



Ms. Kari Oakman
Colorado Oil and Gas Conservation Commission
1120 Lincoln Street, Suite 801
Denver, Colorado 80203

June 25, 2020

**RE: Water Well (Permit No. 1374465, Receipt No. 0248601) Methane Investigation
Water Well Sampling Summary Report
Olsson Project # 020-1374**

Dear Ms. Oakman:

PDC Energy Inc. (PDC) and Great Western Operating Company (GWOC) together referred to as the "operators" retained Olsson to conduct domestic water well sampling as part of the "Identified Thermogenic Gas in Domestic Water Well" investigation. The investigation area is located in the northeast and southeast quarter of section 32, Township 1 North, Range 66 West, of the Sixth Principal Meridian in Weld County, Colorado. Water well sampling was conducted at the direction of the Colorado Oil and Gas Conservation Commission (COGCC) per an e-mail request received by the operators on March 24, 2020.

Landowner Outreach

The landowner outreach consisted of identifying water wells located within a $\frac{3}{4}$ -mile radius of the water well (Permit No. 1374465, Receipt No. 0248601) at coordinates 40.007095 north latitude, and -104.798108 west longitude where methane detections were discovered in March 2020. Per the COGCC approval on April 10, 2020, the sampling targeted wells that were completed approximately 1,000 feet below ground surface (bgs) within the Laramie Fox Hills Aquifer. Initial water well research identified 15 viable water wells that met the sampling criteria. Sampling request letters were submitted to landowners on April 14, 2020 via UPS. Packages were submitted with tracking numbers and delivery was confirmed on April 15, 2020. Olsson received consent notifications from nine of the fourteen landowners. Additionally, a second (confirmation) sample was collected from water well (Permit No. 1374465, Receipt No. 0248601). Olsson conducted telephone outreach and home visits which resulted in two additional landowners participating in the sampling program, thus a total of twelve wells were sampled.

Water Well Sampling

Water well sampling was conducted in accordance with COGCC Baseline Groundwater Quality Sampling Program – Rule 318A.f and the Olsson Sampling and Analysis Plan for Baseline Water Quality Sampling. Sampling was conducted between April 28 and May 28, 2020. Prior to sample collection, water wells were purged to ensure representative formation groundwater was being collected. In addition, water quality measurements were collected using a calibrated instrument that measured temperature, potential of hydrogen (pH), electrical conductivity, and dissolved oxygen. Samples were collected from outside spigots prior to any filtering or water treatment systems.

Samples were collected in laboratory supplied containers, immediately placed into a cooler with ice, and recorded onto a chain of custody. Samples were submitted to Origins Laboratory located in Denver, Colorado the same day as they were collected.

Eight samples had detections of methane above 1 milligram per liter (mg/L) and were submitted to Dolan Integration Group (DIG) located in Westminster, Colorado for additional isotopic and compositional analysis in accordance with COGCC Rule 318A.f. In addition to the confirmation sample at water well (Permit No. 1374465, Receipt No. 0248601), one sample had a detection of methane above 10 mg/L, and the landowner and COGCC were notified in accordance with Rule 318A.f.

The isotopic and compositional analytical results from DIG indicated biogenic, or naturally occurring methane detections in seven samples and a mixture of thermogenic and biogenic methane in one sample. The landowners and the COGCC were notified of the mixture of thermogenic and biogenic methane on the same day that laboratory results were received.

Landowner packages were prepared which included a summary letter, sampling field form, analytical results summary table, laboratory reports, and a water well information booklet. Landowner packages were submitted to each participating landowner via UPS on June 23, 2020. Packages were submitted with tracking numbers and delivery was confirmed on June 24, 2020.

No additional sampling is proposed, as the extent of a mixture of biogenic and thermogenic methane within a $\frac{3}{4}$ -mile radius of water well (Permit No. 1374465, Receipt No. 0248601) has been delineated. Laboratory supplied electronic data deliverables (EDDs) will be uploaded to the Colorado Oil and Gas Information System (COGIS) under a Form 43.

Please let us know if you have any questions or require additional information.

Respectfully,

Ben Huggins

Ben Huggins
Great Western

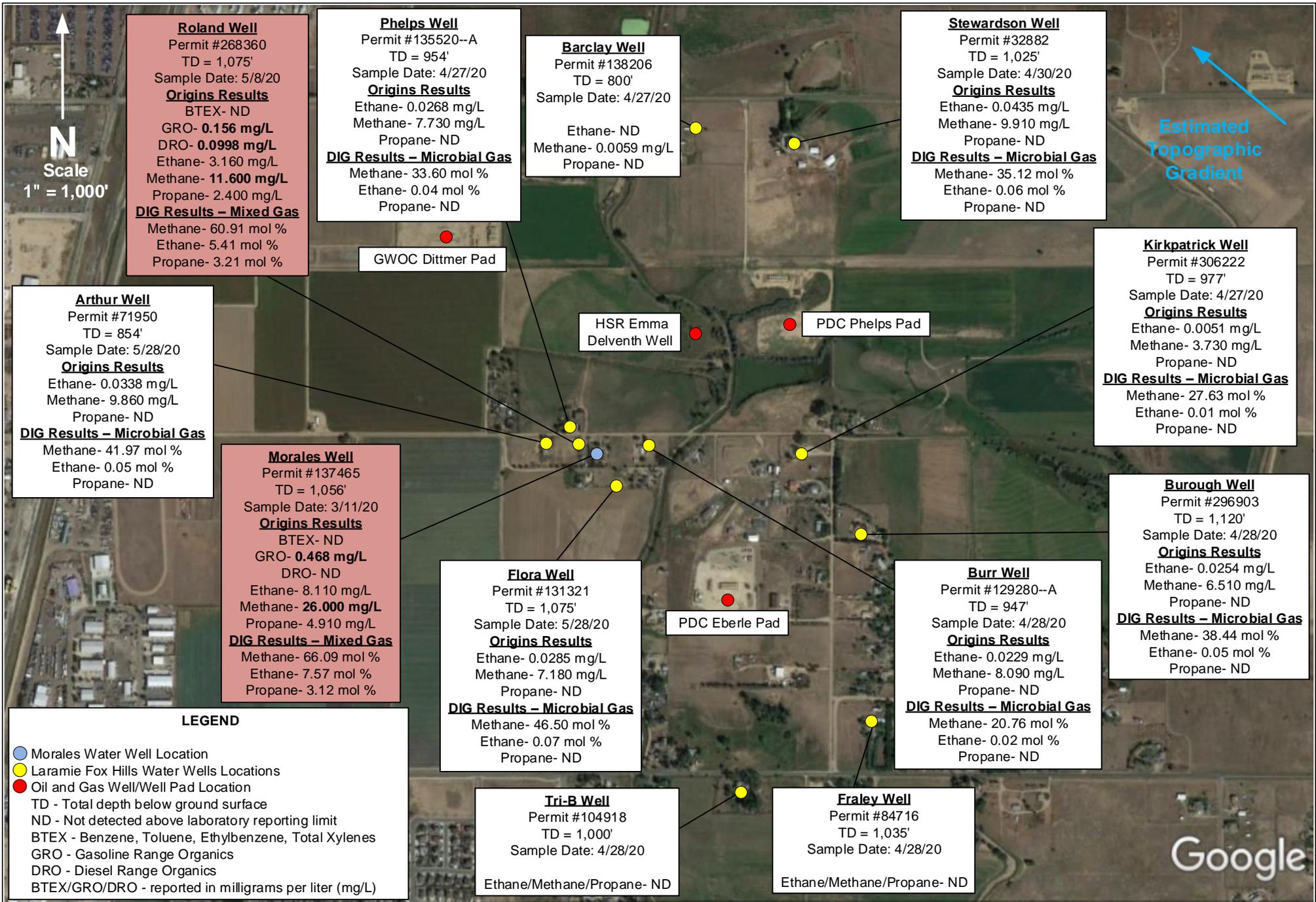
Karen Olson

Karen Olson
PDC

Attachments: Table 1 – Methane Investigation – GW Sample Summary
Figure 1 – Methane Investigation – GW Sample Locations and Analytical Results
Laboratory Analytical Results

Table 1 - Sampling Program - Wells within 3/4 Mile Radius of Investigation Location Completed in the Laramie Fox Hills Aquifer - Results Summary - June 2020

Applicant	Current Landowner	Sample Date	Methane Detected	Trigger Isotopic Testing and/or COGCC Notification	Isotopic Results	County	Township	Range	Section	Q160	Q40	Use 1	Use 2	Aquifer	WW Construction	WW Depth	Top Perf Casing	Bottom Perf Casing	Static Level
DOACK LLC	Otis & Janell Burough	4/28/2020	Yes (6.51 mg/L)	Isotopic	Biogenic	WELD	1 N	66 W	33	SW	NW	Domestic		LARAMIE FOX HILLS	3/8/1984	1120	902	1120	355
ROLAND, RALPH D	Carol Jean Roland Trust (Ralph)	5/8/2020	Yes (11.6 mg/L)	Isotopic & COGCC Notification	Mix Bio and Thermo	WELD	1 N	66 W	32	SE	NW	Domestic		LARAMIE FOX HILLS	5/12/2006	1075	810	1075	463
FLORA, AMY	Amy & Nicholas Flora	5/28/2020	Yes (7.18 mg/l)	Isotopic	Biogenic	WELD	1 N	66 W	32	SE	NW	Domestic	Stock	ALL UNNAMED AQUIFERS	8/5/1983	1051	817	1051	370
SWEITER, WALTER & CAROLINE	Leslie & Valorie Fraley	4/28/2020	No	No	N/A	WELD	1 N	66 W	33	SW	SW	Domestic		LARAMIE FOX HILLS	10/18/1978	1035	940	1035	355
DELVENTHAL M KEITH	Blue Heron Trust/James Stewardson	4/30/2020	Yes (9.91 mg/L)	Isotopic	Biogenic	WELD	1 N	66 W	32	NE	NE	Domestic		LARAMIE FOX HILLS	1/24/1968	1025	885	1025	255
GREIN, IVAN	Tri-B Associates LLLP	4/28/2020	No	No	N/A	ADAMS	1 S	66 W	5	NE	NW	Domestic	Stock	ALL UNNAMED AQUIFERS		1000	0	0	0
MORALES MARY ANN	Joe & Olibama Casias	3/11/2020 5/5/2020	Yes (26.00 mg/L) (22.7 mg/l)	Isotopic & COGCC Notification	Mix Bio and Thermo	WELD	1 N	66 W	32	SE	NW	Household use only		ALL UNNAMED AQUIFERS	4/24/1985	1056	825	1056	374
GREIN, IVAN	David & Diana Andrus	No reply to request	N/A	N/A	N/A	WELD	1 N	66 W	33	NW	SW	Domestic	Stock	LARAMIE FOX HILLS	1/1/1940	1000	0	0	0
KIRPATRICK, DORIS	Samuel & Doris Kirkpatrick	4/27/2020	Yes (3.73 mg/L)	Isotopic	Biogenic	WELD	1 N	66 W	32	SE	NE	Domestic		LARAMIE FOX HILLS	6/10/1980	977	857	977	329
PICKELL, JAMES G.	James & Clara Pickell	No reply to request	N/A	N/A	N/A	WELD	1 N	66 W	32	SE	NE	Domestic		LARAMIE FOX HILLS	3/19/2018	960	800	960	460
DELVENTHAL, E	Brian David Phelps	4/27/2020	Yes (7.73 mg/L)	Isotopic	Biogenic	WELD	1 N	66 W	32	NE	SW	Domestic		ALL UNNAMED AQUIFERS	6/11/1984	954	830	954	324
BURR, M K	Aisa & Dixie Burr	4/28/2020	Yes (8.09 mg/L)	Isotopic	Biogenic	WELD	1 N	66 W	32	SE	NW	Domestic	Stock	ALL UNNAMED AQUIFERS	3/9/1983	947	22	947	324
MERLE K LAND	Lorri Diana Purcell	No reply to request	N/A	N/A	N/A	WELD	1 N	66 W	32	SE	SW	Domestic		LARAMIE FOX HILLS	10/4/1999	940	845	940	384
VON FELDT, JOYCE	William Arthur	5/28/2020	Yes (9.86 mg/l)	Isotopic	Biogenic	WELD	1 N	66 W	32	SE	NW	Domestic		LARAMIE FOX HILLS	5/3/1974	854	770	854	270
DELVENTHAL M KEITH & PEARL	Thomas & Marilyn Barclay	4/27/2020	Yes (0.0059 mg/L)	No	N/A	WELD	1 N	66 W	32	NE	NE	Domestic		LARAMIE FOX HILLS	3/1/1930	800	0	0	0



May 07, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Phelps Project Number - 019-2253

Attached are your analytical results for Morales Methane Investigation - Phelps received by Origins Laboratory, Inc. April 27, 2020. This project is associated with Origins project number Y004362-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Phelps

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Phelps-135520-A	Y004362-01	Water	April 27, 2020 16:10	04/27/2020 17:10

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y004362

Client: Olsson

Client Project ID: Morales Investigation - Phelps

Checklist Completed by: JG

Shipped Via: HD

Date/time completed: 4/28/2020

(UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A

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

Cooler Number/Temperature: 1 / 5.8 °C _____ / _____ °C _____ / _____ °C _____ / _____ °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⁾ ?	<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.

Reviewed by (Project Manager) Jm Date/Time Reviewed 4-29-20

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Phelps-135520-A
4/27/2020 4:10:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004362-01 (Water)

Anions by EPA 300.0

Bromide	0.374	0.200	mg/L	1	1993426	LXA2	04/27/2020	04/29/2020	
Chloride	32.0	1.00	"	5	"	LXA2	"	"	
Fluoride	1.41	0.100	"	1	"	LXA2	"	"	
Nitrate	ND	0.100	"	"	"	LXA2	"	"	U
Nitrite	ND	0.100	"	"	"	LXA2	"	"	U
Sulfate	ND	0.400	"	"	"	LXA2	"	"	U

Anions by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.100	mg/L	5	1993959	KLP1	"	05/04/2020	U
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Bacterial Activity Reaction Tests

Iron Related Bacteria	~150		CFU/mL	1	11111	ARB	04/28/2020	04/28/2020	
Slime Forming Bacteria	<20		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~20		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D2701	KDK	04/27/2020	04/29/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

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 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Phelps-135520-A
4/27/2020 4:10:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004362-01 (Water)

BTEX by EPA 8260D

Surrogate: 1,2-Dichloroethane-d4	93.7 %	70-130			B0D27 01		04/27/2020	04/29/2020	
Surrogate: Toluene-d8	101 %	70-130			"		"	"	
Surrogate: 4-Bromofluorobenzene	117 %	70-130			"		"	"	

Dissolved Gasses by RSK 175

Ethane	26.8	10.0	ug/L	1	11111		04/27/2020	05/04/2020	
Methane	7730	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	33.8	4.00	ug/L	1	1993481	SKJ	04/30/2020	05/01/2020	
Boron	238	150	"	10	"	SKJ	"	"	
Calcium	1450	200	"	1	"	SKJ	"	"	
Iron	ND	100	"	"	"	SKJ	"	"	U
Magnesium	314	30.0	"	"	"	SKJ	"	"	
Manganese	ND	5.00	"	"	"	SKJ	"	"	U
Potassium	1080	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	188000	2500	"	10	"	SKJ	"	"	
Strontium	40.3	10.0	"	1	"	SKJ	"	"	

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Phelps-135520-A
4/27/2020 4:10:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004362-01 (Water)

DRO by 8015C

Diesel Range Organics	ND	188	ug/L	1	1993409	RXC1	04/30/2020	05/04/2020	U
<i>Surrogate: o-Terphenyl</i>	67 %	40-109			"	"	"	"	

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1993396	RXY1	04/27/2020	04/29/2020	U
<i>Surrogate: Bromofluorobenzene</i>	100 %	75-127			"	"	"	"	

pH in Water by EPA 9040C

pH	8.61		pH Units	1	B0D2806	DJL	04/28/2020	04/28/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	844	5.00	uS/cm	"	B0D2807	DJL	04/28/2020	04/28/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	399	4.00	mg/L	1	1993401	RXB5	04/27/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	351	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	48.1	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	506	5.00	mg/L	1	B0D2910	DJL	04/29/2020	05/01/2020	
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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Phelps

Phelps-135520-A
4/27/2020 4:10:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004362-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.109	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	
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 Project Number: 019-2253
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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Blank (B0D2701-BLK1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5	95.3		70-130			
Surrogate: Toluene-d8	63		"	62.5	100		70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5	98.1		70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

LCS (B0D2701-BS1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	45.6	1.00	ug/L	50.0		91.3	70-130			
Toluene	44.6	1.00	"	50.0		89.1	70-130			
Ethylbenzene	45.9	1.00	"	50.0		91.8	70-130			
m,p-Xylene	90.3	2.00	"	100		90.3	70-130			
o-Xylene	46.2	1.00	"	50.0		92.3	70-130			
Surrogate: 1,2-Dichloroethane-d4	54		"	62.5		86.5	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike (B0D2701-MS1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	50.0	1.00	ug/L	50.0	ND	100	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	52.0	1.00	"	50.0	0.140	104	70-130			
m,p-Xylene	101	2.00	"	100	0.430	100	70-130			
o-Xylene	49.5	1.00	"	50.0	ND	99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike Dup (B0D2701-MSD1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	48.3	1.00	ug/L	50.0	ND	96.6	70-130	3.48	20	
Toluene	47.3	1.00	"	50.0	ND	94.6	70-130	4.81	20	
Ethylbenzene	50.2	1.00	"	50.0	0.140	100	70-130	3.54	20	
m,p-Xylene	96.9	2.00	"	100	0.430	96.4	70-130	4.10	20	
o-Xylene	48.1	1.00	"	50.0	ND	96.2	70-130	2.89	20	
Surrogate: 1,2-Dichloroethane-d4	55		"	62.5		88.6	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	70-130			

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 Project Number: 019-2253
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Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

BLANK (1204553379-BLK)

Prepared: Analyzed: 04/29/2020

Sulfate	ND	0.400	mg/L				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Nitrate	ND	0.100	"				-			U
Nitrite	ND	0.100	"				-			U
Bromide	ND	0.200	"				-			U

LCS (1204553380-BKS)

Prepared: Analyzed: 04/29/2020

Chloride	4.94	0.200	mg/L	5.00		98.7	90-110			
Fluoride	2.49	0.100	"	2.50		99.5	90-110			
Nitrate	2.46	0.100	"	2.50		98.6	90-110			
Nitrite	2.52	0.100	"	2.50		101	90-110			
Sulfate	10.0	0.400	"	10.0		100	90-110			
Bromide	1.26	0.200	"	1.25		101	90-110			

DUP (1204553381 D)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Fluoride	1.40	0.100	mg/L		1.39		0-20	0.38	20	
Chloride	28.5	1.00	"		28.5		0-20	0.0421	20	
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Sulfate	ND	0.400	"		0.144		0-20	200	20	U
Bromide	0.340	0.200	"		0.340		0-20	0.118	20	

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Chloride	55.3	1.00	mg/L	5.00		107	90-110			
Fluoride	3.95	0.100	"	2.50		102	90-110			
Nitrate	2.49	0.100	"	2.50		99.4	90-110			H

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch 1993426 -

PS (1204553382 S)	Source: 510300001			Prepared: Analyzed: 04/29/2020						
Nitrite	2.53	0.100	mg/L	2.50	101	90-110				H
Sulfate	10.1	0.400	"	10.0	99.7	90-110				
Bromide	1.58	0.200	"	1.25	99	90-110				

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Anions by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 -

FLTB (1204553343-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Sodium	ND	250	ug/L				-			U
Boron	ND	15.0	"				-			U
Calcium	ND	200	"				-			U
Iron	ND	100	"				-			U
Magnesium	ND	30.0	"				-			U
Strontium	ND	10.0	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Barium	ND	4.00	"				-			U
Manganese	ND	5.00	"				-			U

BLANK (1204553446-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Manganese	ND	5.00	ug/L				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Boron	ND	15.0	"				-			U
Barium	ND	4.00	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Manganese	51.9	5.00	ug/L	50.0		104	85-115			
Strontium	49.9	10.0	"	50.0		99.7	85-115			
Sodium	2050	250	"	2000		102	85-115			

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Selenium	51.4	5.00	ug/L	50.0		103	85-115			
Potassium	2020	300	"	2000		101	85-115			
Boron	97.8	15.0	"	100		97.8	85-115			
Barium	50.2	4.00	"	50.0		100	85-115			
Magnesium	2060	30.0	"	2000		103	85-115			
Iron	2050	100	"	2000		102	85-115			
Calcium	2000	200	"	2000		100	85-115			

DUP (1204553448 D)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Magnesium	259	30.0	ug/L		262		0-20	1.32	20	
Boron	253	150	"		259		0-20	2.37	20	
Barium	28.5	4.00	"		29.2		0-20	2.3	20	
Strontium	31.2	10.0	"		31.4		0-20	0.763	20	
Sodium	195000	2500	"		202000		0-20	3.08	20	
Potassium	955	300	"		966		0-20	1.15	20	
Manganese	ND	5.00	"		3.26		0-20	3.53	20	U
Calcium	1130	200	"		1140		0-20	0.393	20	
Iron	ND	100	"		<33.0		0-20	6.27	20	U
Selenium	ND	5.00	"		<2.00		0-20	76.3	20	U

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	78.3	4.00	ug/L	50.0	29.2	98.4	75-125			
Manganese	52.8	5.00	"	50.0	3.26	99.1	75-125			
Boron	346	150	"	100	259	87.6	75-125			
Potassium	2960	300	"	2000	966	99.8	75-125			
Calcium	3120	200	"	2000	1140	99.2	75-125			
Sodium	193000	2500	"	2000	202000	0	75-125			

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

MS (1204553449 S)	Source: 510300001			Prepared: 04/30/2020 Analyzed: 05/01/2020						
Iron	2010	100	ug/L	2000	<33.0	99.6	75-125			
Magnesium	2290	30.0	"	2000	262	101	75-125			
Selenium	51.4	5.00	"	50.0	<2.00	102	75-125			
Strontium	83.3	10.0	"	50.0	31.4	104	75-125			

Origins Laboratory, Inc.



