared: 08/24/2016 Analyzed: 08/24/2016					
Gasoline Range Hydrocarbons	ND	0.200	mg/kg							U
Benzene	ND	0.002	"							U
Toluene	ND	0.002	"							U
Ethylbenzene	ND	0.002	"							U
Xylenes, total	ND	0.002	"							U
Surrogate: 1,2-Dichloroethane-d4	67		ug/kg	62.5		108	70-130			
Surrogate: Toluene-d8	59		"	62.5		95.0	70-130			
Surrogate: 4-Bromofluorobenzene	68		"	62.5		109	70-130			

Origins Laboratory, Inc.



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.

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2407 - EPA 5030 (soil)

LCS (B6H2407-BS1)

Prepared: 08/24/2016 Analyzed: 08/24/2016

Benzene	0.099	0.002	mg/kg	0.100		98.9	77.1-124			
Toluene	0.093	0.002	"	0.100		92.6	74.5-128			
Ethylbenzene	0.096	0.002	"	0.100		96.4	66.4-127			
m,p-Xylene	0.193	0.004	"	0.200		96.6	76.6-124			
o-Xylene	0.098	0.002	"	0.100		97.8	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	68		ug/kg	62.5		109	70-130			
Surrogate: Toluene-d8	60		"	62.5		95.9	70-130			
Surrogate: 4-Bromofluorobenzene	68		"	62.5		109	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2407 - EPA 5030 (soil)

Matrix Spike (B6H2407-MS1)		Source: X608231-01			Prepared: 08/24/2016 Analyzed: 08/24/2016					
Benzene	0.157	0.002	mg/kg	0.200	ND	78.6	71.8-126			
Toluene	0.147	0.002	"	0.200	ND	73.3	65.1-130			
Ethylbenzene	0.148	0.002	"	0.200	ND	74.2	62.2-130			
m,p-Xylene	0.297	0.004	"	0.400	ND	74.3	46.5-137			
o-Xylene	0.153	0.002	"	0.200	ND	76.6	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	73		ug/kg	62.5		116	70-130			
Surrogate: Toluene-d8	60		"	62.5		95.4	70-130			
Surrogate: 4-Bromofluorobenzene	70		"	62.5		111	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2407 - EPA 5030 (soil)

Matrix Spike Dup (B6H2407-MSD1)		Source: X608231-01			Prepared: 08/24/2016 Analyzed: 08/24/2016					
Benzene	0.142	0.002	mg/kg	0.200	ND	71.2	71.8-126	9.75	11.3	QM-07
Toluene	0.132	0.002	"	0.200	ND	65.8	65.1-130	10.9	15.4	
Ethylbenzene	0.129	0.002	"	0.200	ND	64.4	62.2-130	14.2	19.6	
m,p-Xylene	0.258	0.004	"	0.400	ND	64.4	46.5-137	14.3	19.2	
o-Xylene	0.132	0.002	"	0.200	ND	65.8	54.2-134	15.1	17.9	
Surrogate: 1,2-Dichloroethane-d4	73		ug/kg	62.5		116	70-130			
Surrogate: Toluene-d8	60		"	62.5		95.4	70-130			
Surrogate: 4-Bromofluorobenzene	67		"	62.5		107	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2409 - EPA 5030B (Water)										
Blank (B6H2409-BLK1)					Prepared: 08/24/2016 Analyzed: 08/24/2016					
Benzene	ND	1.00	ug/L							U
Toluene	ND	1.00	"							U
Ethylbenzene	ND	1.00	"							U
Xylenes, total	ND	1.00	"							U
Surrogate: 1,2-Dichloroethane-d4	67		"	62.5	108		84-121			
Surrogate: Toluene-d8	62		"	62.5	99.7		85-115			
Surrogate: 4-Bromofluorobenzene	61		"	62.5	97.5		84-114			

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2409 - EPA 5030B (Water)

LCS (B6H2409-BS1)

Prepared: 08/24/2016 Analyzed: 08/24/2016

Benzene	51.7	1.00	ug/L	50.0	103	73.3-129
Toluene	57.5	1.00	"	50.0	115	76.2-123
Ethylbenzene	50.4	1.00	"	50.0	101	73.6-130
m,p-Xylene	102	2.00	"	100	102	76.1-126
o-Xylene	50.7	1.00	"	50.0	101	76.6-124
Surrogate: 1,2-Dichloroethane-d4	66		"	62.5	106	84-121
Surrogate: Toluene-d8	65		"	62.5	103	85-115
Surrogate: 4-Bromofluorobenzene	60		"	62.5	95.3	84-114