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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993409 - SW846 3535A										
BLANK (1204553370-BLK)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	9.39		"	20.0		47	40-109			
LCS (1204553371-BKS)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	559	200	ug/L	1000		56	45-119			
Surrogate: o-Terphenyl	12.8		"	20.0		64	40-109			
MS (1204553372 S)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	549	221	ug/L	1100	<82.9	50	41-118			
Surrogate: o-Terphenyl	11.3		"	22.1	12.5	51	40-109			
MSD (1204553373 SD)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	730	221	ug/L	1100	<82.9	66	41-118	28	20	
Surrogate: o-Terphenyl	14.0		"	22.1	12.5	64	40-109			

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993396 -										
BLANK (1204553344-BLK)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0515		"	0.0500		103	75-127			
LCS (1204553345-BKS)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.547	0.100	mg/L	0.500		109	80-120			
Surrogate: Bromofluorobenzene	0.0470		"	0.0500		94	75-127			
PS (1204553346 S)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.457	0.100	mg/L	0.500		91	68-127			
Surrogate: Bromofluorobenzene	0.0420		"	0.0500		84	75-127			
PSD (1204553347 SD)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.339	0.100	mg/L	0.500		68	68-127	30	30	
Surrogate: Bromofluorobenzene	0.0499		"	0.0500		100	75-127			

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1300	4.00	mg/L		1310		0-20	0.231	20	
Bicarbonate alkalinity (CaCO3)	1300	4.00	"		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Phelps

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993953 - EPA 365.4 Prep										
BLANK (1204554432-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204554433-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204554434 D)					Source: 510190001 Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	0.147	0.0500	mg/L		0.117		0-41	22.7	41	
MS (1204554435 S)					Source: 510190001 Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.30	0.0500	mg/L	1.00	0.117	118	70-136			

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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Phelps

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

H Holding time exceeded

<20 <20

~20 ~20

~150 ~150

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.



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dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

Job #: 20053981
Lab #: DIG-022833
Client: Origins Laboratory
Sample Name(s): Phelps-135520-A

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Dolan Integration Group shall use commercially reasonable efforts to maintain the Samples it receives from Customer in the condition in which same were initially received, and shall store, free of charge, any portion(s) of the Sample(s) not consumed or altered in the course of testing and analysis for a period of 60 days after their initial receipt, after which time the Samples will be destroyed. At Customer's written request and expense, Dolan Integration Group shall return unused Samples to Customer. At Customer's written request, Dolan Integration Group will also store and maintain Customer's Samples beyond the Free Storage Period for a monthly fee in accordance with Dolan Integration Group's the current storage rates. If Customer fails to timely pay any applicable storage charges, Dolan Integration Group shall be free to destroy the Sample.

Analytical Report



Job #: 20053981
 Lab #: DIG-022833
 Client: Origins Laboratory
 Sample Name: Phelps-135520-A
 Date Sampled: 04/27/20
 Time Sampled: 16:10
 Sample Description: 1L DIG Bottle
 Sampling Notes:
 Date Received: 05/08/20
 Date Analyzed: Gas Composition: 05/12/20 $\delta^{13}\text{C}$: 05/14/20 δD : 05/22/20
 Date Reported: 05/28/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	276211	58.55	-	-	-	
Oxygen + Argon (O ₂ +Ar)	36348	7.71	-	-	-	
Carbon Dioxide (CO ₂)	456	0.10	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	158502	33.60	99.87	-74.1	-282	
Ethane (C ₂ H ₆)	203	0.04	0.13	-	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	nd	nd	nd	-	-	
iso-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
n-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
iso-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
n-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
Hexanes + (C ₆ H ₁₄)	nd	nd	nd	-	-	

Calculated Values:	
Total HCs (ppm)	158705
Gas Wetness (mol % C ₂ +C ₁ +)	0.13
C ₁ /(C ₂ +C ₃) (mol/mol)	780

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

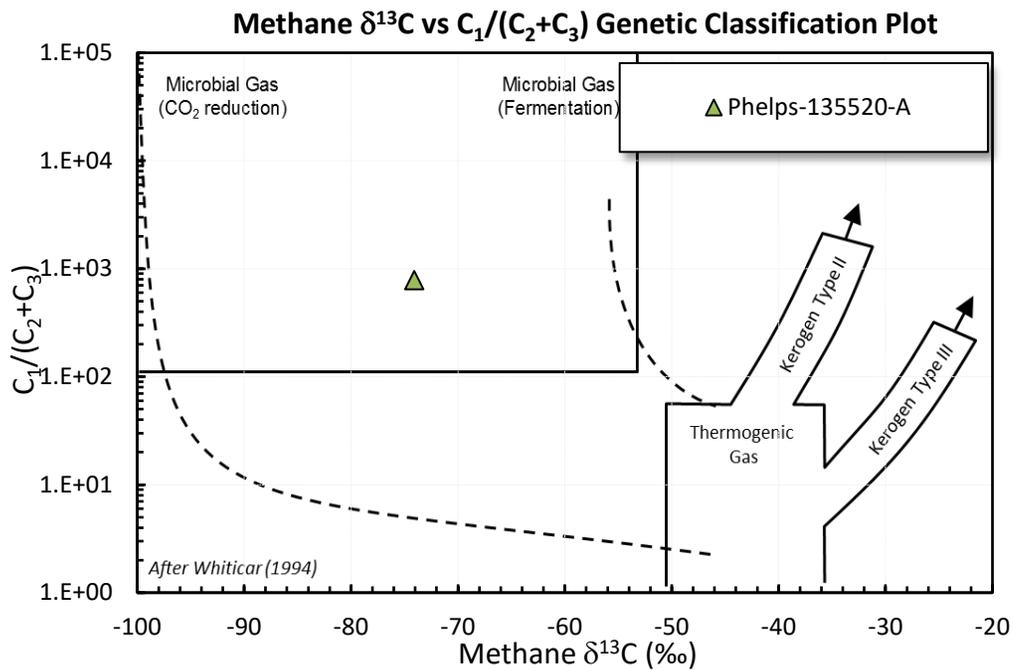
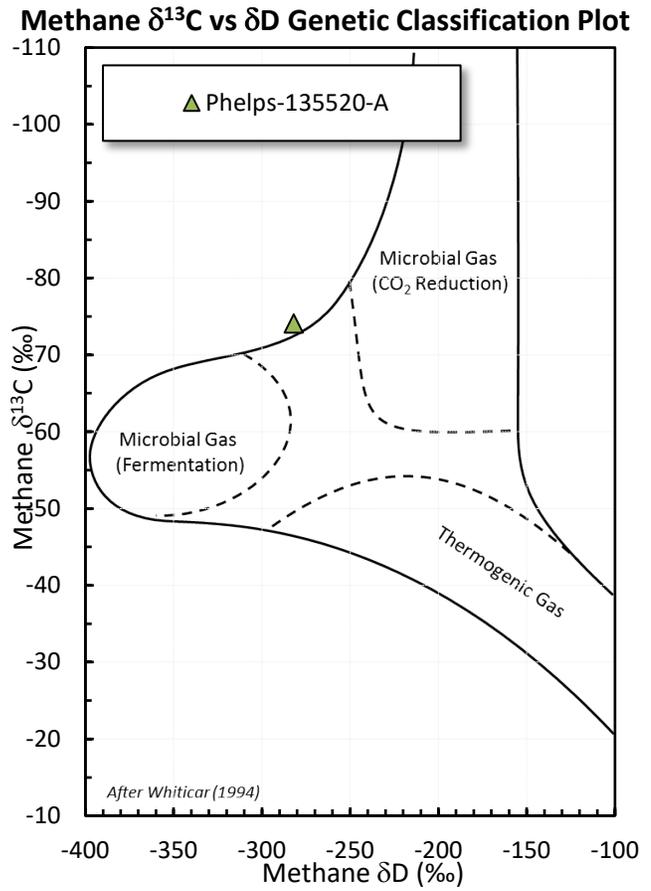
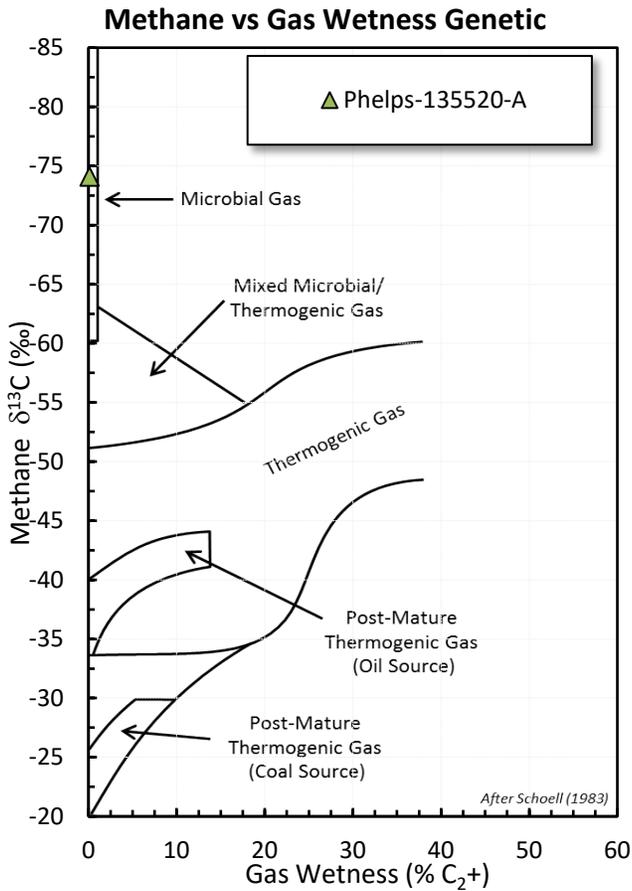
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB 20053981
DIG-022933

main 303.531.2030 • info@digforenergy.com • digforenergy.com
Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	j.merrill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y004362
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (≤ 10 business days) Rush (≤ 5 business days) Expedited Rush (≤ 3 business days)

Sample Description				Analysis Requested						Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	RSK-175: N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ + with dissolved C ₁ , C ₂ , & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane- Pentane (C ₂ - C ₅ if present)	δ ¹³ C CO ₂ (if present)	
Y004362-01	Phelps-133 135520-A	4/27	1410	X		X	X			

Chain-of-Custody Record

	Signature	Company	Date	Time
Relinquished by		Origins	5/8/20	1310
Received by		DIG	5/8/20	1315
Relinquished by				
Received by				
Relinquished by				
Received by				

*Gas composition vs. RSK-175: Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). RSK-175 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

May 07, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Project Number - 019-2253
Kirkpartick

Attached are your analytical results for Morales Methane Investigation - Kirkpartick received by Origins Laboratory, Inc. April 27, 2020. This project is associated with Origins project number Y004363-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation -
Kirkpartick

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Kirkpatrick-306222	Y004363-01	Water	April 27, 2020 15:20	04/27/2020 17:10

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Kirkpartick

Origins Laboratory

Sample Receipt Checklist

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

Origins Work Order: 4004363

Client: Olsson

Client Project ID: Morales Investigation - Kirkpartick

Checklist Completed by: JG

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

Date/time completed: 4/28/2020

Airbill #: N/A

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

Cooler Number/Temperature: 1 / 5.8 °C / °C / °C (Describe)

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⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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.

JM
 Reviewed by (Project Manager)

4-29-20
 Date/Time Reviewed

Origins Laboratory, Inc.

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

Kirkpatrick-306222
4/27/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004363-01 (Water)

Anions by EPA 300.0

Bromide	0.340	0.200	mg/L	1	1993426	LXA2	04/27/2020	04/29/2020	
Chloride	28.5	1.00	"	5	"	LXA2	"	"	
Fluoride	1.39	0.100	"	1	"	LXA2	"	"	
Nitrate	ND	0.100	"	"	"	LXA2	"	"	U
Nitrite	ND	0.100	"	"	"	LXA2	"	"	U
Sulfate	ND	0.400	"	"	"	LXA2	"	"	U

Anions by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.100	mg/L	5	1993959	KLP1	"	05/04/2020	U
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Bacterial Activity Reaction Tests

Iron Related Bacteria	~2200		CFU/mL	1	11111	ARB	04/28/2020	04/28/2020	
Slime Forming Bacteria	<20		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~6000		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D2701	KDK	04/27/2020	04/29/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpatrick

Kirkpatrick-306222
4/27/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004363-01 (Water)

BTEX by EPA 8260D

Surrogate: 1,2-Dichloroethane-d4	93.2 %	70-130			B0D27 01		04/27/2020	04/29/2020	
Surrogate: Toluene-d8	102 %	70-130			"		"	"	
Surrogate: 4-Bromofluorobenzene	115 %	70-130			"		"	"	

Dissolved Gasses by RSK 175

Ethane	5.1	10.0	ug/L	1	11111		04/27/2020	05/04/2020	
Methane	3730	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	29.2	4.00	ug/L	1	1993481	SKJ	04/30/2020	05/01/2020	
Boron	259	150	"	10	"	SKJ	"	"	
Calcium	1140	200	"	1	"	SKJ	"	"	
Iron	ND	100	"	"	"	SKJ	"	"	U
Magnesium	262	30.0	"	"	"	SKJ	"	"	
Manganese	ND	5.00	"	"	"	SKJ	"	"	U
Potassium	966	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	202000	2500	"	10	"	SKJ	"	"	
Strontium	31.4	10.0	"	1	"	SKJ	"	"	

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 Denver CO 80204

Trent Watne
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 Project: Morales Methane Investigation -
 Kirkpatrick

Kirkpatrick-306222
4/27/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004363-01 (Water)

DRO by 8015C

Diesel Range Organics	ND	190	ug/L	1	1993409	RXC1	04/30/2020	05/04/2020	U
<i>Surrogate: o-Terphenyl</i>	71 %	40-109			"	"	"	"	

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1993396	RXY1	04/27/2020	04/29/2020	U
<i>Surrogate: Bromofluorobenzene</i>	98 %	75-127			"	"	"	"	

pH in Water by EPA 9040C

pH	8.64		pH Units	1	B0D2806	DJL	04/28/2020	04/28/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	823	5.00	uS/cm	"	B0D2807	DJL	04/28/2020	04/28/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	396	4.00	mg/L	1	1993401	RXB5	04/27/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	348	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	48.1	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	482	5.00	mg/L	1	B0D2910	DJL	04/29/2020	05/01/2020	
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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation -
Kirkpartick

Kirkpatrick-306222
4/27/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004363-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.116	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	
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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Blank (B0D2701-BLK1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5	95.3		70-130			
Surrogate: Toluene-d8	63		"	62.5	100		70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5	98.1		70-130			

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 Denver CO 80204

Trent Watne
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 Project: Morales Methane Investigation -
 Kirkpartick

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

LCS (B0D2701-BS1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	45.6	1.00	ug/L	50.0		91.3	70-130			
Toluene	44.6	1.00	"	50.0		89.1	70-130			
Ethylbenzene	45.9	1.00	"	50.0		91.8	70-130			
m,p-Xylene	90.3	2.00	"	100		90.3	70-130			
o-Xylene	46.2	1.00	"	50.0		92.3	70-130			
Surrogate: 1,2-Dichloroethane-d4	54		"	62.5		86.5	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

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 Project: Morales Methane Investigation -
 Kirkpartick

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike (B0D2701-MS1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	50.0	1.00	ug/L	50.0	ND	100	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	52.0	1.00	"	50.0	0.140	104	70-130			
m,p-Xylene	101	2.00	"	100	0.430	100	70-130			
o-Xylene	49.5	1.00	"	50.0	ND	99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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 Project: Morales Methane Investigation -
 Kirkpartick

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike Dup (B0D2701-MSD1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	48.3	1.00	ug/L	50.0	ND	96.6	70-130	3.48	20	
Toluene	47.3	1.00	"	50.0	ND	94.6	70-130	4.81	20	
Ethylbenzene	50.2	1.00	"	50.0	0.140	100	70-130	3.54	20	
m,p-Xylene	96.9	2.00	"	100	0.430	96.4	70-130	4.10	20	
o-Xylene	48.1	1.00	"	50.0	ND	96.2	70-130	2.89	20	
Surrogate: 1,2-Dichloroethane-d4	55		"	62.5		88.6	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	70-130			

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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

BLANK (1204553379-BLK)

Prepared: Analyzed: 04/29/2020

Sulfate	ND	0.400	mg/L				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Nitrate	ND	0.100	"				-			U
Nitrite	ND	0.100	"				-			U
Bromide	ND	0.200	"				-			U

LCS (1204553380-BKS)

Prepared: Analyzed: 04/29/2020

Chloride	4.94	0.200	mg/L	5.00		98.7	90-110			
Fluoride	2.49	0.100	"	2.50		99.5	90-110			
Nitrate	2.46	0.100	"	2.50		98.6	90-110			
Nitrite	2.52	0.100	"	2.50		101	90-110			
Sulfate	10.0	0.400	"	10.0		100	90-110			
Bromide	1.26	0.200	"	1.25		101	90-110			

DUP (1204553381 D)

Source: Y004363-01

Prepared: Analyzed: 04/29/2020

Fluoride	1.40	0.100	mg/L		1.39		0-20	0.38	20	
Chloride	28.5	1.00	"		28.5		0-20	0.0421	20	
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Sulfate	ND	0.400	"		0.144		0-20	200	20	U
Bromide	0.340	0.200	"		0.340		0-20	0.118	20	

PS (1204553382 S)

Source: Y004363-01

Prepared: Analyzed: 04/29/2020

Chloride	55.3	1.00	mg/L	5.00		107	90-110			
Fluoride	3.95	0.100	"	2.50		102	90-110			
Nitrate	2.49	0.100	"	2.50		99.4	90-110			H

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1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation -
Kirkpartick

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

PS (1204553382 S)	Source: Y004363-01			Prepared: Analyzed: 04/29/2020						
Nitrite	2.53	0.100	mg/L	2.50	101	90-110				H
Sulfate	10.1	0.400	"	10.0	99.7	90-110				
Bromide	1.58	0.200	"	1.25	99	90-110				

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 Project: Morales Methane Investigation -
 Kirkpartick

Anions by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Source: 509789003 Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Source: 509789003 Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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 Project Number: 019-2253
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 Kirkpartick

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 -

FLTB (1204553343-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Boron	ND	15.0	ug/L				-			U
Calcium	ND	200	"				-			U
Iron	ND	100	"				-			U
Magnesium	ND	30.0	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Barium	ND	4.00	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204553446-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	ND	4.00	ug/L				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Selenium	ND	5.00	"				-			U
Boron	ND	15.0	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Selenium	51.4	5.00	ug/L	50.0		103	85-115			
Strontium	49.9	10.0	"	50.0		99.7	85-115			
Potassium	2020	300	"	2000		101	85-115			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Manganese	51.9	5.00	ug/L	50.0		104	85-115			
Sodium	2050	250	"	2000		102	85-115			
Boron	97.8	15.0	"	100		97.8	85-115			
Barium	50.2	4.00	"	50.0		100	85-115			
Magnesium	2060	30.0	"	2000		103	85-115			
Iron	2050	100	"	2000		102	85-115			
Calcium	2000	200	"	2000		100	85-115			

DUP (1204553448 D)

Source: Y004363-01

Prepared: 04/30/2020 Analyzed: 05/01/2020

Magnesium	259	30.0	ug/L		262		0-20	1.32	20	
Boron	253	150	"		259		0-20	2.37	20	
Barium	28.5	4.00	"		29.2		0-20	2.3	20	
Strontium	31.2	10.0	"		31.4		0-20	0.763	20	
Sodium	195000	2500	"		202000		0-20	3.08	20	
Potassium	955	300	"		966		0-20	1.15	20	
Manganese	ND	5.00	"		3.26		0-20	3.53	20	U
Calcium	1130	200	"		1140		0-20	0.393	20	
Iron	ND	100	"		<33.0		0-20	6.27	20	U
Selenium	ND	5.00	"		<2.00		0-20	76.3	20	U

MS (1204553449 S)

Source: Y004363-01

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	78.3	4.00	ug/L	50.0	29.2	98.4	75-125			
Manganese	52.8	5.00	"	50.0	3.26	99.1	75-125			
Boron	346	150	"	100	259	87.6	75-125			
Potassium	2960	300	"	2000	966	99.8	75-125			
Calcium	3120	200	"	2000	1140	99.2	75-125			
Sodium	193000	2500	"	2000	202000	0	75-125			

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch 1993481 - EPA 200.2

MS (1204553449 S)

Source: Y004363-01

Prepared: 04/30/2020 Analyzed: 05/01/2020

Iron	2010	100	ug/L	2000	<33.0	99.6	75-125			
Magnesium	2290	30.0	"	2000	262	101	75-125			
Selenium	51.4	5.00	"	50.0	<2.00	102	75-125			
Strontium	83.3	10.0	"	50.0	31.4	104	75-125			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993409 - SW846 3535A										
BLANK (1204553370-BLK)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	9.39		"	20.0		47	40-109			
LCS (1204553371-BKS)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	559	200	ug/L	1000		56	45-119			
Surrogate: o-Terphenyl	12.8		"	20.0		64	40-109			
MS (1204553372 S)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	549	221	ug/L	1100	<82.9	50	41-118			
Surrogate: o-Terphenyl	11.3		"	22.1	12.5	51	40-109			
MSD (1204553373 SD)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	730	221	ug/L	1100	<82.9	66	41-118	28	20	
Surrogate: o-Terphenyl	14.0		"	22.1	12.5	64	40-109			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993396 -										
BLANK (1204553344-BLK)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0515		"	0.0500		103	75-127			
LCS (1204553345-BKS)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.547	0.100	mg/L	0.500		109	80-120			
Surrogate: Bromofluorobenzene	0.0470		"	0.0500		94	75-127			
PS (1204553346 S)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.457	0.100	mg/L	0.500		91	68-127			
Surrogate: Bromofluorobenzene	0.0420		"	0.0500		84	75-127			
PSD (1204553347 SD)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.339	0.100	mg/L	0.500		68	68-127	30	30	
Surrogate: Bromofluorobenzene	0.0499		"	0.0500		100	75-127			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1300	4.00	mg/L		1310		0-20	0.231	20	
Bicarbonate alkalinity (CaCO3)	1300	4.00	"		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation -
 Kirkpartick

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993953 - EPA 365.4 Prep										
BLANK (1204554432-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204554433-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204554434 D)		Source: 510190001			Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	0.147	0.0500	mg/L		0.117		0-41	22.7	41	
MS (1204554435 S)		Source: 510190001			Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.30	0.0500	mg/L	1.00	0.117	118	70-136			

Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation -
Kirkpartick

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

H Holding time exceeded

<20 <20

~6000 ~6000

~2200 ~2200

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.



dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

Job #: 20053978
Lab #: DIG-022830
Client: Origins Laboratory
Sample Name(s): Kirkpatrick-306222

The analytical results, opinions, or interpretations contained in this report are based upon information and material supplied by the client for whose exclusive and confidential use this report has been made. The analytical results, opinions, or interpretations expressed represent the best judgment of Dolan Integration Group based on its experience, but any interpretation of test or other data, and any recommendation(s) based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions which are not infallible, and with respect to which professional engineers and analysts may differ. Accordingly, Dolan Integration Group makes no warranty or representation, expressed or implied, of any type, and expressly disclaims same as to the productivity, proper operations, or profitability of any oil, gas, coal, or other mineral, property, well, or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced, in whole or in part, without the written approval of Dolan Integration Group.

Dolan Integration Group shall use commercially reasonable efforts to maintain the Samples it receives from Customer in the condition in which same were initially received, and shall store, free of charge, any portion(s) of the Sample(s) not consumed or altered in the course of testing and analysis for a period of 60 days after their initial receipt, after which time the Samples will be destroyed. At Customer's written request and expense, Dolan Integration Group shall return unused Samples to Customer. At Customer's written request, Dolan Integration Group will also store and maintain Customer's Samples beyond the Free Storage Period for a monthly fee in accordance with Dolan Integration Group's the current storage rates. If Customer fails to timely pay any applicable storage charges, Dolan Integration Group shall be free to destroy the Sample.

Analytical Report



Job #: 20053978
 Lab #: DIG-022830
 Client: Origins Laboratory
 Sample Name: Kirkpatrick-306222
 Date Sampled: 04/27/20
 Time Sampled: 15:20
 Sample Description: 1L DIG Bottle
 Sampling Notes:
 Date Received: 05/08/20
 Date Analyzed: Gas Composition: 05/12/20 $\delta^{13}\text{C}$: 05/14/20 δD : 05/22/20
 Date Reported: 05/28/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	263593	64.23	-	-	-	
Oxygen + Argon (O ₂ +Ar)	32784	7.99	-	-	-	
Carbon Dioxide (CO ₂)	568	0.14	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	113411	27.63	99.95	-73.0	-255	
Ethane (C ₂ H ₆)	58	0.01	0.05	-	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	nd	nd	nd	-	-	
iso-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
n-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
iso-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
n-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
Hexanes + (C ₆ H ₁₄)	nd	nd	nd	-	-	

Calculated Values:	
Total HCs (ppm)	113469
Gas Wetness (mol % C ₂ +C ₁ +)	0.05
C ₁ /(C ₂ +C ₃) (mol/mol)	1947

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

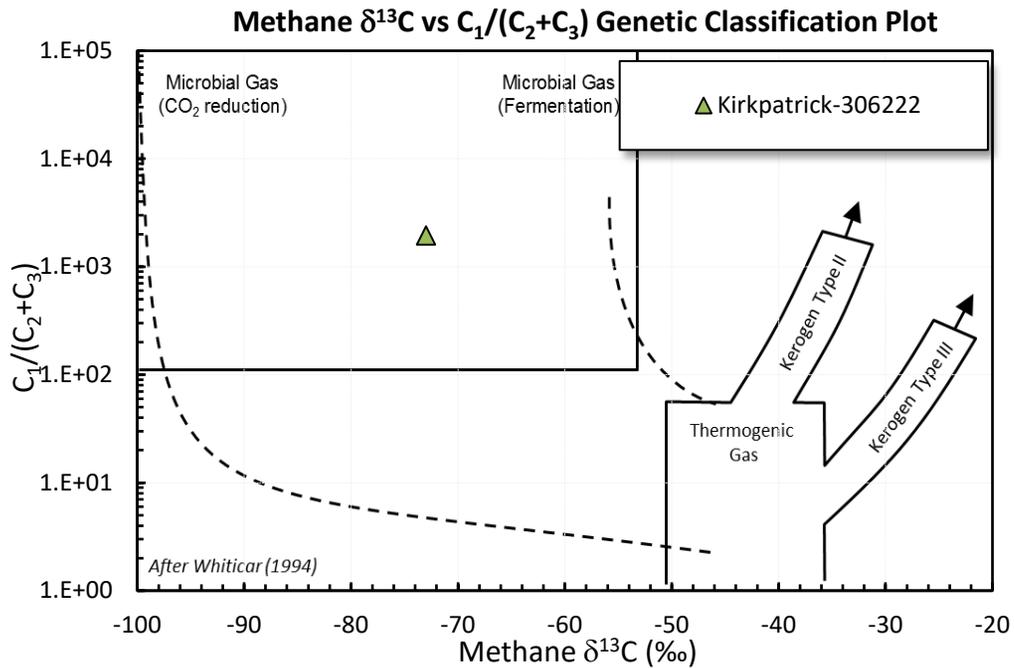
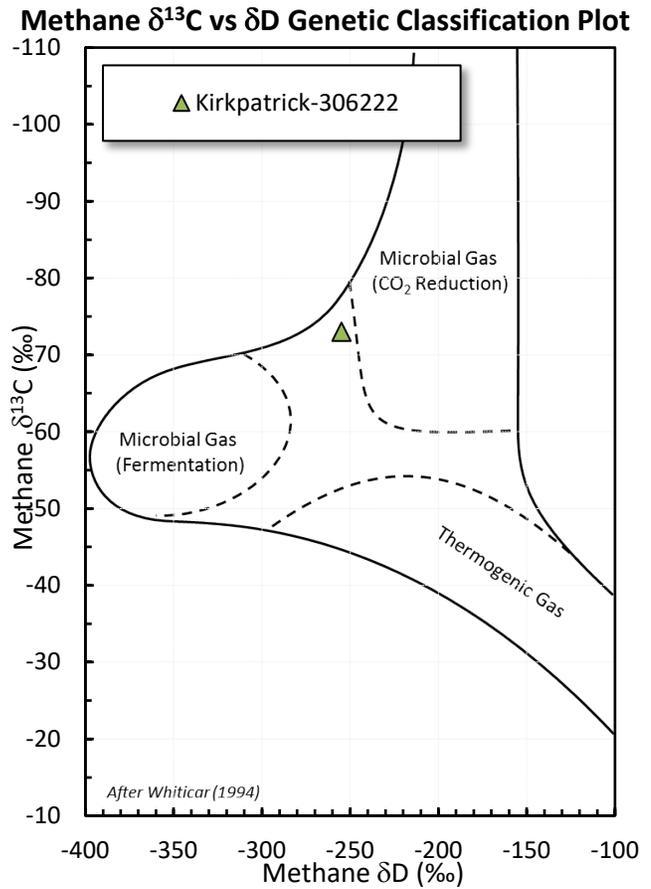
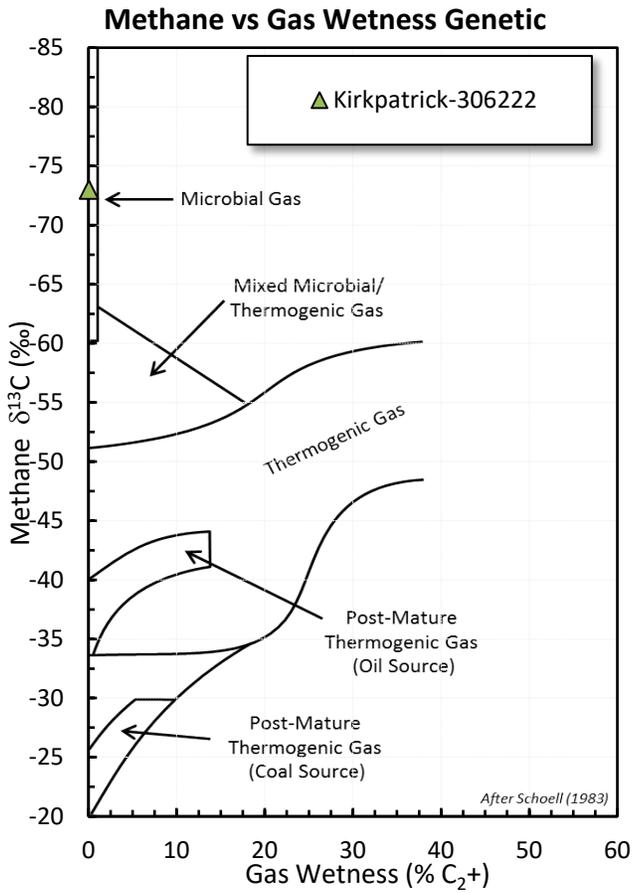
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB 20050978
DIG-022830

main 303.531.2030 • info@digforenergy.com • digforenergy.com

Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerrill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y0043le3
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (≤ 10 business days) Rush (≤ 5 business days) Expedited Rush (≤ 3 business days)

Sample Description				Analysis Requested					Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	RSK-175: N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ + with dissolved C ₁ , C ₂ , & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane- Pentane (C ₂ - C ₅ if present)	
Y0043le3-01	Kirkpatrick- 306222	4/27	1510	X		X	X		

Chain-of-Custody Record

	Signature	Company	Date	Time
Relinquished by		Origins	5/8/20	1310
Received by		DIG	5/8/20	1315
Relinquished by				
Received by				
Relinquished by				
Received by				

*Gas composition vs RSK-175- Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). RSK-175 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

May 05, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Barclay **Project Number - 019-2253**

Attached are your analytical results for Morales Methane Investigation - Barclay received by Origins Laboratory, Inc. April 27, 2020. This project is associated with Origins project number Y004364-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Barclay

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Barclay-138206	Y004364-01	Water	April 27, 2020 13:50	04/27/2020 17:10

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Y004364

Baseline Water Quality Chain of Custody

olsson

Morales Methane Investigation - Barclay

PROJECT NAME: <u>Morales2253001</u>	PROJECT NUMBER: <u>019-2253</u>	Turn Around Time (check)	DISPOSAL	By Lab	PAGE	1 of 1
COMPANY NAME: <u>Olsson</u>	PHONE NUMBER: <u>303-237-2072</u>	Standard	LAB USE ONLY: <u>5.5</u>			
ADDRESS: <u>1525 Raleigh St, Ste. 400</u>	CITY/STATE/ZIP: <u>Denver, CO 80204</u>	72hr	Temperature upon receipt: <u>5.5</u>			
PROJECT MANAGER: <u>Trent Watne</u>	PM EMAIL: <u>twatne@olsson.com</u>	48hr	Custody seals in tact: Yes No N/A			
SAMPLER		24hr				
		Same Day				
DIRECT BILL CLIENT? YES: <input type="checkbox"/> NO: <input type="checkbox"/>	CLIENT COMPANY:					
SEND COPY OF ANALYTICAL TO CLIENT? YES: <input type="checkbox"/> NO: <input type="checkbox"/>	CLIENT NAME:					
	CLIENT EMAIL:					
	CLIENT PROJECT #:					
Lab ID	Field ID	Matrix	Sample Date	Sample Time	Sample # Bottles	Notes:
Berclay_138206		GW	4/7/10	1350	19	PH (SM4500H) / EC (SM2510) 250poly X Anions / Alkalinity (carbonate / bicarbonate) (EPA 300.0) 500poly X Alkalinity (Bicarbonate, Carbonate) (SM2320) 500poly X Nitrate, Nitrite (EPA 300.0) (H2S04) 250poly X Total Phosphorus (SM4500) (H2S04) 250 poly X Cations (Ca, Fe, Mg, Mn, K, Na) (200.7/200.8) 3x 40ml X BTEX (8260) 3x 40ml X GRO (8015) 3x 40ml X DRO (8015) 3x 40ml X Methane, Ethane, Propane (RSK 175) 3x 40ml X Iron Related Bacteria, Sulfur Related Bacteria, Slime Forming Bacteria (BART)
Trip Blank					2	

RELINQUISHED BY: <u>Kyle Polko</u>	PRINTED NAME: <u>Jason Guevara</u>	SIGNATURE: <u>[Signature]</u>	DATE: <u>4/15/10</u>	TIME: <u>1910</u>
RECEIVED BY: <u>Jason Guevara</u>			DATE: <u>4/17/10</u>	TIME: <u>1710</u>
RELINQUISHED BY:				
RECEIVED BY:				
RELINQUISHED BY:				

Comments: Hold ISO flask until methane results return

QC PACKAGE (check below)	
LEVEL I (Standard CC)	X
LEVEL II (Std. CC - forms)	
LEVEL III (Std. CC - forms + raw data)	

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y004364

Client: Olsson

Client Project ID: Morales Investigation - Barclay

Checklist Completed by: JG

Shipped Via: HD

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

Date/time completed: 4/28/2020

Airbill #: N/A

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

Cooler Number/Temperature: 1 / 5.8 °C / °C / °C (Describe)

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⁾ ?	<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.

Reviewed by (Project Manager) JM

4-29-20
 Date/Time Reviewed

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Barclav-138206
4/27/2020 1:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004364-01 (Water)

Anions by EPA 300.0

Bromide	0.465	0.200	mg/L	1	1993426	LXA2	04/27/2020	04/29/2020	
Chloride	50.4	2.00	"	10	"	LXA2	"	"	
Fluoride	2.68	0.100	"	1	"	LXA2	"	"	
Nitrate	0.172	0.100	"	"	"	LXA2	"	"	
Nitrite	ND	0.100	"	"	"	LXA2	"	"	U
Sulfate	116	4.00	"	10	"	LXA2	"	"	

Anions by EPA 353.2

Nitrogen, Nitrate/Nitrite	0.212	0.100	mg/L	5	1993959	KLP1	"	05/04/2020	
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Bacterial Activity Reaction Tests

Iron Related Bacteria	~35000		CFU/mL	1	11111	ARB	04/28/2020	04/28/2020	
Slime Forming Bacteria	~500		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~27000		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D2701	KDK	04/27/2020	04/29/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Barclav-138206
4/27/2020 1:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004364-01 (Water)

BTEX by EPA 8260D

Surrogate: 1,2-Dichloroethane-d4	93.5 %	70-130			BOD27 01		04/27/2020	04/29/2020	
Surrogate: Toluene-d8	101 %	70-130			"		"	"	
Surrogate: 4-Bromofluorobenzene	117 %	70-130			"		"	"	

Dissolved Gasses by RSK 175

Ethane	ND	10.0	ug/L	1	11111		04/27/2020	05/05/2020	
Methane	5.9	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	70.2	4.00	ug/L	1	1993481	SKJ	04/30/2020	05/01/2020	
Boron	62.7	15.0	"	"	"	SKJ	"	"	
Calcium	5700	200	"	"	"	SKJ	"	"	
Iron	ND	100	"	"	"	SKJ	"	"	U
Magnesium	702	30.0	"	"	"	SKJ	"	"	
Manganese	9.31	5.00	"	"	"	SKJ	"	"	
Potassium	1320	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	208000	2500	"	10	"	SKJ	"	"	
Strontium	115	10.0	"	1	"	SKJ	"	"	

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Barclav-138206
4/27/2020 1:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004364-01 (Water)

DRO by 8015C

Diesel Range Organics	ND	187	ug/L	1	1993409	RXC1	04/30/2020	05/04/2020	U
<i>Surrogate: o-Terphenyl</i>	80 %	40-109			"	"	"	"	

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1993396	RXY1	04/27/2020	04/29/2020	U
<i>Surrogate: Bromofluorobenzene</i>	101 %	75-127			"	"	"	"	

pH in Water by EPA 9040C

pH	8.31		pH Units	1	B0D2806	DJL	04/28/2020	04/28/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	997	5.00	uS/cm	"	B0D2807	DJL	04/28/2020	04/28/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	301	4.00	mg/L	1	1993401	RXB5	04/27/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	285	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	16.0	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	577	5.00	mg/L	1	B0D2910	DJL	04/29/2020	05/01/2020	
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1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Barclay

Barclav-138206
4/27/2020 1:50:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004364-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.0525	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	
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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Blank (B0D2701-BLK1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
<i>Surrogate: 1,2-Dichloroethane-d4</i>	60		"	62.5	95.3		70-130			
<i>Surrogate: Toluene-d8</i>	63		"	62.5	100		70-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	61		"	62.5	98.1		70-130			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

LCS (B0D2701-BS1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	45.6	1.00	ug/L	50.0		91.3	70-130			
Toluene	44.6	1.00	"	50.0		89.1	70-130			
Ethylbenzene	45.9	1.00	"	50.0		91.8	70-130			
m,p-Xylene	90.3	2.00	"	100		90.3	70-130			
o-Xylene	46.2	1.00	"	50.0		92.3	70-130			
Surrogate: 1,2-Dichloroethane-d4	54		"	62.5		86.5	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike (B0D2701-MS1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	50.0	1.00	ug/L	50.0	ND	100	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	52.0	1.00	"	50.0	0.140	104	70-130			
m,p-Xylene	101	2.00	"	100	0.430	100	70-130			
o-Xylene	49.5	1.00	"	50.0	ND	99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike Dup (B0D2701-MSD1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	48.3	1.00	ug/L	50.0	ND	96.6	70-130	3.48	20	
Toluene	47.3	1.00	"	50.0	ND	94.6	70-130	4.81	20	
Ethylbenzene	50.2	1.00	"	50.0	0.140	100	70-130	3.54	20	
m,p-Xylene	96.9	2.00	"	100	0.430	96.4	70-130	4.10	20	
o-Xylene	48.1	1.00	"	50.0	ND	96.2	70-130	2.89	20	
Surrogate: 1,2-Dichloroethane-d4	55		"	62.5		88.6	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	70-130			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

BLANK (1204553379-BLK)

Prepared: Analyzed: 04/29/2020

Nitrate	ND	0.100	mg/L				-			U
Bromide	ND	0.200	"				-			U
Nitrite	ND	0.100	"				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Sulfate	ND	0.400	"				-			U

LCS (1204553380-BKS)

Prepared: Analyzed: 04/29/2020

Fluoride	2.49	0.100	mg/L	2.50		99.5	90-110			
Chloride	4.94	0.200	"	5.00		98.7	90-110			
Sulfate	10.0	0.400	"	10.0		100	90-110			
Nitrate	2.46	0.100	"	2.50		98.6	90-110			
Nitrite	2.52	0.100	"	2.50		101	90-110			
Bromide	1.26	0.200	"	1.25		101	90-110			

DUP (1204553381 D)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Sulfate	ND	0.400	mg/L		0.144		0-20	200	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Fluoride	1.40	0.100	"		1.39		0-20	0.38	20	
Chloride	28.5	1.00	"		28.5		0-20	0.0421	20	
Bromide	0.340	0.200	"		0.340		0-20	0.118	20	

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Fluoride	3.95	0.100	mg/L	2.50		102	90-110			
Sulfate	10.1	0.400	"	10.0		99.7	90-110			
Nitrate	2.49	0.100	"	2.50		99.4	90-110			H

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Chloride	55.3	1.00	mg/L	5.00		107	90-110			
Bromide	1.58	0.200	"	1.25		99	90-110			
Nitrite	2.53	0.100	"	2.50		101	90-110			H

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Anions by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Source: 509789003 Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Source: 509789003 Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 -

FLTB (1204553343-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Boron	ND	15.0	ug/L				-			U
Barium	ND	4.00	"				-			U
Iron	ND	100	"				-			U
Magnesium	ND	30.0	"				-			U
Manganese	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Calcium	ND	200	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U
Selenium	ND	5.00	"				-			U

BLANK (1204553446-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Strontium	ND	10.0	ug/L				-			U
Sodium	ND	250	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Boron	ND	15.0	"				-			U
Barium	ND	4.00	"				-			U
Selenium	ND	5.00	"				-			U

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Potassium	2020	300	ug/L	2000	101	85-115
Boron	97.8	15.0	"	100	97.8	85-115
Sodium	2050	250	"	2000	102	85-115

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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	50.2	4.00	ug/L	50.0	100	85-115				
Calcium	2000	200	"	2000	100	85-115				
Iron	2050	100	"	2000	102	85-115				
Magnesium	2060	30.0	"	2000	103	85-115				
Manganese	51.9	5.00	"	50.0	104	85-115				
Selenium	51.4	5.00	"	50.0	103	85-115				
Strontium	49.9	10.0	"	50.0	99.7	85-115				

DUP (1204553448 D)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	28.5	4.00	ug/L	29.2	0-20	2.3	20			
Sodium	195000	2500	"	202000	0-20	3.08	20			
Selenium	ND	5.00	"	<2.00	0-20	76.3	20			U
Boron	253	150	"	259	0-20	2.37	20			
Potassium	955	300	"	966	0-20	1.15	20			
Iron	ND	100	"	<33.0	0-20	6.27	20			U
Magnesium	259	30.0	"	262	0-20	1.32	20			
Manganese	ND	5.00	"	3.26	0-20	3.53	20			U
Calcium	1130	200	"	1140	0-20	0.393	20			
Strontium	31.2	10.0	"	31.4	0-20	0.763	20			

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Selenium	51.4	5.00	ug/L	50.0	<2.00	102	75-125			
Potassium	2960	300	"	2000	966	99.8	75-125			
Manganese	52.8	5.00	"	50.0	3.26	99.1	75-125			
Magnesium	2290	30.0	"	2000	262	101	75-125			
Iron	2010	100	"	2000	<33.0	99.6	75-125			
Calcium	3120	200	"	2000	1140	99.2	75-125			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

MS (1204553449 S)	Source: 510300001			Prepared: 04/30/2020 Analyzed: 05/01/2020						
Barium	78.3	4.00	ug/L	50.0	29.2	98.4	75-125			
Strontium	83.3	10.0	"	50.0	31.4	104	75-125			
Sodium	193000	2500	"	2000	202000	0	75-125			
Boron	346	150	"	100	259	87.6	75-125			

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 Project: Morales Methane Investigation - Barclay

DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993409 - SW846 3535A										
BLANK (1204553370-BLK)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	9.39		"	20.0		47	40-109			
LCS (1204553371-BKS)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	559	200	ug/L	1000		56	45-119			
Surrogate: o-Terphenyl	12.8		"	20.0		64	40-109			
MS (1204553372 S)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	549	221	ug/L	1100	<82.9	50	41-118			
Surrogate: o-Terphenyl	11.3		"	22.1	12.5	51	40-109			
MSD (1204553373 SD)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	730	221	ug/L	1100	<82.9	66	41-118	28	20	
Surrogate: o-Terphenyl	14.0		"	22.1	12.5	64	40-109			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993396 -										
BLANK (1204553344-BLK)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0515		"	0.0500		103	75-127			
LCS (1204553345-BKS)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.547	0.100	mg/L	0.500		109	80-120			
Surrogate: Bromofluorobenzene	0.0470		"	0.0500		94	75-127			
PS (1204553346 S)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.457	0.100	mg/L	0.500		91	68-127			
Surrogate: Bromofluorobenzene	0.0420		"	0.0500		84	75-127			
PSD (1204553347 SD)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.339	0.100	mg/L	0.500		68	68-127	30	30	
Surrogate: Bromofluorobenzene	0.0499		"	0.0500		100	75-127			

Origins Laboratory, Inc.