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2409 - EPA 5030B (Water)

Matrix Spike (B6H2409-MS1)		Source: X608229-04			Prepared: 08/24/2016 Analyzed: 08/24/2016					
Benzene	59.6	1.00	ug/L	50.0	2.12	115	74-130			
Toluene	62.5	1.00	"	50.0	ND	125	73-131			
Ethylbenzene	57.4	1.00	"	50.0	0.730	113	76-132			
m,p-Xylene	104	2.00	"	100	ND	104	69-139			
o-Xylene	49.6	1.00	"	50.0	ND	99.2	74-131			
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5		103	84-121			
Surrogate: Toluene-d8	63		"	62.5		101	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.9	84-114			

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2409 - EPA 5030B (Water)

Matrix Spike Dup (B6H2409-MSD1)		Source: X608229-04			Prepared: 08/24/2016 Analyzed: 08/24/2016					
Benzene	62.4	1.00	ug/L	50.0	2.12	121	74-130	4.62	20	
Toluene	65.3	1.00	"	50.0	ND	131	73-131	4.49	20	
Ethylbenzene	59.6	1.00	"	50.0	0.730	118	76-132	3.80	20	
m,p-Xylene	107	2.00	"	100	ND	107	69-139	2.35	20	
o-Xylene	50.3	1.00	"	50.0	ND	101	74-131	1.48	20	
Surrogate: 1,2-Dichloroethane-d4	65		"	62.5		104	84-121			
Surrogate: Toluene-d8	62		"	62.5		99.7	85-115			
Surrogate: 4-Bromofluorobenzene	59		"	62.5		95.0	84-114			

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2408 - EPA 3580

Blank (B6H2408-BLK1)

Prepared: 08/24/2016 Analyzed: 08/24/2016

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	46		"	50.0		91.0	59-131			

LCS (B6H2408-BS1)

Prepared: 08/24/2016 Analyzed: 08/24/2016

Diesel (C10-C28)	885	50.0	mg/kg	1000		88.5	64-121			
Residual Range Organics (C28-C40)	887	200	"	1000		88.7	58-124			
Surrogate: o-Terphenyl	41		"	50.0		82.7	59-131			

Matrix Spike (B6H2408-MS1)

Source: X608231-01

Prepared: 08/24/2016 Analyzed: 08/24/2016

Diesel (C10-C28)	944	50.0	mg/kg	1000	16.0	92.8	53-125			
Residual Range Organics (C28-C40)	961	200	"	1000	ND	96.1	47-133			
Surrogate: o-Terphenyl	46		"	50.0		91.5	59-131			

Matrix Spike Dup (B6H2408-MSD1)

Source: X608231-01

Prepared: 08/24/2016 Analyzed: 08/24/2016

Diesel (C10-C28)	853	50.0	mg/kg	1000	16.0	83.7	53-125	10.3	20	
Residual Range Organics (C28-C40)	840	200	"	1000	ND	84.0	47-133	13.5	20	
Surrogate: o-Terphenyl	43		"	50.0		85.6	59-131			

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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2405 - NO PREP										
Duplicate (B6H2405-DUP1)		Source: X608234-01			Prepared: 08/24/2016 Analyzed: 08/24/2016					
pH	8.51		pH Units		8.69			2.09	25	
Batch B6H2406 - NO PREP										
Blank (B6H2406-BLK1)		Prepared: 08/24/2016 Analyzed: 08/24/2016								
Specific Conductance (EC)	0.00290		mmhos/cm							
Duplicate (B6H2406-DUP1)		Source: X608234-01			Prepared: 08/24/2016 Analyzed: 08/24/2016					
Specific Conductance (EC)	1.20		mmhos/cm		1.25			3.83	25	

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Tasman Geosciences

6899 Pecos Street, Unit C

Denver CO 80211

Bob Cornez

Project Number: [none]

Project: KMG - Lorenz L 30-3

Notes and Definitions

U Sample is Non-Detect.

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.

Origins Laboratory, Inc.



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.

Jen Pellegrini For Noelle Doyle Mathis, President



August 26, 2016

Tasman Geosciences

Bob Cornez

6899 Pecos Street, Unit C

Denver

CO 80211

Project Name - KMG - Lorenz L 30-3

Project Number - [none]

Attached are your analytical results for KMG - Lorenz L 30-3 received by Origins Laboratory, Inc. August 25, 2016. This project is associated with Origins project number X608267-01.