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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Barclay

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1300	4.00	mg/L		1310		0-20	0.231	20	
Bicarbonate alkalinity (CaCO3)	1300	4.00	"		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

Origins Laboratory, Inc.



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Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Barclay

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

H Holding time exceeded

~500 ~500

~35000 ~35000

~27000 ~27000

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.



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May 07, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Burr **Project Number - 019-2253**

Attached are your analytical results for Morales Methane Investigation - Burr received by Origins Laboratory, Inc. April 28, 2020. This project is associated with Origins project number Y004371-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Burr

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Burr-129280-A	Y004371-01	Water	April 28, 2020 13:35	04/28/2020 14:55

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y004371

Client: Olsson

Client Project ID: Morales Investigation - Burr

Checklist Completed by: JG

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

Date/time completed: 4/28/2020

Airbill #: N/A

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

Cooler Number/Temperature: 1 12.5 °C / °C / °C (Describe)

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⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input type="checkbox"/>	<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 JM (Project Manager)

4-29-20
 Date/Time Reviewed

Origins Laboratory, Inc.

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Burr-129280-A
4/28/2020 1:35:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004371-01 (Water)

Anions by EPA 300.0

Bromide	0.365	0.200	mg/L	1	1993426	LXA2	04/28/2020	04/29/2020	
Chloride	31.0	1.00	"	5	"	LXA2	"	"	
Fluoride	1.44	0.100	"	1	"	LXA2	"	"	
Nitrate	ND	0.100	"	"	"	LXA2	"	"	U
Nitrite	ND	0.100	"	"	"	LXA2	"	"	U
Sulfate	ND	0.400	"	"	"	LXA2	"	"	U

Anions by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L	1	1993959	KLP1	"	05/04/2020	U
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Bacterial Activity Reaction Tests

Iron Related Bacteria	~2200		CFU/mL	1	11111	ARB	"	04/28/2020	
Slime Forming Bacteria	<20		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~6000		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D2701	KDK	04/28/2020	04/29/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

Origins Laboratory, Inc.



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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Burr-129280-A
4/28/2020 1:35:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004371-01 (Water)

BTEX by EPA 8260D

Surrogate: 1,2-Dichloroethane-d4	93.4 %	70-130			BOD27 01		04/28/2020	04/29/2020	
Surrogate: Toluene-d8	101 %	70-130			"		"	"	
Surrogate: 4-Bromofluorobenzene	116 %	70-130			"		"	"	

Dissolved Gasses by RSK 175

Ethane	22.9	10.0	ug/L	1	11111		04/28/2020	05/04/2020	
Methane	8090	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	24.8	4.00	ug/L	1	1993481	SKJ	04/30/2020	05/01/2020	
Boron	246	150	"	10	"	SKJ	"	"	
Calcium	1170	200	"	1	"	SKJ	"	"	
Iron	132	100	"	"	"	SKJ	"	"	
Magnesium	272	30.0	"	"	"	SKJ	"	"	
Manganese	10.9	5.00	"	"	"	SKJ	"	"	
Potassium	943	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	197000	2500	"	10	"	SKJ	"	"	
Strontium	32.1	10.0	"	1	"	SKJ	"	"	

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Burr-129280-A
4/28/2020 1:35:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004371-01 (Water)

DRO by 8015C

Diesel Range Organics	ND	188	ug/L	1	1993409	RXC1	04/30/2020	05/04/2020	U
<i>Surrogate: o-Terphenyl</i>	63 %	40-109			"	"	"	"	

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1993396	RXY1	04/28/2020	04/29/2020	U
<i>Surrogate: Bromofluorobenzene</i>	95 %	75-127			"	"	"	"	

pH in Water by EPA 9040C

pH	8.60		pH Units	1	B0D2806	DJL	04/28/2020	04/28/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	816	5.00	uS/cm	"	B0D2807	DJL	04/28/2020	04/28/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	401	4.00	mg/L	1	1993401	RXB5	04/28/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	351	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	50.2	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	489	5.00	mg/L	1	B0D2910	DJL	04/29/2020	05/01/2020	
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Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Burr

Burr-129280-A
4/28/2020 1:35:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004371-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.0910	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Blank (B0D2701-BLK1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5		95.3	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.1	70-130			

Origins Laboratory, Inc.



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Trent Watne
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 Project: Morales Methane Investigation - Burr

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

LCS (B0D2701-BS1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	45.6	1.00	ug/L	50.0		91.3	70-130			
Toluene	44.6	1.00	"	50.0		89.1	70-130			
Ethylbenzene	45.9	1.00	"	50.0		91.8	70-130			
m,p-Xylene	90.3	2.00	"	100		90.3	70-130			
o-Xylene	46.2	1.00	"	50.0		92.3	70-130			
Surrogate: 1,2-Dichloroethane-d4	54		"	62.5		86.5	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

Origins Laboratory, Inc.



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 Project: Morales Methane Investigation - Burr

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike (B0D2701-MS1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	50.0	1.00	ug/L	50.0	ND	100	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	52.0	1.00	"	50.0	0.140	104	70-130			
m,p-Xylene	101	2.00	"	100	0.430	100	70-130			
o-Xylene	49.5	1.00	"	50.0	ND	99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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 Project: Morales Methane Investigation - Burr

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike Dup (B0D2701-MSD1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	48.3	1.00	ug/L	50.0	ND	96.6	70-130	3.48	20	
Toluene	47.3	1.00	"	50.0	ND	94.6	70-130	4.81	20	
Ethylbenzene	50.2	1.00	"	50.0	0.140	100	70-130	3.54	20	
m,p-Xylene	96.9	2.00	"	100	0.430	96.4	70-130	4.10	20	
o-Xylene	48.1	1.00	"	50.0	ND	96.2	70-130	2.89	20	
Surrogate: 1,2-Dichloroethane-d4	55		"	62.5		88.6	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	70-130			

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 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

BLANK (1204553379-BLK)

Prepared: Analyzed: 04/29/2020

Sulfate	ND	0.400	mg/L				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Nitrate	ND	0.100	"				-			U
Nitrite	ND	0.100	"				-			U
Bromide	ND	0.200	"				-			U

LCS (1204553380-BKS)

Prepared: Analyzed: 04/29/2020

Chloride	4.94	0.200	mg/L	5.00		98.7	90-110			
Fluoride	2.49	0.100	"	2.50		99.5	90-110			
Nitrate	2.46	0.100	"	2.50		98.6	90-110			
Nitrite	2.52	0.100	"	2.50		101	90-110			
Sulfate	10.0	0.400	"	10.0		100	90-110			
Bromide	1.26	0.200	"	1.25		101	90-110			

DUP (1204553381 D)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Fluoride	1.40	0.100	mg/L		1.39		0-20	0.38	20	
Chloride	28.5	1.00	"		28.5		0-20	0.0421	20	
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Sulfate	ND	0.400	"		0.144		0-20	200	20	U
Bromide	0.340	0.200	"		0.340		0-20	0.118	20	

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Chloride	55.3	1.00	mg/L	5.00		107	90-110			
Fluoride	3.95	0.100	"	2.50		102	90-110			
Nitrate	2.49	0.100	"	2.50		99.4	90-110			H

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 Denver CO 80204

Trent Watne
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 Project: Morales Methane Investigation - Burr

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Nitrite	2.53	0.100	mg/L	2.50		101	90-110			H
Sulfate	10.1	0.400	"	10.0		99.7	90-110			
Bromide	1.58	0.200	"	1.25		99	90-110			

Origins Laboratory, Inc.



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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Anions by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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Trent Watne
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 Project: Morales Methane Investigation - Burr

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 -

FLTB (1204553343-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Boron	ND	15.0	ug/L				-			U
Calcium	ND	200	"				-			U
Iron	ND	100	"				-			U
Magnesium	ND	30.0	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Barium	ND	4.00	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204553446-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	ND	4.00	ug/L				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Selenium	ND	5.00	"				-			U
Boron	ND	15.0	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Selenium	51.4	5.00	ug/L	50.0		103	85-115			
Strontium	49.9	10.0	"	50.0		99.7	85-115			
Potassium	2020	300	"	2000		101	85-115			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Manganese	51.9	5.00	ug/L	50.0		104	85-115			
Sodium	2050	250	"	2000		102	85-115			
Boron	97.8	15.0	"	100		97.8	85-115			
Barium	50.2	4.00	"	50.0		100	85-115			
Magnesium	2060	30.0	"	2000		103	85-115			
Iron	2050	100	"	2000		102	85-115			
Calcium	2000	200	"	2000		100	85-115			

DUP (1204553448 D)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Magnesium	259	30.0	ug/L		262		0-20	1.32	20	
Boron	253	150	"		259		0-20	2.37	20	
Barium	28.5	4.00	"		29.2		0-20	2.3	20	
Strontium	31.2	10.0	"		31.4		0-20	0.763	20	
Sodium	195000	2500	"		202000		0-20	3.08	20	
Potassium	955	300	"		966		0-20	1.15	20	
Manganese	ND	5.00	"		3.26		0-20	3.53	20	U
Calcium	1130	200	"		1140		0-20	0.393	20	
Iron	ND	100	"		<33.0		0-20	6.27	20	U
Selenium	ND	5.00	"		<2.00		0-20	76.3	20	U

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	78.3	4.00	ug/L	50.0	29.2	98.4	75-125			
Manganese	52.8	5.00	"	50.0	3.26	99.1	75-125			
Boron	346	150	"	100	259	87.6	75-125			
Potassium	2960	300	"	2000	966	99.8	75-125			
Calcium	3120	200	"	2000	1140	99.2	75-125			
Sodium	193000	2500	"	2000	202000	0	75-125			

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

MS (1204553449 S)	Source: 510300001			Prepared: 04/30/2020 Analyzed: 05/01/2020						
Iron	2010	100	ug/L	2000	<33.0	99.6	75-125			
Magnesium	2290	30.0	"	2000	262	101	75-125			
Selenium	51.4	5.00	"	50.0	<2.00	102	75-125			
Strontium	83.3	10.0	"	50.0	31.4	104	75-125			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993409 - SW846 3535A										
BLANK (1204553370-BLK)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	9.39		"	20.0		47	40-109			
LCS (1204553371-BKS)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	559	200	ug/L	1000		56	45-119			
Surrogate: o-Terphenyl	12.8		"	20.0		64	40-109			
MS (1204553372 S)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	549	221	ug/L	1100	<82.9	50	41-118			
Surrogate: o-Terphenyl	11.3		"	22.1	12.5	51	40-109			
MSD (1204553373 SD)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	730	221	ug/L	1100	<82.9	66	41-118	28	20	
Surrogate: o-Terphenyl	14.0		"	22.1	12.5	64	40-109			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993396 -										
BLANK (1204553344-BLK)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0515		"	0.0500		103	75-127			
LCS (1204553345-BKS)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.547	0.100	mg/L	0.500		109	80-120			
Surrogate: Bromofluorobenzene	0.0470		"	0.0500		94	75-127			
PS (1204553346 S)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.457	0.100	mg/L	0.500		91	68-127			
Surrogate: Bromofluorobenzene	0.0420		"	0.0500		84	75-127			
PSD (1204553347 SD)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.339	0.100	mg/L	0.500		68	68-127	30	30	
Surrogate: Bromofluorobenzene	0.0499		"	0.0500		100	75-127			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1300	4.00	mg/L		1310		0-20	0.231	20	
Bicarbonate alkalinity (CaCO3)	1300	4.00	"		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

Origins Laboratory, Inc.



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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burr

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993953 - EPA 365.4 Prep										
BLANK (1204554432-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204554433-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204554434 D)		Source: 510190001			Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	0.147	0.0500	mg/L		0.117		0-41	22.7	41	
MS (1204554435 S)		Source: 510190001			Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.30	0.0500	mg/L	1.00	0.117	118	70-136			

Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Burr

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

H Holding time exceeded

<20 <20

~6000 ~6000

~2200 ~2200

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.



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dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

Job #: 20053980
Lab #: DIG-022832
Client: Origins Laboratory
Sample Name(s): Burr-129280-A

The analytical results, opinions, or interpretations contained in this report are based upon information and material supplied by the client for whose exclusive and confidential use this report has been made. The analytical results, opinions, or interpretations expressed represent the best judgment of Dolan Integration Group based on its experience, but any interpretation of test or other data, and any recommendation(s) based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions which are not infallible, and with respect to which professional engineers and analysts may differ. Accordingly, Dolan Integration Group makes no warranty or representation, expressed or implied, of any type, and expressly disclaims same as to the productivity, proper operations, or profitability of any oil, gas, coal, or other mineral, property, well, or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced, in whole or in part, without the written approval of Dolan Integration Group.

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Analytical Report



Job #: 20053980
 Lab #: DIG-022832
 Client: Origins Laboratory
 Sample Name: Burr-129280-A
 Date Sampled: 04/28/20
 Time Sampled: 13:35
 Sample Description: 1L DIG Bottle
 Sampling Notes:
 Date Received: 05/08/20
 Date Analyzed: Gas Composition: 05/12/20 $\delta^{13}\text{C}$: 05/14/20 δD : 05/22/20
 Date Reported: 05/28/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	438530	66.69	-	-	-	
Oxygen + Argon (O ₂ +Ar)	81722	12.43	-	-	-	
Carbon Dioxide (CO ₂)	646	0.10	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	136493	20.76	99.90	-74.4	-279	
Ethane (C ₂ H ₆)	138	0.02	0.10		-	
Ethene (C ₂ H ₄)	nd	nd	nd		-	
Propane (C ₃ H ₈)	nd	nd	nd		-	
iso-Butane (C ₄ H ₁₀)	nd	nd	nd		-	
n-Butane (C ₄ H ₁₀)	nd	nd	nd		-	
iso-Pentane (C ₅ H ₁₂)	nd	nd	nd		-	
n-Pentane (C ₅ H ₁₂)	nd	nd	nd		-	
Hexanes + (C ₆ H ₁₄)	nd	nd	nd		-	

Calculated Values:	
Total HCs (ppm)	136631
Gas Wetness (mol % C ₂ +C ₁ +))	0.10
C ₁ /(C ₂ +C ₃) (mol/mol)	989

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

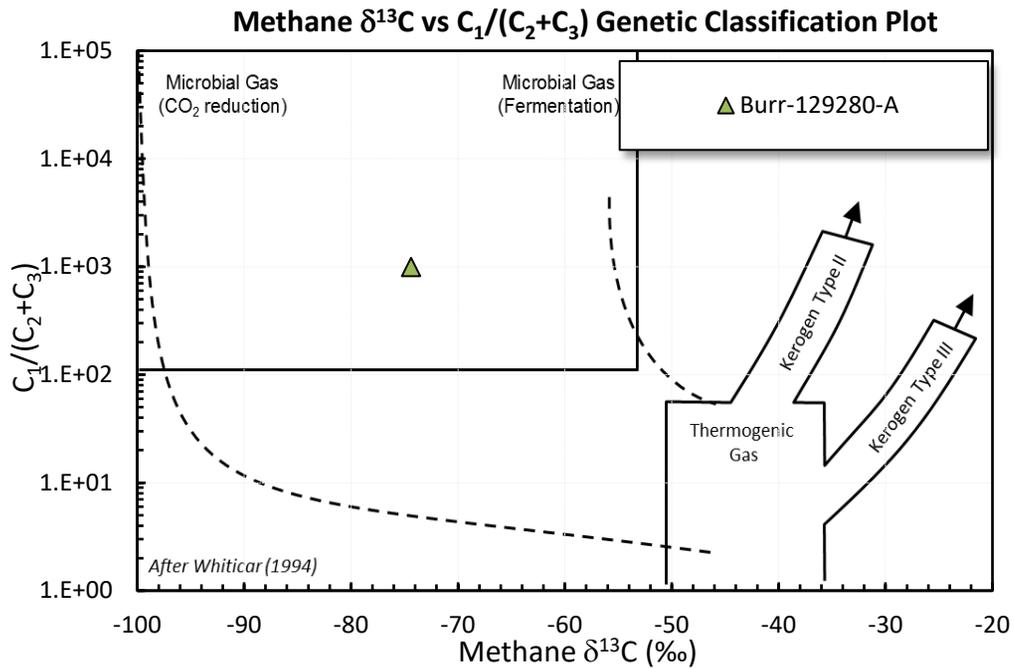
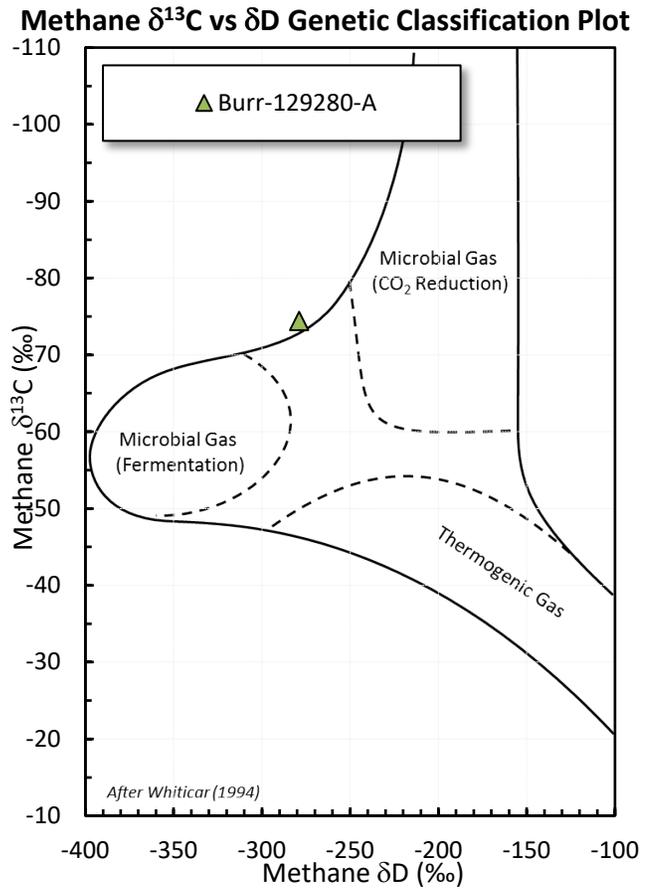
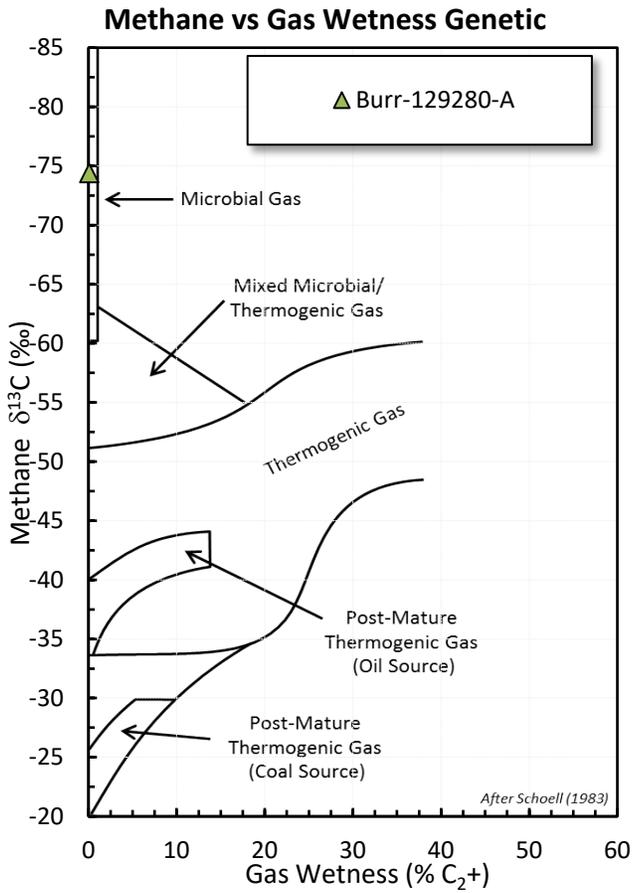
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB 20053980
DIG-022832

main 303.531.2030 • info@digforenergy.com • digforenergy.com
Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerrill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y004371
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (≤ 10 business days) Rush (≤ 5 business days) Expedited Rush (≤ 3 business days)

Sample Description				Analysis Requested					Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	RSK-175: N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ + with dissolved C ₂ , C ₂ , & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane- Pentane (C ₂ - C ₅ if present)	
Y004371-01	Burr-129280-A	4/28	1335	X		X	X		

Chain-of-Custody Record

	Signature	Company	Date	Time
Relinquished by		Origins	5/8/20	1310
Received by		DIG	5/8/20	1315
Relinquished by				
Received by				
Relinquished by				
Received by				

*Gas composition vs RSK-175. Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). RSK-175 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

May 05, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Fraley **Project Number - 019-2253**

Attached are your analytical results for Morales Methane Investigation - Fraley received by Origins Laboratory, Inc. April 28, 2020. This project is associated with Origins project number Y004373-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Fraley

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Fraley-84716	Y004373-01	Water	April 28, 2020 11:00	04/28/2020 14:55

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Fraley

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y004373

Client: Olsson

Client Project ID: Morales Investigation - Fraley

Checklist Completed by: JG

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

Date/time completed: 4/28/2020

Airbill #: N/A

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

Cooler Number/Temperature: 1 12.5 °C / °C / °C (Describe) °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⁾ ?	<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.