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

Tasman Geosciences

6899 Pecos Street, Unit C

Denver CO 80211

Bob Cornez

Project Number: [none]

Project: KMG - Lorenz L 30-3

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
N02 @ 4'	X608267-01	Soil	August 25, 2016 12:44	08/25/2016 17:26
GW02	X608267-02	Water	August 25, 2016 12:47	08/25/2016 17:26

Origins Laboratory, Inc.



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Jen Pellegrini For Noelle Doyle Mathis, President

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

ORIGINS
LABORATORY, INC

www.originslaboratory.com

X608267

page 1 of 1

Client: APL
Address: _____
Telephone Number: 303-881-4525
Email Address: Yvonne@Tasman-Geo.com
Project Manager: Robert Cornez
Project Name: Lorenz L 30-3
Project Number: Zed M, Bob I
Samples Collected By: _____

Sample ID Description	Date Sampled	Time Sampled	# of Containers	Preservative				Matrix			Analysis				Sample Instructions
				Unpreserved	HCl	HNO ₃	Other	Groundwater	Soil	Air Summ #	Other	PH	EC	SAF-T (EC240)	
N0204'	8/25/16	1244	2	X					X					X	1
GW02	8/25/16	1247	3	X				X						X	2
															3
															4
															5
															6
															7
															8
															9
															10

Relinquished By:	Date:	Time:	Received By:	Date:	Time:	Turnaround Time:
Zed M	8/25/16	1726	[Signature]	8/25/16	1726	Same Day <input checked="" type="checkbox"/> 24 Hr <input type="checkbox"/> 48 Hr <input type="checkbox"/> Standard <input type="checkbox"/>

Date Results Needed

Temp Received- 26°

Origins Laboratory, Inc.

Jefe Pellegrini

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.

Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: X606267

Client: Tasman

Client Project ID: Lorenz L 30-3

Checklist Completed by: Jeff Smith

Shipped Via: Pick Up

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

Date/time completed: 8/25/12

Airbill #: N/A

Matrix(s) Received: (Check all that apply): ☒ Soil/Solid ☒ Water ☐ Other: _____

Cooler Number/Temperature: 1 / 2-4 °C 1 °C 1 °C (Describe) _____ °C

Thermometer ID: TW03

Requirement Description	Yes	No	N/A	Comments (if any)
If samples require cooling, was the temperature between 0°C to ≤ 6°C ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Are custody seals present on each sample container? (if so, document in comments if they are signed and dated, broken or intact)		<input checked="" type="checkbox"/>		
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>			
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.		<input checked="" type="checkbox"/>		
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)	<input checked="" type="checkbox"/>			
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.

Jeff Smith
Reviewed by (Project Manager)

8/25/12
Date/Time Reviewed

Origins Laboratory, Inc.

Jen Pellegrini

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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

N02 @ 4'

8/25/2016 12:44:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X608267-01 (Soil)

DRO/RRO by EPA8015C

Diesel (C10-C28)	27.4	25.0	mg/kg	1	B6H2508	08/25/2016	08/25/2016	
Residual Range Organics (C28-C40)	ND	100	"	"	"	"	"	U

Surrogate: o-Terphenyl 71.7 % 59-131 " " "

GBTEX by EPA 8260C

Gasoline Range Hydrocarbons	ND	5.00	mg/kg	25	B6H2504	08/25/2016	08/25/2016	U
Benzene	ND	0.050	"	"	"	"	"	U
Toluene	ND	0.050	"	"	"	"	"	U
Ethylbenzene	ND	0.050	"	"	"	"	"	U
Xylenes, total	ND	0.050	"	"	"	"	"	U

Surrogate: 1,2-Dichloroethane-d4 92.5 % 70-130 " " "
Surrogate: Toluene-d8 102 % 70-130 " " "
Surrogate: 4-Bromofluorobenzene 98.7 % 70-130 " " "

pH in Soil by EPA 9045D

pH	7.11		pH Units	1	B6H2507	08/25/2016	08/25/2016	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	0.0638		mmhos/cm	"	B6H2509	08/25/2016	08/25/2016	
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Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

GW02

8/25/2016 12:47:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
X608267-02 (Water)

BTEX by EPA 8260C

Benzene	18.4	4.00	ug/L	4	B6H2501	08/25/2016	08/25/2016
Toluene	6.44	4.00	"	"	"	"	"
Ethylbenzene	121	4.00	"	"	"	"	"
Xylenes, total	981	4.00	"	"	"	"	"

Surrogate: 1,2-Dichloroethane-d4	90.9 %	84-121			"	"	"
Surrogate: Toluene-d8	114 %	85-115			"	"	"
Surrogate: 4-Bromofluorobenzene	102 %	84-114			"	"	"

Origins Laboratory, Inc.



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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2501 - EPA 5030B (Water)										
Blank (B6H2501-BLK1)					Prepared: 08/25/2016 Analyzed: 08/25/2016					
Benzene	ND	1.00	ug/L							U
Toluene	ND	1.00	"							U
Ethylbenzene	ND	1.00	"							U
Xylenes, total	ND	1.00	"							U
Surrogate: 1,2-Dichloroethane-d4	66		"	62.5	106		84-121			
Surrogate: Toluene-d8	63		"	62.5	101		85-115			
Surrogate: 4-Bromofluorobenzene	61		"	62.5	98.4		84-114			

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Tasman Geosciences
6899 Pecos Street, Unit C
Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2501 - EPA 5030B (Water)										
LCS (B6H2501-BS1)					Prepared: 08/25/2016 Analyzed: 08/25/2016					
Benzene	45.6	1.00	ug/L	50.0		91.3	73.3-129			
Toluene	50.6	1.00	"	50.0		101	76.2-123			
Ethylbenzene	45.8	1.00	"	50.0		91.6	73.6-130			
m,p-Xylene	90.9	2.00	"	100		90.9	76.1-126			
o-Xylene	45.2	1.00	"	50.0		90.5	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	66		"	62.5		105	84-121			
Surrogate: Toluene-d8	65		"	62.5		104	85-115			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.8	84-114			

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Bob Cornez
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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 B6H2501 - EPA 5030B (Water)

Matrix Spike (B6H2501-MS1)		Source: X608211-01			Prepared: 08/25/2016 Analyzed: 08/25/2016					
Benzene	62.7	1.00	ug/L	50.0	3.67	118	74-130			
Toluene	66.8	1.00	"	50.0	ND	134	73-131			QM-07
Ethylbenzene	58.0	1.00	"	50.0	ND	116	76-132			
m,p-Xylene	113	2.00	"	100	ND	113	69-139			
o-Xylene	54.8	1.00	"	50.0	0.520	109	74-131			
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5		99.3	84-121			
Surrogate: Toluene-d8	64		"	62.5		103	85-115			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.9	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 B6H2501 - EPA 5030B (Water)

Matrix Spike Dup (B6H2501-MSD1)		Source: X608211-01			Prepared: 08/25/2016 Analyzed: 08/25/2016					
Benzene	67.1	1.00	ug/L	50.0	3.67	127	74-130	6.84	20	
Toluene	69.0	1.00	"	50.0	ND	138	73-131	3.33	20	QM-07
Ethylbenzene	66.1	1.00	"	50.0	ND	132	76-132	13.1	20	
m,p-Xylene	126	2.00	"	100	ND	126	69-139	10.8	20	
o-Xylene	61.4	1.00	"	50.0	0.520	122	74-131	11.3	20	
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5		102	84-121			
Surrogate: Toluene-d8	62		"	62.5		99.9	85-115			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	84-114			

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Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2504 - EPA 5030 (soil)										
Blank (B6H2504-BLK1)					Prepared: 08/25/2016 Analyzed: 08/25/2016					
Gasoline Range Hydrocarbons	ND	0.200	mg/kg							U
Benzene	ND	0.002	"							U
Toluene	ND	0.002	"							U
Ethylbenzene	ND	0.002	"							U
Xylenes, total	ND	0.002	"							U
Surrogate: 1,2-Dichloroethane-d4	62		ug/kg	62.5		99.1	70-130			
Surrogate: Toluene-d8	65		"	62.5		104	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		102	70-130			

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Bob Cornez
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Project: KMG - Lorenz L 30-3

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 B6H2504 - EPA 5030 (soil)										
LCS (B6H2504-BS1)					Prepared: 08/25/2016 Analyzed: 08/25/2016					
Benzene	0.107	0.002	mg/kg	0.100		107	77.1-124			
Toluene	0.110	0.002	"	0.100		110	74.5-128			
Ethylbenzene	0.094	0.002	"	0.100		94.1	66.4-127			
m,p-Xylene	0.197	0.004	"	0.200		98.7	76.6-124			
o-Xylene	0.092	0.002	"	0.100		92.3	76.6-124			
Surrogate: 1,2-Dichloroethane-d4	59		ug/kg	62.5		94.8	70-130			
Surrogate: Toluene-d8	68		"	62.5		108	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		98.6	70-130			