Jm
 Reviewed by (Project Manager)

4-29-20
 Date/Time Reviewed

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Fraley

Fraley-84716
4/28/2020 11:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004373-01 (Water)

Anions by EPA 300.0

Bromide	0.282	0.200	mg/L	1	1993426	LXA2	04/28/2020	04/29/2020	
Chloride	93.4	4.00	"	20	"	LXA2	"	"	
Fluoride	1.88	0.100	"	1	"	LXA2	"	"	
Nitrate	5.53	2.00	"	20	"	LXA2	"	"	
Nitrite	ND	0.100	"	1	"	LXA2	"	"	U
Sulfate	158	8.00	"	20	"	LXA2	"	"	

Anions by EPA 353.2

Nitrogen, Nitrate/Nitrite	6.37	0.200	mg/L	10	1993959	KLP1	"	05/04/2020	
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Bacterial Activity Reaction Tests

Iron Related Bacteria	~9000		CFU/mL	1	11111	ARB	"	04/28/2020	
Slime Forming Bacteria	~100		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~6000		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D2701	KDK	04/28/2020	04/29/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Fraley

Fraley-84716

4/28/2020 11:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004373-01 (Water)

BTEX by EPA 8260D

Surrogate: 1,2-Dichloroethane-d4	94.1 %	70-130			BOD27 01		04/28/2020	04/29/2020	
Surrogate: Toluene-d8	102 %	70-130			"		"	"	
Surrogate: 4-Bromofluorobenzene	119 %	70-130			"		"	"	

Dissolved Gasses by RSK 175

Ethane	ND	10.0	ug/L	1	11111		04/28/2020	05/05/2020	
Methane	ND	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	23.1	4.00	ug/L	1	1993481	SKJ	04/30/2020	05/01/2020	
Boron	149	15.0	"	"	"	SKJ	"	"	
Calcium	100000	2000	"	10	"	SKJ	"	"	
Iron	167	100	"	1	"	SKJ	"	"	
Magnesium	34400	30.0	"	"	"	SKJ	"	"	
Manganese	ND	5.00	"	"	"	SKJ	"	"	U
Potassium	2900	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	83100	2500	"	10	"	SKJ	"	"	
Strontium	1860	100	"	"	"	SKJ	"	"	

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Fraley

Fraley-84716
4/28/2020 11:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004373-01 (Water)

DRO by 8015C

Diesel Range Organics	ND	189	ug/L	1	1993409	RXC1	04/30/2020	05/04/2020	U
<i>Surrogate: o-Terphenyl</i>	55 %	40-109			"	"	"	"	

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1993396	RXY1	04/28/2020	04/29/2020	U
<i>Surrogate: Bromofluorobenzene</i>	100 %	75-127			"	"	"	"	

pH in Water by EPA 9040C

pH	7.21		pH Units	1	B0D2806	DJL	04/28/2020	04/28/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	1110	5.00	uS/cm	"	B0D2807	DJL	04/28/2020	04/28/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	261	4.00	mg/L	1	1993401	RXB5	04/28/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	261	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	ND	4.00	"	"	"	RXB5	"	"	U

Total Dissolved Solids by 2540C

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Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Fraley

Fralev-84716

4/28/2020 11:00:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004373-01 (Water)

Total Dissolved Solids by 2540C

Total Dissolved Solids	677	5.00	mg/L	1	B0D2910	DJL	04/29/2020	05/01/2020	
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Total Phosphorus by EPA 365.4

Phosphorus, Total as P	ND	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	U
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Trent Watne
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 Project: Morales Methane Investigation - Fraley

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Blank (B0D2701-BLK1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
<i>Surrogate: 1,2-Dichloroethane-d4</i>	60		"	62.5	95.3		70-130			
<i>Surrogate: Toluene-d8</i>	63		"	62.5	100		70-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	61		"	62.5	98.1		70-130			

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Trent Watne
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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

LCS (B0D2701-BS1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	45.6	1.00	ug/L	50.0		91.3	70-130			
Toluene	44.6	1.00	"	50.0		89.1	70-130			
Ethylbenzene	45.9	1.00	"	50.0		91.8	70-130			
m,p-Xylene	90.3	2.00	"	100		90.3	70-130			
o-Xylene	46.2	1.00	"	50.0		92.3	70-130			
Surrogate: 1,2-Dichloroethane-d4	54		"	62.5		86.5	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike (B0D2701-MS1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	50.0	1.00	ug/L	50.0	ND	100	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	52.0	1.00	"	50.0	0.140	104	70-130			
m,p-Xylene	101	2.00	"	100	0.430	100	70-130			
o-Xylene	49.5	1.00	"	50.0	ND	99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike Dup (B0D2701-MSD1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	48.3	1.00	ug/L	50.0	ND	96.6	70-130	3.48	20	
Toluene	47.3	1.00	"	50.0	ND	94.6	70-130	4.81	20	
Ethylbenzene	50.2	1.00	"	50.0	0.140	100	70-130	3.54	20	
m,p-Xylene	96.9	2.00	"	100	0.430	96.4	70-130	4.10	20	
o-Xylene	48.1	1.00	"	50.0	ND	96.2	70-130	2.89	20	
Surrogate: 1,2-Dichloroethane-d4	55		"	62.5		88.6	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	70-130			

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 Project: Morales Methane Investigation - Fraley

Volatile Organic Compounds by GC/MS SW846 8260D - 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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Classical Chemistry Parameters - 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 B0D2806 - NO PREP

Duplicate (B0D2806-DUP1) Source: Y004362-01 Prepared: 04/28/2020 Analyzed: 04/28/2020

pH	8.52		pH Units		8.61			1.05	200	
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Batch B0D2807 - NO PREP

Blank (B0D2807-BLK1) Prepared: 04/28/2020 Analyzed: 04/28/2020

Specific Conductance (EC)	2.80	5.00	uS/cm							
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Duplicate (B0D2807-DUP1) Source: Y004362-01 Prepared: 04/28/2020 Analyzed: 04/28/2020

Specific Conductance (EC)	843	5.00	uS/cm		844			0.0593	10	
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Batch B0D2910 - NO PREP

Blank (B0D2910-BLK1) Prepared: 04/29/2020 Analyzed: 05/01/2020

Total Dissolved Solids	ND	5.00	mg/L							
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LCS (B0D2910-BS1) Prepared: 04/29/2020 Analyzed: 05/01/2020

Total Dissolved Solids	68.8	5.00	mg/L	71.6	96.1	85-115				
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Duplicate (B0D2910-DUP1) Source: Y004362-01 Prepared: 04/29/2020 Analyzed: 05/01/2020

Total Dissolved Solids	508	5.00	mg/L		506			0.316	20	
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 Project: Morales Methane Investigation - Fraley

Anions by EPA 300.0 - Quality Control
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

BLANK (1204553379-BLK)

Prepared: Analyzed: 04/29/2020

Sulfate	ND	0.400	mg/L				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Nitrate	ND	0.100	"				-			U
Nitrite	ND	0.100	"				-			U
Bromide	ND	0.200	"				-			U

LCS (1204553380-BKS)

Prepared: Analyzed: 04/29/2020

Chloride	4.94	0.200	mg/L	5.00		98.7	90-110			
Fluoride	2.49	0.100	"	2.50		99.5	90-110			
Nitrate	2.46	0.100	"	2.50		98.6	90-110			
Nitrite	2.52	0.100	"	2.50		101	90-110			
Sulfate	10.0	0.400	"	10.0		100	90-110			
Bromide	1.26	0.200	"	1.25		101	90-110			

DUP (1204553381 D)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Fluoride	1.40	0.100	mg/L		1.39		0-20	0.38	20	
Chloride	28.5	1.00	"		28.5		0-20	0.0421	20	
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Sulfate	ND	0.400	"		0.144		0-20	200	20	U
Bromide	0.340	0.200	"		0.340		0-20	0.118	20	

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Chloride	55.3	1.00	mg/L	5.00		107	90-110			
Fluoride	3.95	0.100	"	2.50		102	90-110			
Nitrate	2.49	0.100	"	2.50		99.4	90-110			H

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 Project: Morales Methane Investigation - Fraley

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

PS (1204553382 S)	Source: 510300001			Prepared: Analyzed: 04/29/2020						
Nitrite	2.53	0.100	mg/L	2.50	101	90-110				H
Sulfate	10.1	0.400	"	10.0	99.7	90-110				
Bromide	1.58	0.200	"	1.25	99	90-110				

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Anions by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Source: 509789003 Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Source: 509789003 Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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 Project: Morales Methane Investigation - Fraley

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 -

FLTB (1204553343-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Boron	ND	15.0	ug/L				-			U
Calcium	ND	200	"				-			U
Iron	ND	100	"				-			U
Magnesium	ND	30.0	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Barium	ND	4.00	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204553446-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	ND	4.00	ug/L				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Selenium	ND	5.00	"				-			U
Boron	ND	15.0	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Selenium	51.4	5.00	ug/L	50.0		103	85-115			
Strontium	49.9	10.0	"	50.0		99.7	85-115			
Potassium	2020	300	"	2000		101	85-115			

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 Project: Morales Methane Investigation - Fraley

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Manganese	51.9	5.00	ug/L	50.0		104	85-115			
Sodium	2050	250	"	2000		102	85-115			
Boron	97.8	15.0	"	100		97.8	85-115			
Barium	50.2	4.00	"	50.0		100	85-115			
Magnesium	2060	30.0	"	2000		103	85-115			
Iron	2050	100	"	2000		102	85-115			
Calcium	2000	200	"	2000		100	85-115			

DUP (1204553448 D)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Magnesium	259	30.0	ug/L		262		0-20	1.32	20	
Boron	253	150	"		259		0-20	2.37	20	
Barium	28.5	4.00	"		29.2		0-20	2.3	20	
Strontium	31.2	10.0	"		31.4		0-20	0.763	20	
Sodium	195000	2500	"		202000		0-20	3.08	20	
Potassium	955	300	"		966		0-20	1.15	20	
Manganese	ND	5.00	"		3.26		0-20	3.53	20	U
Calcium	1130	200	"		1140		0-20	0.393	20	
Iron	ND	100	"		<33.0		0-20	6.27	20	U
Selenium	ND	5.00	"		<2.00		0-20	76.3	20	U

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	78.3	4.00	ug/L	50.0	29.2	98.4	75-125			
Manganese	52.8	5.00	"	50.0	3.26	99.1	75-125			
Boron	346	150	"	100	259	87.6	75-125			
Potassium	2960	300	"	2000	966	99.8	75-125			
Calcium	3120	200	"	2000	1140	99.2	75-125			
Sodium	193000	2500	"	2000	202000	0	75-125			

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Trent Watne
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 Project: Morales Methane Investigation - Fraley

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

MS (1204553449 S)	Source: 510300001			Prepared: 04/30/2020 Analyzed: 05/01/2020						
Iron	2010	100	ug/L	2000	<33.0	99.6	75-125			
Magnesium	2290	30.0	"	2000	262	101	75-125			
Selenium	51.4	5.00	"	50.0	<2.00	102	75-125			
Strontium	83.3	10.0	"	50.0	31.4	104	75-125			

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DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993409 - SW846 3535A										
BLANK (1204553370-BLK)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	9.39		"	20.0		47	40-109			
LCS (1204553371-BKS)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	559	200	ug/L	1000		56	45-119			
Surrogate: o-Terphenyl	12.8		"	20.0		64	40-109			
MS (1204553372 S)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	549	221	ug/L	1100	<82.9	50	41-118			
Surrogate: o-Terphenyl	11.3		"	22.1	12.5	51	40-109			
MSD (1204553373 SD)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	730	221	ug/L	1100	<82.9	66	41-118	28	20	
Surrogate: o-Terphenyl	14.0		"	22.1	12.5	64	40-109			

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 Project: Morales Methane Investigation - Fraley

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993396 -										
BLANK (1204553344-BLK)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0515		"	0.0500		103	75-127			
LCS (1204553345-BKS)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.547	0.100	mg/L	0.500		109	80-120			
Surrogate: Bromofluorobenzene	0.0470		"	0.0500		94	75-127			
PS (1204553346 S)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.457	0.100	mg/L	0.500		91	68-127			
Surrogate: Bromofluorobenzene	0.0420		"	0.0500		84	75-127			
PSD (1204553347 SD)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.339	0.100	mg/L	0.500		68	68-127	30	30	
Surrogate: Bromofluorobenzene	0.0499		"	0.0500		100	75-127			

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 Project Number: 019-2253
 Project: Morales Methane Investigation - Fraley

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1300	4.00	mg/L		1310		0-20	0.231	20	
Bicarbonate alkalinity (CaCO3)	1300	4.00	"		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Fraley

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993953 - EPA 365.4 Prep										
BLANK (1204554432-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204554433-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204554434 D)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
		Source: 510190001								
Phosphorus, Total as P	0.147	0.0500	mg/L		0.117		0-41	22.7	41	
MS (1204554435 S)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
		Source: 510190001								
Phosphorus, Total as P	1.30	0.0500	mg/L	1.00	0.117	118	70-136			

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1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Fraley

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

H Holding time exceeded

~9000 ~9000

~6000 ~6000

~100 ~100

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.



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May 07, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Burough **Project Number - 019-2253**

Attached are your analytical results for Morales Methane Investigation - Burough received by Origins Laboratory, Inc. April 28, 2020. This project is associated with Origins project number Y004374-01.

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

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Burough

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Borough-296903	Y004374-01	Water	April 28, 2020 12:15	04/28/2020 14:55

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Origins Laboratory

Sample Receipt Checklist

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

Origins Work Order: Y004374

Client: Olsson

Client Project ID: Morales Investigation - Burough

Checklist Completed by: JG

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

Date/time completed: 4/28/2020

Airbill #: N/A

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

Cooler Number/Temperature: 1 12.5 °C 1 °C 1 °C (Describe) °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⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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.

JM
 Reviewed by (Project Manager)

4-29-20
 Date/Time Reviewed

Origins Laboratory, Inc.

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Burough-296903
4/28/2020 12:15:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004374-01 (Water)

Anions by EPA 300.0

Bromide	0.438	0.200	mg/L	1	1993426	LXA2	04/28/2020	04/29/2020	
Chloride	38.5	2.00	"	10	"	LXA2	"	"	
Fluoride	1.66	0.100	"	1	"	LXA2	"	"	
Nitrate	ND	0.100	"	"	"	LXA2	"	"	U
Nitrite	ND	0.100	"	"	"	LXA2	"	"	U
Sulfate	ND	0.400	"	"	"	LXA2	"	"	U

Anions by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L	1	1993959	KLP1	"	05/04/2020	U
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Bacterial Activity Reaction Tests

Iron Related Bacteria	~500		CFU/mL	1	11111	ARB	"	04/28/2020	
Slime Forming Bacteria	<20		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~6000		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D2701	KDK	04/28/2020	04/29/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Burouah-296903
4/28/2020 12:15:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004374-01 (Water)

BTEX by EPA 8260D

Surrogate: 1,2-Dichloroethane-d4	94.2 %	70-130			B0D27 01		04/28/2020	04/29/2020	
Surrogate: Toluene-d8	102 %	70-130			"		"	"	
Surrogate: 4-Bromofluorobenzene	117 %	70-130			"		"	"	

Dissolved Gasses by RSK 175

Ethane	25.4	10.0	ug/L	1	11111		04/28/2020	05/04/2020	
Methane	6510	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	39.9	4.00	ug/L	1	1993481	SKJ	04/30/2020	05/01/2020	
Boron	295	150	"	10	"	SKJ	"	"	
Calcium	1380	200	"	1	"	SKJ	"	"	
Iron	ND	100	"	"	"	SKJ	"	"	U
Magnesium	319	30.0	"	"	"	SKJ	"	"	
Manganese	ND	5.00	"	"	"	SKJ	"	"	U
Potassium	1120	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	235000	2500	"	10	"	SKJ	"	"	
Strontium	42.5	10.0	"	1	"	SKJ	"	"	

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Burouah-296903
4/28/2020 12:15:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004374-01 (Water)

DRO by 8015C

Diesel Range Organics	ND	189	ug/L	1	1993409	RXC1	04/30/2020	05/04/2020	U
<i>Surrogate: o-Terphenyl</i>	58 %	40-109			"	"	"	"	

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1993396	RXY1	04/28/2020	04/29/2020	U
<i>Surrogate: Bromofluorobenzene</i>	97 %	75-127			"	"	"	"	

pH in Water by EPA 9040C

pH	8.67		pH Units	1	B0D2806	DJL	04/28/2020	04/28/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	961	5.00	uS/cm	"	B0D2807	DJL	04/28/2020	04/28/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	458	4.00	mg/L	1	1993401	RXB5	04/28/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	378	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	80.2	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	549	5.00	mg/L	1	B0D2910	DJL	04/29/2020	05/01/2020	
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Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Burough

Burouah-296903

4/28/2020 12:15:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004374-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.0930	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	
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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Blank (B0D2701-BLK1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
<i>Surrogate: 1,2-Dichloroethane-d4</i>	60		"	62.5		95.3	70-130			
<i>Surrogate: Toluene-d8</i>	63		"	62.5		100	70-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	61		"	62.5		98.1	70-130			

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 Project: Morales Methane Investigation - Burough

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

LCS (B0D2701-BS1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	45.6	1.00	ug/L	50.0		91.3	70-130			
Toluene	44.6	1.00	"	50.0		89.1	70-130			
Ethylbenzene	45.9	1.00	"	50.0		91.8	70-130			
m,p-Xylene	90.3	2.00	"	100		90.3	70-130			
o-Xylene	46.2	1.00	"	50.0		92.3	70-130			
Surrogate: 1,2-Dichloroethane-d4	54		"	62.5		86.5	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

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 Project: Morales Methane Investigation - Burough

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike (B0D2701-MS1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	50.0	1.00	ug/L	50.0	ND	100	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	52.0	1.00	"	50.0	0.140	104	70-130			
m,p-Xylene	101	2.00	"	100	0.430	100	70-130			
o-Xylene	49.5	1.00	"	50.0	ND	99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike Dup (B0D2701-MSD1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	48.3	1.00	ug/L	50.0	ND	96.6	70-130	3.48	20	
Toluene	47.3	1.00	"	50.0	ND	94.6	70-130	4.81	20	
Ethylbenzene	50.2	1.00	"	50.0	0.140	100	70-130	3.54	20	
m,p-Xylene	96.9	2.00	"	100	0.430	96.4	70-130	4.10	20	
o-Xylene	48.1	1.00	"	50.0	ND	96.2	70-130	2.89	20	
Surrogate: 1,2-Dichloroethane-d4	55		"	62.5		88.6	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.0	70-130			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Volatile Organic Compounds by GC/MS SW846 8260D - 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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Classical Chemistry Parameters - 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 B0D2806 - NO PREP

Duplicate (B0D2806-DUP1) Source: Y004362-01 Prepared: 04/28/2020 Analyzed: 04/28/2020

pH	8.52		pH Units		8.61			1.05	200	
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Batch B0D2807 - NO PREP

Blank (B0D2807-BLK1) Prepared: 04/28/2020 Analyzed: 04/28/2020

Specific Conductance (EC)	2.80	5.00	uS/cm							
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Duplicate (B0D2807-DUP1) Source: Y004362-01 Prepared: 04/28/2020 Analyzed: 04/28/2020

Specific Conductance (EC)	843	5.00	uS/cm		844			0.0593	10	
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Batch B0D2910 - NO PREP

Blank (B0D2910-BLK1) Prepared: 04/29/2020 Analyzed: 05/01/2020

Total Dissolved Solids	ND	5.00	mg/L							
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LCS (B0D2910-BS1) Prepared: 04/29/2020 Analyzed: 05/01/2020

Total Dissolved Solids	68.8	5.00	mg/L	71.6	96.1	85-115				
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Duplicate (B0D2910-DUP1) Source: Y004362-01 Prepared: 04/29/2020 Analyzed: 05/01/2020

Total Dissolved Solids	508	5.00	mg/L		506			0.316	20	
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

BLANK (1204553379-BLK)

Prepared: Analyzed: 04/29/2020

Sulfate	ND	0.400	mg/L				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Nitrate	ND	0.100	"				-			U
Nitrite	ND	0.100	"				-			U
Bromide	ND	0.200	"				-			U

LCS (1204553380-BKS)

Prepared: Analyzed: 04/29/2020

Chloride	4.94	0.200	mg/L	5.00		98.7	90-110			
Fluoride	2.49	0.100	"	2.50		99.5	90-110			
Nitrate	2.46	0.100	"	2.50		98.6	90-110			
Nitrite	2.52	0.100	"	2.50		101	90-110			
Sulfate	10.0	0.400	"	10.0		100	90-110			
Bromide	1.26	0.200	"	1.25		101	90-110			

DUP (1204553381 D)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Fluoride	1.40	0.100	mg/L		1.39		0-20	0.38	20	
Chloride	28.5	1.00	"		28.5		0-20	0.0421	20	
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Sulfate	ND	0.400	"		0.144		0-20	200	20	U
Bromide	0.340	0.200	"		0.340		0-20	0.118	20	

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Chloride	55.3	1.00	mg/L	5.00		107	90-110			
Fluoride	3.95	0.100	"	2.50		102	90-110			
Nitrate	2.49	0.100	"	2.50		99.4	90-110			H

Origins Laboratory, Inc.