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Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2504 - EPA 5030 (soil)

Matrix Spike (B6H2504-MS1)		Source: X608230-01			Prepared: 08/25/2016 Analyzed: 08/25/2016					
Benzene	0.113	0.002	mg/kg	0.100	ND	113	71.8-126			
Toluene	0.105	0.002	"	0.100	ND	105	65.1-130			
Ethylbenzene	0.105	0.002	"	0.100	ND	105	62.2-130			
m,p-Xylene	0.212	0.004	"	0.200	ND	106	46.5-137			
o-Xylene	0.106	0.002	"	0.100	ND	106	54.2-134			
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		106	70-130			
Surrogate: Toluene-d8	60		"	62.5		96.7	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		102	70-130			

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Bob Cornez
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Project: KMG - Lorenz L 30-3

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 B6H2504 - EPA 5030 (soil)

Matrix Spike Dup (B6H2504-MSD1)		Source: X608230-01			Prepared: 08/25/2016 Analyzed: 08/25/2016					
Benzene	0.107	0.002	mg/kg	0.100	ND	107	71.8-126	5.55	11.3	
Toluene	0.098	0.002	"	0.100	ND	98.0	65.1-130	7.28	15.4	
Ethylbenzene	0.097	0.002	"	0.100	ND	97.5	62.2-130	7.33	19.6	
m,p-Xylene	0.196	0.004	"	0.200	ND	98.2	46.5-137	7.37	19.2	
o-Xylene	0.098	0.002	"	0.100	ND	98.1	54.2-134	7.59	17.9	
Surrogate: 1,2-Dichloroethane-d4	66		ug/kg	62.5		106	70-130			
Surrogate: Toluene-d8	59		"	62.5		94.9	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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Project Number: [none]
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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 B6H2508 - EPA 3580

Blank (B6H2508-BLK1)

Prepared: 08/25/2016 Analyzed: 08/25/2016

Diesel (C10-C28)	ND	50.0	mg/kg							U
Residual Range Organics (C28-C40)	ND	200	"							U
Surrogate: o-Terphenyl	45		"	50.0		89.9	59-131			

LCS (B6H2508-BS1)

Prepared: 08/25/2016 Analyzed: 08/25/2016

Diesel (C10-C28)	862	50.0	mg/kg	1000		86.2	64-121			
Residual Range Organics (C28-C40)	1070	200	"	1000		107	58-124			
Surrogate: o-Terphenyl	46		"	50.0		91.1	59-131			

Matrix Spike (B6H2508-MS1)

Source: X608267-01

Prepared: 08/25/2016 Analyzed: 08/25/2016

Diesel (C10-C28)	880	50.0	mg/kg	1000	27.4	85.3	53-125			
Residual Range Organics (C28-C40)	1090	200	"	1000	ND	109	47-133			
Surrogate: o-Terphenyl	47		"	50.0		93.2	59-131			

Matrix Spike Dup (B6H2508-MSD1)

Source: X608267-01

Prepared: 08/25/2016 Analyzed: 08/25/2016

Diesel (C10-C28)	859	50.0	mg/kg	1000	27.4	83.1	53-125	2.54	20	
Residual Range Organics (C28-C40)	1050	200	"	1000	ND	105	47-133	3.65	20	
Surrogate: o-Terphenyl	49		"	50.0		97.7	59-131			

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Denver CO 80211

Bob Cornez
Project Number: [none]
Project: KMG - Lorenz L 30-3

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 B6H2507 - NO PREP										
Duplicate (B6H2507-DUP1)		Source: X608267-01			Prepared: 08/25/2016 Analyzed: 08/25/2016					
pH	7.84		pH Units		7.11			9.77	25	
Batch B6H2509 - NO PREP										
Blank (B6H2509-BLK1)		Prepared: 08/25/2016 Analyzed: 08/25/2016								
Specific Conductance (EC)	0.00230		mmhos/cm							
Duplicate (B6H2509-DUP1)		Source: X608267-01			Prepared: 08/25/2016 Analyzed: 08/25/2016					
Specific Conductance (EC)	0.0580		mmhos/cm		0.0638			9.52	25	

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Tasman Geosciences

6899 Pecos Street, Unit C

Denver CO 80211

Bob Cornez

Project Number: [none]

Project: KMG - Lorenz L 30-3

Notes and Definitions

U Sample is Non-Detect.

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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Jen Pellegrini For Noelle Doyle Mathis, President