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Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Burough

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

PS (1204553382 S)	Source: 510300001			Prepared: Analyzed: 04/29/2020						
Nitrite	2.53	0.100	mg/L	2.50	101	90-110				H
Sulfate	10.1	0.400	"	10.0	99.7	90-110				
Bromide	1.58	0.200	"	1.25	99	90-110				

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Anions by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Prepared: Analyzed: 05/04/2020					
		Source: 509789003								
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Prepared: Analyzed: 05/04/2020					
		Source: 509789003								
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch 1993481 -

FLTB (1204553343-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Boron	ND	15.0	ug/L				-			U
Calcium	ND	200	"				-			U
Iron	ND	100	"				-			U
Magnesium	ND	30.0	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Barium	ND	4.00	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204553446-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	ND	4.00	ug/L				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Selenium	ND	5.00	"				-			U
Boron	ND	15.0	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Selenium	51.4	5.00	ug/L	50.0		103	85-115			
Strontium	49.9	10.0	"	50.0		99.7	85-115			
Potassium	2020	300	"	2000		101	85-115			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Manganese	51.9	5.00	ug/L	50.0		104	85-115			
Sodium	2050	250	"	2000		102	85-115			
Boron	97.8	15.0	"	100		97.8	85-115			
Barium	50.2	4.00	"	50.0		100	85-115			
Magnesium	2060	30.0	"	2000		103	85-115			
Iron	2050	100	"	2000		102	85-115			
Calcium	2000	200	"	2000		100	85-115			

DUP (1204553448 D)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Magnesium	259	30.0	ug/L		262		0-20	1.32	20	
Boron	253	150	"		259		0-20	2.37	20	
Barium	28.5	4.00	"		29.2		0-20	2.3	20	
Strontium	31.2	10.0	"		31.4		0-20	0.763	20	
Sodium	195000	2500	"		202000		0-20	3.08	20	
Potassium	955	300	"		966		0-20	1.15	20	
Manganese	ND	5.00	"		3.26		0-20	3.53	20	U
Calcium	1130	200	"		1140		0-20	0.393	20	
Iron	ND	100	"		<33.0		0-20	6.27	20	U
Selenium	ND	5.00	"		<2.00		0-20	76.3	20	U

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	78.3	4.00	ug/L	50.0	29.2	98.4	75-125			
Manganese	52.8	5.00	"	50.0	3.26	99.1	75-125			
Boron	346	150	"	100	259	87.6	75-125			
Potassium	2960	300	"	2000	966	99.8	75-125			
Calcium	3120	200	"	2000	1140	99.2	75-125			
Sodium	193000	2500	"	2000	202000	0	75-125			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Iron	2010	100	ug/L	2000	<33.0	99.6	75-125			
Magnesium	2290	30.0	"	2000	262	101	75-125			
Selenium	51.4	5.00	"	50.0	<2.00	102	75-125			
Strontium	83.3	10.0	"	50.0	31.4	104	75-125			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993409 - SW846 3535A										
BLANK (1204553370-BLK)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	9.39		"	20.0		47	40-109			
LCS (1204553371-BKS)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	559	200	ug/L	1000		56	45-119			
Surrogate: o-Terphenyl	12.8		"	20.0		64	40-109			
MS (1204553372 S)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	549	221	ug/L	1100	<82.9	50	41-118			
Surrogate: o-Terphenyl	11.3		"	22.1	12.5	51	40-109			
MSD (1204553373 SD)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	730	221	ug/L	1100	<82.9	66	41-118	28	20	
Surrogate: o-Terphenyl	14.0		"	22.1	12.5	64	40-109			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993396 -										
BLANK (1204553344-BLK)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0515		"	0.0500		103	75-127			
LCS (1204553345-BKS)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.547	0.100	mg/L	0.500		109	80-120			
Surrogate: Bromofluorobenzene	0.0470		"	0.0500		94	75-127			
PS (1204553346 S)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.457	0.100	mg/L	0.500		91	68-127			
Surrogate: Bromofluorobenzene	0.0420		"	0.0500		84	75-127			
PSD (1204553347 SD)					Source: 510311001 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.339	0.100	mg/L	0.500		68	68-127	30	30	
Surrogate: Bromofluorobenzene	0.0499		"	0.0500		100	75-127			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1300	4.00	mg/L		1310		0-20	0.231	20	
Bicarbonate alkalinity (CaCO3)	1300	4.00	"		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Burough

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993953 - EPA 365.4 Prep										
BLANK (1204554432-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204554433-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204554434 D)					Source: 510190001 Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	0.147	0.0500	mg/L		0.117		0-41	22.7	41	
MS (1204554435 S)					Source: 510190001 Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.30	0.0500	mg/L	1.00	0.117	118	70-136			

Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Burough

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

H Holding time exceeded

<20 <20

~6000 ~6000

~500 ~500

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.



dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

Job #: 20053979
Lab #: DIG-022831
Client: Origins Laboratory
Sample Name(s): Burough-296903

The analytical results, opinions, or interpretations contained in this report are based upon information and material supplied by the client for whose exclusive and confidential use this report has been made. The analytical results, opinions, or interpretations expressed represent the best judgment of Dolan Integration Group based on its experience, but any interpretation of test or other data, and any recommendation(s) based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions which are not infallible, and with respect to which professional engineers and analysts may differ. Accordingly, Dolan Integration Group makes no warranty or representation, expressed or implied, of any type, and expressly disclaims same as to the productivity, proper operations, or profitability of any oil, gas, coal, or other mineral, property, well, or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced, in whole or in part, without the written approval of Dolan Integration Group.

Dolan Integration Group shall use commercially reasonable efforts to maintain the Samples it receives from Customer in the condition in which same were initially received, and shall store, free of charge, any portion(s) of the Sample(s) not consumed or altered in the course of testing and analysis for a period of 60 days after their initial receipt, after which time the Samples will be destroyed. At Customer's written request and expense, Dolan Integration Group shall return unused Samples to Customer. At Customer's written request, Dolan Integration Group will also store and maintain Customer's Samples beyond the Free Storage Period for a monthly fee in accordance with Dolan Integration Group's the current storage rates. If Customer fails to timely pay any applicable storage charges, Dolan Integration Group shall be free to destroy the Sample.

Analytical Report



Job #: 20053979
 Lab #: DIG-022831
 Client: Origins Laboratory
 Sample Name: Burough-296903
 Date Sampled: 04/28/20
 Time Sampled: 12:15
 Sample Description: 1L DIG Bottle
 Sampling Notes:
 Date Received: 05/08/20
 Date Analyzed: Gas Composition: 05/12/20 $\delta^{13}\text{C}$: 05/14/20 δD : 05/22/20
 Date Reported: 05/28/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	249596	55.74	-	-	-	
Oxygen + Argon (O ₂ +Ar)	25400	5.67	-	-	-	
Carbon Dioxide (CO ₂)	454	0.10	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	172125	38.44	99.86	-73.7	-277	
Ethane (C ₂ H ₆)	244	0.05	0.14	-	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	nd	nd	nd	-	-	
iso-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
n-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
iso-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
n-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
Hexanes + (C ₆ H ₁₄)	nd	nd	nd	-	-	

Calculated Values:	
Total HCs (ppm)	172369
Gas Wetness (mol % C ₂ +C ₁ +)	0.14
C ₁ /(C ₂ +C ₃) (mol/mol)	706

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

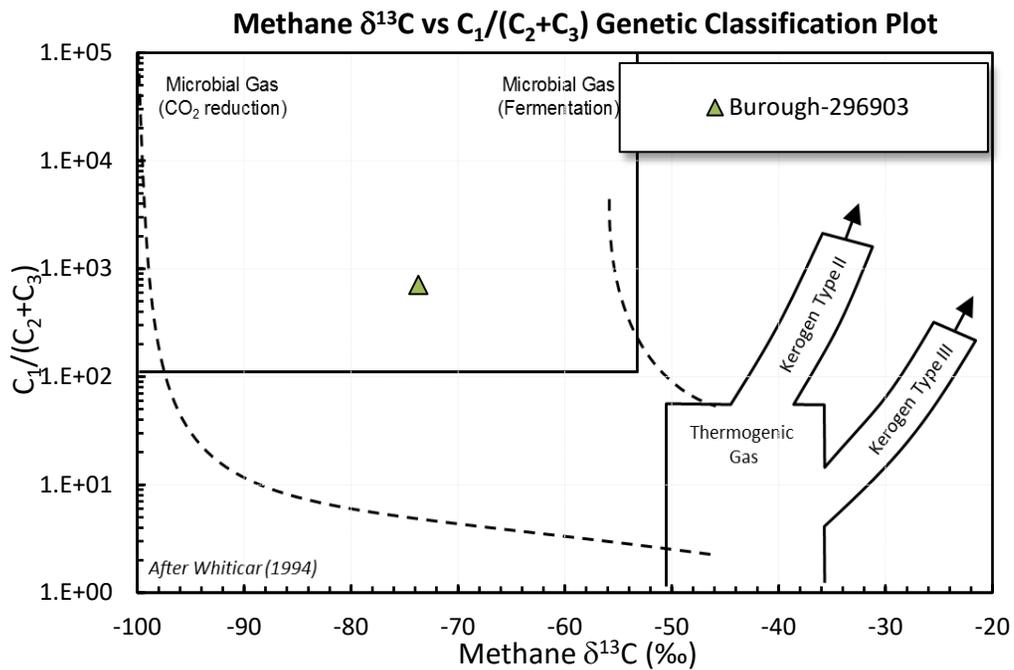
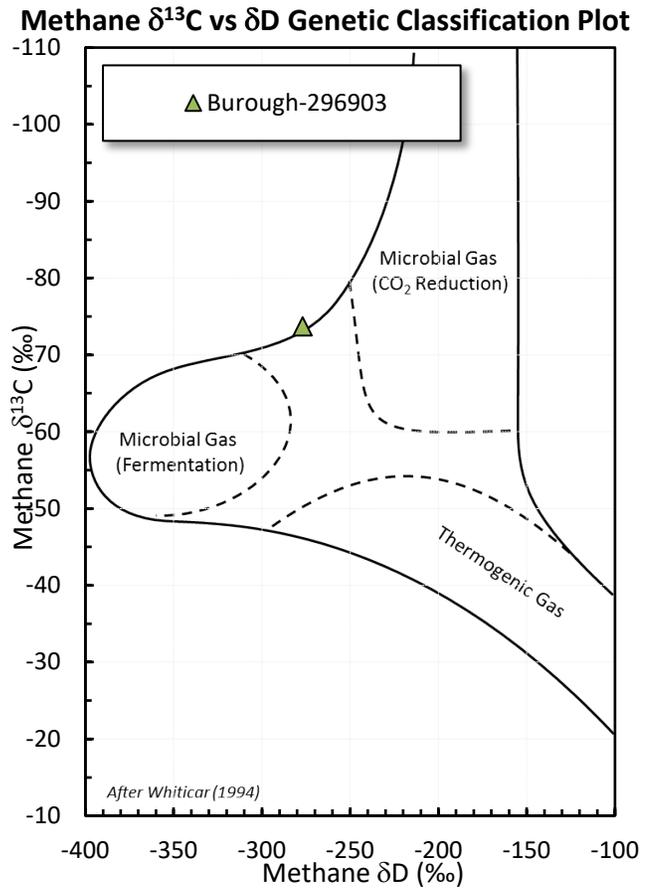
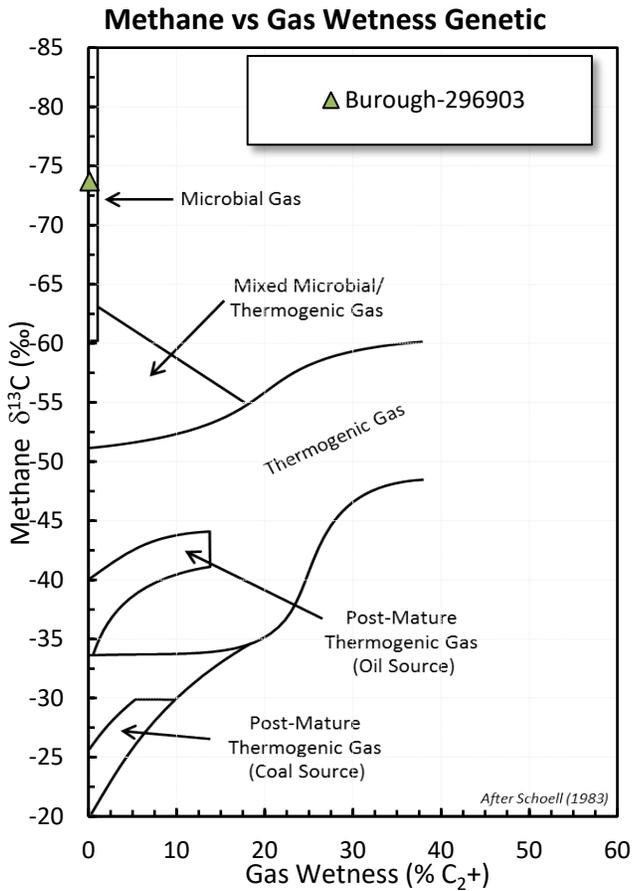
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB 200523979

DIG-022831

main 303.531.2030 • info@digforenergy.com • digforenergy.com

Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerrill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y004374
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (≤ 10 business days) Rush (≤ 5 business days) Expedited Rush (≤ 3 business days)

Sample Description				Analysis Requested						Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	RSK-175: N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ with dissolved C ₁ , C ₂ , & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane-Pentane (C ₂ -C ₅ if present)	δ ¹³ C CO ₂ (if present)	
Y004374-01	Borough 298103	4/28	1215	X		X	X			

Chain-of-Custody Record

Signature	Company	Date	Time
	Origins	5/8/20	1310
	DIG	5/8/20	1315

*Gas composition vs. RSK-175. Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). RSK-175 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

May 07, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Tri-B **Project Number - 019-2253**

Attached are your analytical results for Morales Methane Investigation - Tri-B received by Origins Laboratory, Inc. April 28, 2020. This project is associated with Origins project number Y004375-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Tri-B

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Tri-B_104918	Y004375-01	Water	April 28, 2020 11:35	04/28/2020 14:55

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

1004375

Baseline Water Quality Chain of Custody

olsson

PROJECT NAME Morales Methane Investigation - Tri-B	PROJECT NUMBER (I) 9-2253	DISPOSAL	By Lab	PAGE	1	of	1
COMPANY NAME Olsson	PHONE NUMBER 303-231-2072	LAB USE ONLY: Temperature upon receipt: 2.5 Custody seals in tact: Yes No N/A					
ADDRESS 1525 Raleigh St., Ste. 400	CITY/STATE/ZIP Denver, CO 80204	Turn Around Time (check)					
PROJECT MANAGER Trent Watne	PHI EMAIL twatne@olsson.com	Standard					
SAMPLER		72hr					
		48hr					
		24hr					
		Same Day					
PH (SM4500H) / EC (SM251) 250ply							
Antons / Alkalinity (Carbonate / bicarbonate) (EPA 300.0) 500ply							
Alkalinity (Bicarbonate, Carbonate) (SM220) 500ply							
Nitrate, Nitrite (EPA 300.0) (H2S04) 250ply							
250ply							
250ply							
Cations (Ca, Fe, Mg, Mn, K, Na) Metals (Ba, B, Sr, Se) (200.7/200.8 Dissolved) BTX (250) 3x 40ml							
DRO (8015) 3x 40ml							
Methane, Ethane, Propane (RSK 175) 3x 40ml							
Bacteria, Slime Forming Bacteria (BART) Iron Related Bacteria, Sulfur Related							
Notes:							

Lab ID	Field ID	Matrix	Sample Date	Sample Time	# Bottles
Tri-B_104918		GW	4/28/20	1135	19
Tri-B Blank					2

RELINQUISHED BY	PRINTED NAME	SIGNATURE	DATE	TIME
Wade J. Adams	Wade J. Adams	[Signature]	4/28/20	1455
RECEIVED BY				
RELINQUISHED BY				
RECEIVED BY				

Comments:

Hold ISO flask until methane results return

QC PACKAGE (check below)

<input checked="" type="checkbox"/>	LEVEL I (Standard GC)
<input type="checkbox"/>	LEVEL III (SIC GC + Ions)
<input type="checkbox"/>	LEVEL IV (SIC GC + Ions + raw data)

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y004375

Client: Olsson

Client Project ID: Morales Investigation - Tri-B

Checklist Completed by: JG

Shipped Via: HD
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A

Date/time completed: 4/28/2020

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

Cooler Number/Temperature: 1 12.5 °C / _____ °C / _____ °C (Describe) _____ °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⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
For volatiles in water – is there headspace (> ¼ inch bubble) present? If yes, contact client and note in narrative.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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.

Jm
 Reviewed by (Project Manager)

4-29-20
 Date/Time Reviewed

Origins Laboratory, Inc.

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Tri-B 104918
4/28/2020 11:35:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004375-01 (Water)

Anions by EPA 300.0

Bromide	0.537	0.200	mg/L	1	1993426	LXA2	04/28/2020	04/29/2020	
Chloride	101	10.0	"	50	"	LXA2	"	"	
Fluoride	2.26	0.100	"	1	"	LXA2	"	"	
Nitrate	2.27	0.100	"	"	"	LXA2	"	"	
Nitrite	ND	0.100	"	"	"	LXA2	"	"	U
Sulfate	404	20.0	"	50	"	LXA2	"	"	

Anions by EPA 353.2

Nitrogen, Nitrate/Nitrite	2.68	0.100	mg/L	5	1993959	KLP1	"	05/04/2020	
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Bacterial Activity Reaction Tests

Iron Related Bacteria	~2200		CFU/mL	1	11111	ARB	"	04/28/2020	
Slime Forming Bacteria	<20		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~325		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D2701	KDK	04/28/2020	04/29/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

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Tri-B 104918
4/28/2020 11:35:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004375-01 (Water)

BTEX by EPA 8260D

Surrogate: 1,2-Dichloroethane-d4	94.4 %	70-130			BOD27 01		04/28/2020	04/29/2020	
Surrogate: Toluene-d8	102 %	70-130			"		"	"	
Surrogate: 4-Bromofluorobenzene	117 %	70-130			"		"	"	

Dissolved Gasses by RSK 175

Ethane	ND	10.0	ug/L	1	11111		04/28/2020	05/04/2020	
Methane	ND	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	31.7	4.00	ug/L	1	1993481	SKJ	04/30/2020	05/01/2020	
Boron	156	15.0	"	"	"	SKJ	"	"	
Calcium	95400	2000	"	10	"	SKJ	"	"	
Iron	167	100	"	1	"	SKJ	"	"	
Magnesium	34600	30.0	"	"	"	SKJ	"	"	
Manganese	22.3	5.00	"	"	"	SKJ	"	"	
Potassium	3240	300	"	"	"	SKJ	"	"	
Selenium	38.8	5.00	"	"	"	SKJ	"	"	
Sodium	209000	2500	"	10	"	SKJ	"	"	
Strontium	1740	100	"	"	"	SKJ	"	"	

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Tri-B 104918
4/28/2020 11:35:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004375-01 (Water)

DRO by 8015C

Diesel Range Organics	ND	191	ug/L	1	1993409	RXC1	04/30/2020	05/04/2020	U
<i>Surrogate: o-Terphenyl</i>	46 %	40-109			"	"	"	"	

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1993396	RXY1	04/28/2020	04/29/2020	U
<i>Surrogate: Bromofluorobenzene</i>	101 %	75-127			"	"	"	"	

pH in Water by EPA 9040C

pH	7.22		pH Units	1	B0D2806	DJL	04/28/2020	04/28/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	1610	5.00	uS/cm	"	B0D2807	DJL	04/28/2020	04/28/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	281	4.00	mg/L	1	1993401	RXB5	04/28/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	281	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	ND	4.00	"	"	"	RXB5	"	"	U

Total Dissolved Solids by 2540C

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Tri-B 104918
4/28/2020 11:35:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004375-01 (Water)

Total Dissolved Solids by 2540C

Total Dissolved Solids	1070	5.00	mg/L	1	B0D2910	DJL	04/29/2020	05/01/2020	
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Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.267	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	
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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Blank (B0D2701-BLK1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	60		"	62.5	95.3		70-130			
Surrogate: Toluene-d8	63		"	62.5	100		70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5	98.1		70-130			

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 Project: Morales Methane Investigation - Tri-B

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

LCS (B0D2701-BS1)

Prepared: 04/27/2020 Analyzed: 04/29/2020

Benzene	45.6	1.00	ug/L	50.0		91.3	70-130			
Toluene	44.6	1.00	"	50.0		89.1	70-130			
Ethylbenzene	45.9	1.00	"	50.0		91.8	70-130			
m,p-Xylene	90.3	2.00	"	100		90.3	70-130			
o-Xylene	46.2	1.00	"	50.0		92.3	70-130			
Surrogate: 1,2-Dichloroethane-d4	54		"	62.5		86.5	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		96.4	70-130			

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 Project: Morales Methane Investigation - Tri-B

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike (B0D2701-MS1)	Source: Y004335-01			Prepared: 04/27/2020 Analyzed: 04/29/2020						
Benzene	50.0	1.00	ug/L	50.0	ND	100	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	52.0	1.00	"	50.0	0.140	104	70-130			
m,p-Xylene	101	2.00	"	100	0.430	100	70-130			
o-Xylene	49.5	1.00	"	50.0	ND	99.0	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		101	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		98.3	70-130			

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 Project: Morales Methane Investigation - Tri-B

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D2701 - EPA 5030B (Water)

Matrix Spike Dup (B0D2701-MSD1)	Source: Y004335-01				Prepared: 04/27/2020 Analyzed: 04/29/2020					
Benzene	48.3	1.00	ug/L	50.0	ND	96.6	70-130	3.48	20	
Toluene	47.3	1.00	"	50.0	ND	94.6	70-130	4.81	20	
Ethylbenzene	50.2	1.00	"	50.0	0.140	100	70-130	3.54	20	
m,p-Xylene	96.9	2.00	"	100	0.430	96.4	70-130	4.10	20	
o-Xylene	48.1	1.00	"	50.0	ND	96.2	70-130	2.89	20	
<i>Surrogate: 1,2-Dichloroethane-d4</i>	55		"	62.5		88.6	70-130			
<i>Surrogate: Toluene-d8</i>	63		"	62.5		101	70-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	62		"	62.5		99.0	70-130			

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

BLANK (1204553379-BLK)

Prepared: Analyzed: 04/29/2020

Sulfate	ND	0.400	mg/L				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Nitrate	ND	0.100	"				-			U
Nitrite	ND	0.100	"				-			U
Bromide	ND	0.200	"				-			U

LCS (1204553380-BKS)

Prepared: Analyzed: 04/29/2020

Chloride	4.94	0.200	mg/L	5.00		98.7	90-110			
Fluoride	2.49	0.100	"	2.50		99.5	90-110			
Nitrate	2.46	0.100	"	2.50		98.6	90-110			
Nitrite	2.52	0.100	"	2.50		101	90-110			
Sulfate	10.0	0.400	"	10.0		100	90-110			
Bromide	1.26	0.200	"	1.25		101	90-110			

DUP (1204553381 D)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Fluoride	1.40	0.100	mg/L		1.39		0-20	0.38	20	
Chloride	28.5	1.00	"		28.5		0-20	0.0421	20	
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Sulfate	ND	0.400	"		0.144		0-20	200	20	U
Bromide	0.340	0.200	"		0.340		0-20	0.118	20	

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Chloride	55.3	1.00	mg/L	5.00		107	90-110			
Fluoride	3.95	0.100	"	2.50		102	90-110			
Nitrate	2.49	0.100	"	2.50		99.4	90-110			H

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Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993426 -

PS (1204553382 S)

Source: 510300001

Prepared: Analyzed: 04/29/2020

Nitrite	2.53	0.100	mg/L	2.50		101	90-110			H
Sulfate	10.1	0.400	"	10.0		99.7	90-110			
Bromide	1.58	0.200	"	1.25		99	90-110			

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 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Anions by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 -

FLTB (1204553343-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Boron	ND	15.0	ug/L				-			U
Calcium	ND	200	"				-			U
Iron	ND	100	"				-			U
Magnesium	ND	30.0	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Barium	ND	4.00	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204553446-BLK)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	ND	4.00	ug/L				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Selenium	ND	5.00	"				-			U
Boron	ND	15.0	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Selenium	51.4	5.00	ug/L	50.0		103	85-115			
Strontium	49.9	10.0	"	50.0		99.7	85-115			
Potassium	2020	300	"	2000		101	85-115			

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Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

LCS (1204553447-BKS)

Prepared: 04/30/2020 Analyzed: 05/01/2020

Manganese	51.9	5.00	ug/L	50.0		104	85-115			
Sodium	2050	250	"	2000		102	85-115			
Boron	97.8	15.0	"	100		97.8	85-115			
Barium	50.2	4.00	"	50.0		100	85-115			
Magnesium	2060	30.0	"	2000		103	85-115			
Iron	2050	100	"	2000		102	85-115			
Calcium	2000	200	"	2000		100	85-115			

DUP (1204553448 D)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Magnesium	259	30.0	ug/L		262		0-20	1.32	20	
Boron	253	150	"		259		0-20	2.37	20	
Barium	28.5	4.00	"		29.2		0-20	2.3	20	
Strontium	31.2	10.0	"		31.4		0-20	0.763	20	
Sodium	195000	2500	"		202000		0-20	3.08	20	
Potassium	955	300	"		966		0-20	1.15	20	
Manganese	3.14	5.00	"		3.26		0-20	3.53	20	J
Calcium	1130	200	"		1140		0-20	0.393	20	
Iron	ND	100	"		<33.0		0-20	6.27	20	U
Selenium	ND	5.00	"		<2.00		0-20	76.3	20	U

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Barium	78.3	4.00	ug/L	50.0	29.2	98.4	75-125			
Manganese	52.8	5.00	"	50.0	3.26	99.1	75-125			
Boron	346	150	"	100	259	87.6	75-125			
Potassium	2960	300	"	2000	966	99.8	75-125			
Calcium	3120	200	"	2000	1140	99.2	75-125			
Sodium	193000	2500	"	2000	202000	0	75-125			

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Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1993481 - EPA 200.2

MS (1204553449 S)

Source: 510300001

Prepared: 04/30/2020 Analyzed: 05/01/2020

Iron	2010	100	ug/L	2000	<33.0	99.6	75-125			
Magnesium	2290	30.0	"	2000	262	101	75-125			
Selenium	51.4	5.00	"	50.0	<2.00	102	75-125			
Strontium	83.3	10.0	"	50.0	31.4	104	75-125			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993409 - SW846 3535A										
BLANK (1204553370-BLK)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	9.39		"	20.0		47	40-109			
LCS (1204553371-BKS)					Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	559	200	ug/L	1000		56	45-119			
Surrogate: o-Terphenyl	12.8		"	20.0		64	40-109			
MS (1204553372 S)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	549	221	ug/L	1100	<82.9	50	41-118			
Surrogate: o-Terphenyl	11.3		"	22.1	12.5	51	40-109			
MSD (1204553373 SD)					Source: 510278005 Prepared: 04/30/2020 Analyzed: 05/04/2020					
Diesel Range Organics	730	221	ug/L	1100	<82.9	66	41-118	28	20	
Surrogate: o-Terphenyl	14.0		"	22.1	12.5	64	40-109			

Origins Laboratory, Inc.



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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993396 -										
BLANK (1204553344-BLK)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0515		"	0.0500		103	75-127			
LCS (1204553345-BKS)					Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.547	0.100	mg/L	0.500		109	80-120			
Surrogate: Bromofluorobenzene	0.0470		"	0.0500		94	75-127			
PS (1204553346 S)					Source: Y004375-01 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.457	0.100	mg/L	0.500		91	68-127			
Surrogate: Bromofluorobenzene	0.0420		"	0.0500		84	75-127			
PSD (1204553347 SD)					Source: Y004375-01 Prepared: Analyzed: 04/29/2020					
Gasoline Range Organics	0.339	0.100	mg/L	0.500		68	68-127	30	30	
Surrogate: Bromofluorobenzene	0.0499		"	0.0500		100	75-127			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1300	4.00	mg/L		1310		0-20	0.231	20	
Bicarbonate alkalinity (CaCO3)	1300	4.00	"		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 019-2253
 Project: Morales Methane Investigation - Tri-B

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993953 - EPA 365.4 Prep										
BLANK (1204554432-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	0.0305	0.0500	mg/L				-			J
LCS (1204554433-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204554434 D)		Source: 510190001			Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	0.147	0.0500	mg/L		0.117		0-41	22.7	41	
MS (1204554435 S)		Source: 510190001			Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.30	0.0500	mg/L	1.00	0.117	118	70-136			

Origins Laboratory, Inc.



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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 019-2253
Project: Morales Methane Investigation - Tri-B

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

J Greater than the detection limit but less than the reporting limit

H Holding time exceeded

<20 <20

~325 ~325

~2200 ~2200

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.

May 07, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Project Number - 020-1374
Stewardson

Attached are your analytical results for Morales Methane Investigation - Stewardson received by Origins Laboratory, Inc. April 30, 2020. This project is associated with Origins project number Y004409-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation -
Stewardson

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Stewardson-32882	Y004409-01	Water	April 30, 2020 9:50	04/30/2020 10:50

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

000449

Baseline Water Quality Chain of Custody

olsson

PROJECT NAME: Morales Methane Investigation- Stewardson COMPANY NAME: Olsson ADDRESS: 1525 Raleigh St., Ste. 400 PROJECT MANAGER: Trent Watne SAMPLER:	PROJECT NUMBER: 020-1374 020-1374 PHONE NUMBER: 303-237-2072 CITY/STATE/ZIP: Denver, CO 80204 PM EMAIL: twatne@olsson.com	DISPOSAL: By Lab LAB USE ONLY: 5.7 Temperature upon receipt: Custody seals in tact: Yes No N/A	Turn Around Time (check) Standard <input checked="" type="checkbox"/> 72hr 48hr 24hr Same Day	PAGE 1 of 1		
DIRECT BILL CLIENT: YES: <input type="checkbox"/> NO: <input type="checkbox"/> CLIENT COMPANY: _____ CLIENT NAME: _____ SEND COPY OF ANALYTICAL TO CLIENT? YES: <input type="checkbox"/> NO: <input type="checkbox"/> CLIENT PROJECT #: _____		PH (SM4500H) / EC (SM2510) 250poly Atrons / Alkalinity (carbonate / bicarbonate) (EPA 300.0) 500poly Alkalinity (Bicarbonate, Carbonate) (SM230) 500poly Nitrate, Nitrite (EPA 300.0) (H2Se4) Total Phosphorus (SM4500) (H2Se4) 250 poly Cations (Ca, Fe, Sr, Se) (200.7/200.8) BTREX (8260) 3x 40ml GRC (8015) 3x 40ml DRC (8015) 3x 40ml Methane, Ethane, Propane (RSK 175) 3x 40ml Iron Related Bacteria, Sulfur Related Bacteria, Slime Forming Bacteria (BART)				
Lab ID	Field ID	Matrix	Sample Date	Sample Time	# Bottles	Notes:
	Stewardson_32882	GW	4/20/20	9:50	19	
	Tri Blank				2	

Comments:

Hold ISO flask until methane results return

QC PACKAGE (check below)	
<input checked="" type="checkbox"/> LEVEL I (Standard CC)	
<input type="checkbox"/> LEVEL III (SU CC + forms)	
<input type="checkbox"/> LEVEL IV (SU CC + forms + raw data)	

RELINQUISHED BY	PRINTED NAME	SIGNATURE	DATE	TIME
BY: Kyle Petos	Kyle Petos		4/20/20	10:50
RECEIVED BY: Seson Guram	Seson Guram		4/20/20	10:50
RELINQUISHED BY:				
RECEIVED BY:				
RELINQUISHED BY:				

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: 1004409

Client: Olsson
 Client Project ID: Morales - Stewardson

Checklist Completed by: JG

Shipped Via: HD
 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A

Date/time completed: 4/30/2020

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

Cooler Number/Temperature: 1 / 5-7 °C 1 °C 1 °C 1 °C (Describe)

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⁾ ?	<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 analysis 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) JM

5-1-20
 Date/Time Reviewed

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Stewardson-32882
4/30/2020 9:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004409-01 (Water)

Anions by EPA 300.0

Bromide	0.797	0.200	mg/L	1	1994229	LXA2	04/30/2020	05/01/2020	
Chloride	71.7	4.00	"	20	"	LXA2	"	"	
Fluoride	2.09	0.100	"	1	"	LXA2	"	"	
Nitrate	ND	2.00	"	20	"	LXA2	"	"	U
Nitrite	ND	0.100	"	1	"	LXA2	"	"	U
Sulfate	ND	0.400	"	"	"	LXA2	"	"	U

Bacterial Activity Reaction Tests

Iron Related Bacteria	~2200		CFU/mL	1	11111	ARB	"	04/30/2020	
Slime Forming Bacteria	~2500		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~6000		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0D3005	KDK	04/30/2020	04/30/2020	Ua
Toluene	ND	1.00	"	"	"	KDK	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	KDK	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	KDK	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	99.8 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	103 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	123 %	70-130			"	"	"	"	

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Stewardson-32882
4/30/2020 9:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Pace Analytical
Y004409-01 (Water)

Dissolved Gasses by RSK 175

Ethane	43.5	10.0	ug/L	1	11111		04/30/2020	05/05/2020	
Methane	9910	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	48.7	4.00	ug/L	1	1994135	SKJ	05/04/2020	05/04/2020	
Boron	321	150	"	10	"	SKJ	"	05/05/2020	
Calcium	1740	200	"	1	"	SKJ	"	05/04/2020	
Iron	ND	100	"	"	"	SKJ	"	"	U
Magnesium	425	30.0	"	"	"	SKJ	"	"	
Manganese	5.11	5.00	"	"	"	SKJ	"	"	
Potassium	1320	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	299000	2500	"	10	"	SKJ	"	"	
Strontium	58.7	10.0	"	1	"	SKJ	"	"	

DRO by 8015C

Diesel Range Organics	ND	191	ug/L	1	1993809	RXC1	"	05/05/2020	U
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Surrogate: o-Terphenyl 83 % 40-109 " " "

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Stewardson-32882
4/30/2020 9:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y004409-01 (Water)

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	1994514	RXY1	04/30/2020	05/04/2020	U
<i>Surrogate: Bromofluorobenzene</i>	95 %	75-127			"	"	"	"	

Nitrate/Nitrite by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L	1	1993959	KLP1	"	05/04/2020	U
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pH in Water by EPA 9040C

pH	8.27		pH Units	1	B0D3006	KDK	04/30/2020	04/30/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	1100	5.00	uS/cm	"	B0D3007	KDK	04/30/2020	04/30/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	495	4.00	mg/L	1	1993401	RXB5	04/30/2020	05/01/2020	
Bicarbonate alkalinity (CaCO3)	453	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	42.1	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	667	5.00	mg/L	1	B0D3008	DJL	04/30/2020	05/05/2020	
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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation -
Stewardson

Stewardson-32882
4/30/2020 9:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y004409-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.0682	0.0500	mg/L	1	1993953	KLP1	05/04/2020	05/05/2020	
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Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D3005 - EPA 5030B (Water)

Blank (B0D3005-BLK1)

Prepared: 04/30/2020 Analyzed: 04/30/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5	98.4		70-130			
Surrogate: Toluene-d8	64		"	62.5	103		70-130			
Surrogate: 4-Bromofluorobenzene	76		"	62.5	122		70-130			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D3005 - EPA 5030B (Water)

LCS (B0D3005-BS1)

Prepared: 04/30/2020 Analyzed: 04/30/2020

Benzene	45.0	1.00	ug/L	50.0		90.1	70-130			
Toluene	48.8	1.00	"	50.0		97.7	70-130			
Ethylbenzene	44.3	1.00	"	50.0		88.5	70-130			
m,p-Xylene	91.7	2.00	"	100		91.7	70-130			
o-Xylene	44.4	1.00	"	50.0		88.8	70-130			
Surrogate: 1,2-Dichloroethane-d4	58		"	62.5		93.5	70-130			
Surrogate: Toluene-d8	65		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	75		"	62.5		120	70-130			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch B0D3005 - EPA 5030B (Water)

Matrix Spike (B0D3005-MS1)	Source: Y004409-01			Prepared: 04/30/2020 Analyzed: 04/30/2020						
Benzene	46.0	1.00	ug/L	50.0	ND	92.1	70-130			
Toluene	49.1	1.00	"	50.0	ND	98.3	70-130			
Ethylbenzene	44.6	1.00	"	50.0	ND	89.1	70-130			
m,p-Xylene	92.6	2.00	"	100	ND	92.6	70-130			
o-Xylene	45.8	1.00	"	50.0	ND	91.6	70-130			
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5		94.2	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	76		"	62.5		122	70-130			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0D3005 - EPA 5030B (Water)

Matrix Spike Dup (B0D3005-MSD1)	Source: Y004409-01			Prepared: 04/30/2020 Analyzed: 04/30/2020						
Benzene	48.4	1.00	ug/L	50.0	ND	96.7	70-130	4.92	20	
Toluene	51.3	1.00	"	50.0	ND	103	70-130	4.40	20	
Ethylbenzene	46.5	1.00	"	50.0	ND	93.1	70-130	4.35	20	
m,p-Xylene	97.6	2.00	"	100	ND	97.6	70-130	5.22	20	
o-Xylene	48.2	1.00	"	50.0	ND	96.3	70-130	4.98	20	
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5		94.5	70-130			
Surrogate: Toluene-d8	65		"	62.5		104	70-130			
Surrogate: 4-Bromofluorobenzene	75		"	62.5		120	70-130			

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1994229 -

BLANK (1204554866-BLK)

Prepared: Analyzed: 05/01/2020

Chloride	ND	0.200	mg/L				-			U
Bromide	ND	0.200	"				-			U
Fluoride	ND	0.100	"				-			U
Nitrate	ND	0.100	"				-			U
Nitrite	ND	0.100	"				-			U
Sulfate	ND	0.400	"				-			U

LCS (1204554867-BKS)

Prepared: Analyzed: 05/01/2020

Nitrate	2.50	0.100	mg/L	2.50		100	90-110			
Bromide	1.30	0.200	"	1.25		104	90-110			
Nitrite	2.56	0.100	"	2.50		102	90-110			
Fluoride	2.54	0.100	"	2.50		101	90-110			
Chloride	4.95	0.200	"	5.00		98.9	90-110			
Sulfate	10.5	0.400	"	10.0		105	90-110			

DUP (1204554868 D)

Source: Y004409-01

Prepared: Analyzed: 05/01/2020

Nitrite	ND	0.100	mg/L		<0.0330		0-20	0	20	U
Chloride	71.7	4.00	"		71.7		0-20	0.0669	20	
Fluoride	2.09	0.100	"		2.09		0-20	0.043	20	
Nitrate	ND	2.00	"		<0.660		0-20	0	20	U
Bromide	0.789	0.200	"		0.797		0-20	1.06	20	
Sulfate	ND	0.400	"		0.181		0-20	200	20	U

PS (1204554869 S)

Source: Y004409-01

Prepared: Analyzed: 05/01/2020

Sulfate	10.1	0.400	mg/L	10.0		99.2	90-110			
Nitrate	49.6	2.00	"	2.50		99.2	90-110			
Bromide	2.00	0.200	"	1.25		96	90-110			

Origins Laboratory, Inc.



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 Stewardson

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1994229 -

PS (1204554869 S)

Source: Y004409-01

Prepared: Analyzed: 05/01/2020

Chloride	179	4.00	mg/L	5.00	107	90-110				
Fluoride	4.65	0.100	"	2.50	102	90-110				
Nitrite	2.49	0.100	"	2.50	99.4	90-110				

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 Stewardson

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1994135 -

FLTB (1204554639-BLK)

Prepared: 05/04/2020 Analyzed: 05/04/2020

Barium	ND	4.00	ug/L				-			U
Potassium	ND	300	"				-			U
Strontium	ND	10.0	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Boron	ND	15.0	"				-			U

BLANK (1204554775-BLK)

Prepared: 05/04/2020 Analyzed: 05/04/2020

Barium	ND	4.00	ug/L				-			U
Boron	ND	15.0	"				-			U
Magnesium	ND	30.0	"				-			U
Calcium	ND	200	"				-			U
Manganese	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Selenium	ND	5.00	"				-			U
Sodium	ND	250	"				-			U
Strontium	ND	10.0	"				-			U
Iron	ND	100	"				-			U

LCS (1204554776-BKS)

Prepared: 05/04/2020 Analyzed: 05/04/2020

Calcium	2070	200	ug/L	2000	104	85-115
Strontium	50.9	10.0	"	50.0	102	85-115
Sodium	2230	250	"	2000	111	85-115

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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1994135 - EPA 200.2

LCS (1204554776-BKS)

Prepared: 05/04/2020 Analyzed: 05/04/2020

Manganese	50.0	5.00	ug/L	50.0		100	85-115			
Potassium	2090	300	"	2000		105	85-115			
Selenium	51.1	5.00	"	50.0		102	85-115			
Iron	1970	100	"	2000		98.5	85-115			
Boron	99.8	15.0	"	100		99.8	85-115			
Barium	51.1	4.00	"	50.0		102	85-115			
Magnesium	2210	30.0	"	2000		110	85-115			

DUP (1204554777 D)

Source: Y004409-01

Prepared: 05/04/2020 Analyzed: 05/04/2020

Strontium	60.4	10.0	ug/L		58.7		0-20	2.85	20	
Selenium	ND	5.00	"		<2.00		0-20	13.4	20	U
Sodium	300000	2500	"		299000		0-20	0.161	20	
Barium	50.1	4.00	"		48.7		0-20	2.75	20	
Potassium	1360	300	"		1320		0-20	2.74	20	
Manganese	5.21	5.00	"		5.11		0-20	2	20	
Magnesium	431	30.0	"		425		0-20	1.49	20	
Calcium	1750	200	"		1740		0-20	0.212	20	
Boron	325	150	"		321		0-20	1.15	20	
Iron	ND	100	"		45.8		0-20	5.95	20	U

MS (1204554778 S)

Source: Y004409-01

Prepared: 05/04/2020 Analyzed: 05/04/2020

Calcium	3740	200	ug/L	2000	1740	99.7	75-125			
Boron	428	150	"	100	321	107	75-125			
Iron	1940	100	"	2000	45.8	94.6	75-125			
Magnesium	2570	30.0	"	2000	425	107	75-125			
Manganese	52.5	5.00	"	50.0	5.11	94.8	75-125			
Potassium	3400	300	"	2000	1320	104	75-125			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1994135 - EPA 200.2

MS (1204554778 S)	Source: Y004409-01			Prepared: 05/04/2020 Analyzed: 05/04/2020						
Selenium	50.8	5.00	ug/L	50.0	<2.00	98.3	75-125			
Sodium	308000	2500	"	2000	299000	0	75-125			
Strontium	112	10.0	"	50.0	58.7	107	75-125			
Barium	99.2	4.00	"	50.0	48.7	101	75-125			

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DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993809 - SW846 3535A										
BLANK (1204554165-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	13.7		"	20.0		68	40-109			
LCS (1204554166-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Diesel Range Organics	683	200	ug/L	1000		68	45-119			
Surrogate: o-Terphenyl	14.8		"	20.0		74	40-109			
MS (1204554167 S)					Source: 510365003 Prepared: 05/04/2020 Analyzed: 05/05/2020					
Diesel Range Organics	605	222	ug/L	1110	<83.3	54	41-118			
Surrogate: o-Terphenyl	12.7		"	22.2	110	57	40-109			
MSD (1204554168 SD)					Source: 510365003 Prepared: 05/04/2020 Analyzed: 05/05/2020					
Diesel Range Organics	615	222	ug/L	1110	<83.3	55	41-118	2	20	
Surrogate: o-Terphenyl	12.8		"	22.2	110	58	40-109			

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 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1994514 -										
BLANK (120455590-BLK)					Prepared: Analyzed: 05/04/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0538		"	0.0500		108	75-127			
LCS (120455591-BKS)					Prepared: Analyzed: 05/04/2020					
Gasoline Range Organics	0.415	0.100	mg/L	0.500		83	80-120			
Surrogate: Bromofluorobenzene	0.0500		"	0.0500		100	75-127			
PS (120455592 S)					Source: Y004409-01		Prepared: Analyzed: 05/05/2020			
Gasoline Range Organics	0.364	0.100	mg/L	0.500		73	68-127			
Surrogate: Bromofluorobenzene	0.0429		"	0.0500		86	75-127			
PSD (120455593 SD)					Source: Y004409-01		Prepared: Analyzed: 05/05/2020			
Gasoline Range Organics	0.486	0.100	mg/L	0.500		97	68-127	29	30	
Surrogate: Bromofluorobenzene	0.0439		"	0.0500		88	75-127			
BLANK (1204555894-BLK)					Prepared: Analyzed: 05/05/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0536		"	0.0500		107	75-127			
LCS (1204555895-BKS)					Prepared: Analyzed: 05/05/2020					
Gasoline Range Organics	0.552	0.100	mg/L	0.500		110	80-120			
Surrogate: Bromofluorobenzene	0.0480		"	0.0500		96	75-127			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
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Nitrate/Nitrite by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993959 -										
BLANK (1204554456-BLK)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204554457-BKS)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.08	0.0200	mg/L	1.00		108	90-110			
DUP (1204554458 D)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	1.13	0.100	mg/L		1.14		0-20	1.32	20	
PS (1204554460 S)					Prepared: Analyzed: 05/04/2020					
Nitrogen, Nitrate/Nitrite	6.65	0.100	mg/L	1.00		110	90-110			

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation -
 Stewardson

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993401 -										
LCS (1204553355-BKS)					Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	105	4.00	mg/L	100		105	90-110			
DUP (1204553357 D)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Bicarbonate alkalinity (CaCO3)	1300	4.00	mg/L		1310		0-20	0.231	20	
Carbonate alkalinity (CaCO3)	ND	4.00	"		<1.45		0-20	0	20	U
Alkalinity, Total as CaCO3	1300	4.00	"		1310		0-20	0.231	20	
MS (1204553358 S)					Source: 509838005 Prepared: Analyzed: 05/01/2020					
Alkalinity, Total as CaCO3	1400	4.00	mg/L	100	1310	0	80-120			

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 Stewardson

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1993953 - EPA 365.4 Prep										
BLANK (1204554432-BLK)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204554433-BKS)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204554434 D)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	0.147	0.0500	mg/L		0.117		0-41	22.7	41	
MS (1204554435 S)					Prepared: 05/04/2020 Analyzed: 05/05/2020					
Phosphorus, Total as P	1.30	0.0500	mg/L	1.00	0.117	118	70-136			

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Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation -
Stewardson

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

~6000 ~6000

~2500 ~2500

~2200 ~2200

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.



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dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

Job #: 20053964
Lab #: DIG-022804
Client: Origins Laboratory
Sample Name(s): STEWARDSON-32882

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Analytical Report



Job #: 20053964
 Lab #: DIG-022804
 Client: Origins Laboratory
 Sample Name: STEWARDSON-32882
 Date Sampled: 04/30/20
 Time Sampled: 9:50
 Sample Description: 1L DIG Bottle
 Sampling Notes:
 Date Received: 05/07/20
 Date Analyzed: Gas Composition: 05/08/20 $\delta^{13}\text{C}$: 05/14/20 δD : 05/22/20
 Date Reported: 05/28/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	294674	57.12	-	-	-	
Oxygen + Argon (O ₂ +Ar)	38932	7.55	-	-	-	
Carbon Dioxide (CO ₂)	833	0.16	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	181153	35.12	99.84	-72.6	-272	
Ethane (C ₂ H ₆)	287	0.06	0.16	-	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	nd	nd	nd	-	-	
iso-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
n-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
iso-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
n-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
Hexanes + (C ₆ H ₁₄)	nd	nd	nd	-	-	

Calculated Values:	
Total HCs (ppm)	181440
Gas Wetness (mol % C ₂ +C ₁ +)	0.16
C ₁ /(C ₂ +C ₃) (mol/mol)	632

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

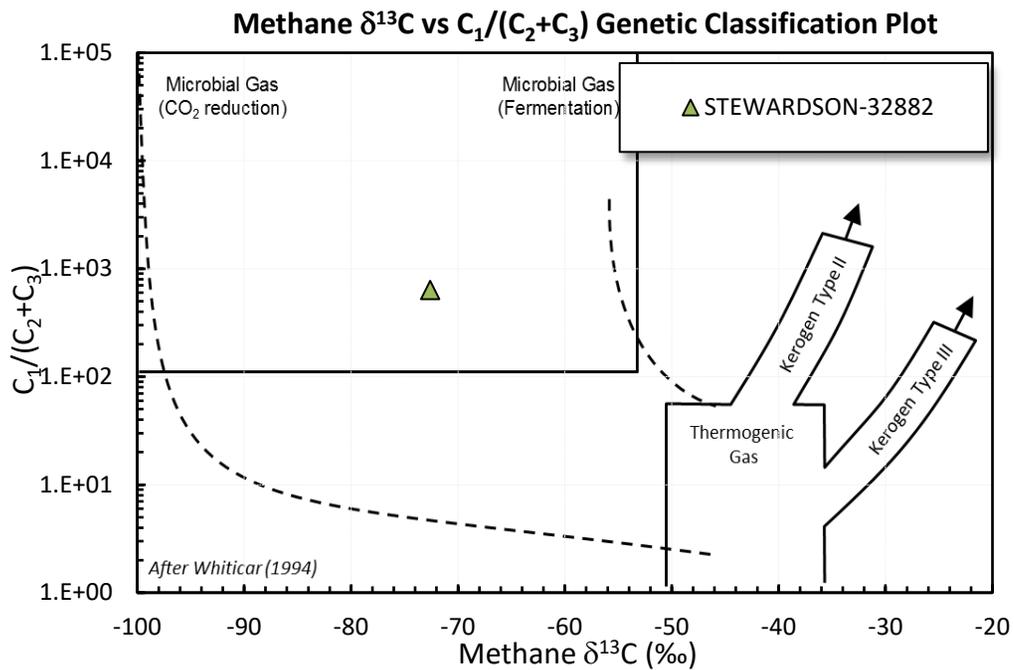
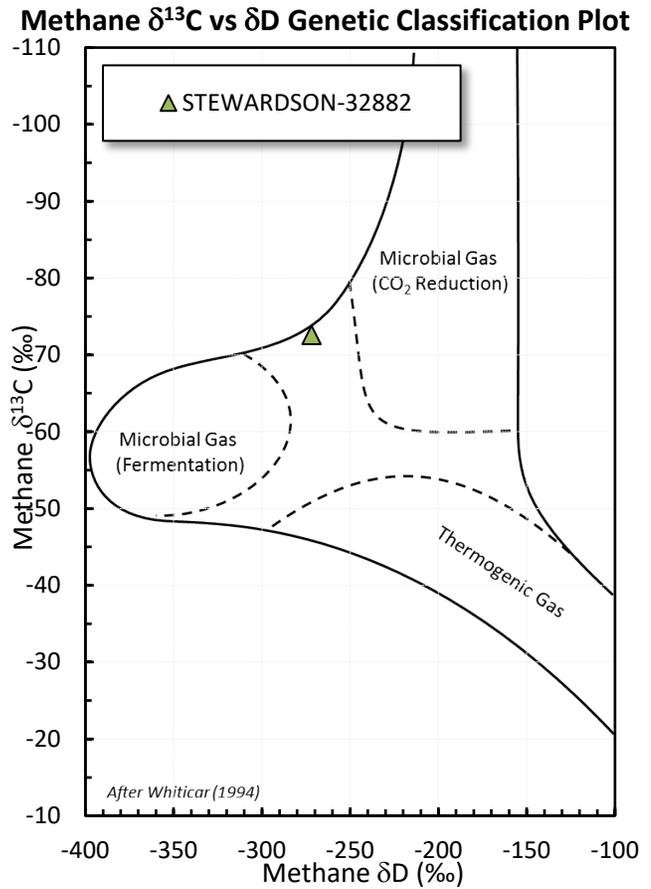
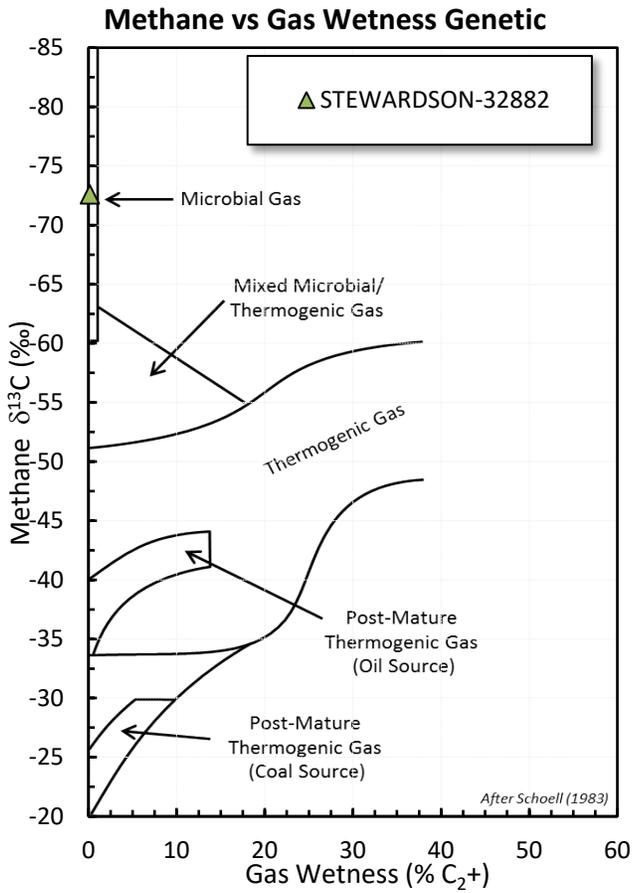
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB 20053964

DIG-022804



Geochemistry
for Energy

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Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerrill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y004409
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (≤ 10 business days) Rush (≤ 5 business days) Expedited Rush (≤ 3 business days)

Sample Description				Analysis Requested					Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	RSK-175: N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ with dissolved C ₁ , C ₂ , & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane-Pentane (C ₂ -C ₅ if present)	
Y004409-01	Stewardson-32882	4/30	950	X		X	X		

Chain-of-Custody Record

Signature	Company	Date	Time
	Origins	5/7/20	1348
	DIG	5/7/2020	1348
Relinquished by			
Received by			
Relinquished by			
Received by			
Relinquished by			
Received by			

*Gas composition vs. RSK-175. Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). RSK-175 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

May 15, 2020

Tasman Geosciences

Christine Hamlin

6855 West 119th Avenue

Broomfield CO 80020

**Project Name - PDC - Morales Methane
Investigation**

Project Number - [none]

Attached are your analytical results for PDC - Morales Methane Investigation received by Origins Laboratory, Inc. May 06, 2020. This project is associated with Origins project number Y005081-01.

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



Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Christine Hamlin
Project Number: [none]
Project: PDC - Morales Methane Investigation

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Casias-Morales Well	Y005081-01	Water	May 6, 2020 14:55	05/06/2020 16:45

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

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

Sample Receipt Checklist

Origins Work Order: Y005081 Client: Tasman
 Client Project ID: Morales Methane Investigation

Checklist Completed by: JG Shipped Via: HD
 Date/time completed: 5/17/2020 (UPS, FedEx, Hand Delivered, Pick-up, etc.)
 Airbill #: N/A

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

Cooler Number/Temperature: 1 / 13.7 °C _____ / _____ °C _____ / _____ °C _____ / _____ °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⁾ ?		<input checked="" type="checkbox"/>		<u>Same Day</u>
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 Na ₂ SO 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) JM Date/Time Reviewed 5-8-20

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Casias-Morales Well
5/6/2020 2:55:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005081-01 (Water)

Anions by EPA 300.0

Bromide	1.16	0.800	mg/L	4	1995945	JLD1	05/06/2020	05/08/2020	
Chloride	105	5.00	"	25	"	JLD1	"	05/11/2020	
Fluoride	2.19	0.100	"	1	"	JLD1	"	05/08/2020	
Nitrate	ND	0.100	"	"	"	JLD1	"	"	U
Nitrite	ND	0.100	"	"	"	JLD1	"	"	U
Sulfate	ND	0.400	"	"	"	JLD1	"	"	U

Bacterial Activity Reaction Tests

Iron Related Bacteria	~9000		CFU/mL	1	11111	ARB	"	05/06/2020	
Slime Forming Bacteria	~100		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~1400		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	BOE0702	ZZZ	05/07/2020	05/07/2020	Ua
Toluene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	ZZZ	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	116 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	101 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	80.4 %	70-130			"	"	"	"	

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Casias-Morales Well
5/6/2020 2:55:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Pace Analytical
Y005081-01 (Water)

Dissolved Gasses by RSK 175

Ethane	6520	10.0	ug/L	1	11111		05/06/2020	05/11/2020	
Methane	22700	10.0	"	"	"		"	"	
n-Propane	3930	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	52.3	4.00	ug/L	1	1996144	BAJ	05/11/2020	05/13/2020	
Boron	410	150	"	10	"	BAJ	"	"	
Calcium	1720	200	"	1	"	PRB	"	"	
Iron	221	100	"	"	"	BAJ	"	"	
Magnesium	414	30.0	"	"	"	PRB	"	"	
Manganese	12.1	5.00	"	"	"	BAJ	"	"	
Potassium	1490	300	"	"	"	PRB	"	"	
Selenium	ND	5.00	"	"	"	BAJ	"	"	U
Sodium	340000	2500	"	10	"	PRB	"	"	
Strontium	75.5	10.0	"	1	"	BAJ	"	"	

DRO by 8015C

Diesel Range Organics	ND	190	ug/L	1	1995841	RXC1	"	05/11/2020	U
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Surrogate: o-Terphenyl 74 % 40-109 " " "

GRO by 8015C

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Casias-Morales Well
5/6/2020 2:55:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005081-01 (Water)

GRO by 8015C

Gasoline Range Organics	0.302	0.100	mg/L	1	1996289	RXY1	05/06/2020	05/11/2020	
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<i>Surrogate: Bromofluorobenzene</i>	91 %	75-127			"	"	"	"	
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Nitrate/Nitrite by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.100	mg/L	5	1995314	KLP1	"	05/13/2020	U
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pH in Water by EPA 9040C

pH	8.48		pH Units	1	B0E0609	DJL	05/06/2020	05/07/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	1300	5.00	uS/cm	"	B0E0610	DJL	05/06/2020	05/07/2020	
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Total Alkalinity by 2320B

Alkalinity, Total as CaCO3	541	4.00	mg/L	1	1995925	RXB5	05/06/2020	05/11/2020	
Bicarbonate alkalinity (CaCO3)	490	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	50.2	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	748	5.00	mg/L	1	B0E0801	DJL	05/08/2020	05/12/2020	
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Origins Laboratory, Inc.



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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Christine Hamlin
Project Number: [none]
Project: PDC - Morales Methane Investigation

Casias-Morales Well
5/6/2020 2:55:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y005081-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.116	0.0500	mg/L	1	1995313	KLP1	05/11/2020	05/12/2020	
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Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0702 - EPA 5030B (Water)

Blank (B0E0702-BLK1)

Prepared: 05/07/2020 Analyzed: 05/07/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5	98.7		70-130			
Surrogate: Toluene-d8	66		"	62.5	106		70-130			
Surrogate: 4-Bromofluorobenzene	53		"	62.5	85.5		70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0702 - EPA 5030B (Water)

LCS (B0E0702-BS1)

Prepared: 05/07/2020 Analyzed: 05/07/2020

Benzene	49.4	1.00	ug/L	50.0		98.8	70-130			
Toluene	51.3	1.00	"	50.0		103	70-130			
Ethylbenzene	54.2	1.00	"	50.0		108	70-130			
m,p-Xylene	107	2.00	"	100		107	70-130			
o-Xylene	51.6	1.00	"	50.0		103	70-130			
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		102	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	55		"	62.5		88.0	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0702 - EPA 5030B (Water)

Matrix Spike (B0E0702-MS1)	Source: Y005074-21			Prepared: 05/07/2020 Analyzed: 05/07/2020						
Benzene	43.8	1.00	ug/L	50.0	ND	87.5	70-130			
Toluene	46.4	1.00	"	50.0	ND	92.8	70-130			
Ethylbenzene	49.1	1.00	"	50.0	ND	98.3	70-130			
m,p-Xylene	101	2.00	"	100	ND	101	70-130			
o-Xylene	50.1	1.00	"	50.0	ND	100	70-130			
Surrogate: 1,2-Dichloroethane-d4	69		"	62.5		111	70-130			
Surrogate: Toluene-d8	64		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	53		"	62.5		84.8	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0702 - EPA 5030B (Water)

Matrix Spike Dup (B0E0702-MSD1)	Source: Y005074-21			Prepared: 05/07/2020 Analyzed: 05/07/2020						
Benzene	43.3	1.00	ug/L	50.0	ND	86.7	70-130	0.965	20	
Toluene	47.1	1.00	"	50.0	ND	94.2	70-130	1.45	20	
Ethylbenzene	49.8	1.00	"	50.0	ND	99.7	70-130	1.39	20	
m,p-Xylene	100	2.00	"	100	ND	100	70-130	0.408	20	
o-Xylene	50.4	1.00	"	50.0	ND	101	70-130	0.577	20	
Surrogate: 1,2-Dichloroethane-d4	68		"	62.5		108	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	53		"	62.5		85.0	70-130			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1995945 -

BLANK (1204558529-BLK)

Prepared: Analyzed: 05/08/2020

Nitrate	ND	0.100	mg/L				-			U
Nitrite	ND	0.100	"				-			U
Fluoride	ND	0.100	"				-			U
Chloride	ND	0.200	"				-			U
Bromide	ND	0.200	"				-			U
Sulfate	ND	0.400	"				-			U

LCS (1204558530-BKS)

Prepared: Analyzed: 05/08/2020

Bromide	1.20	0.200	mg/L	1.25		96	90-110			
Chloride	4.60	0.200	"	5.00		91.9	90-110			
Fluoride	2.41	0.100	"	2.50		96.4	90-110			
Nitrate	2.33	0.100	"	2.50		93.2	90-110			
Nitrite	2.37	0.100	"	2.50		94.9	90-110			
Sulfate	9.46	0.400	"	10.0		94.6	90-110			

DUP (1204558531 D)

Source: Y005081-01

Prepared: Analyzed: 05/08/2020

Sulfate	ND	0.400	mg/L		<0.133		0-20	0	20	U
Bromide	1.10	0.800	"		1.16		0-20	4.49	20	
Chloride	105	5.00	"		105		0-20	0.36	20	
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Fluoride	2.18	0.100	"		2.19		0-20	0.445	20	

PS (1204558532 S)

Source: Y005081-01

Prepared: Analyzed: 05/08/2020

Fluoride	4.67	0.100	mg/L	2.50		99.2	90-110			
Chloride	238	5.00	"	5.00		106	90-110			
Nitrate	2.31	0.100	"	2.50		92.3	90-110			

Origins Laboratory, Inc.



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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Christine Hamlin
Project Number: [none]
Project: PDC - Morales Methane Investigation

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1995945 -

PS (1204558532 S)	Source: Y005081-01			Prepared: Analyzed: 05/08/2020						
Nitrite	2.62	0.100	mg/L	2.50	105	90-110				
Sulfate	9.63	0.400	"	10.0	96.3	90-110				
Bromide	6.08	0.800	"	1.25	98.5	90-110				

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996144 -

FLTB (1204558570-BLK)

Prepared: 05/11/2020 Analyzed: 05/13/2020

Sodium	ND	250	ug/L				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Boron	ND	15.0	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Barium	ND	4.00	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204558920-BLK)

Prepared: 05/11/2020 Analyzed: 05/13/2020

Sodium	ND	250	ug/L				-			U
Iron	ND	100	"				-			U
Strontium	ND	10.0	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Boron	ND	15.0	"				-			U
Barium	ND	4.00	"				-			U
Calcium	ND	200	"				-			U

LCS (1204558921-BKS)

Prepared: 05/11/2020 Analyzed: 05/13/2020

Strontium	55.3	10.0	ug/L	50.0		111	85-115			
Boron	108	15.0	"	100		108	85-115			
Calcium	2170	200	"	2000		108	85-115			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996144 - EPA 200.2

LCS (1204558921-BKS)

Prepared: 05/11/2020 Analyzed: 05/13/2020

Iron	2300	100	ug/L	2000	115	85-115				
Magnesium	2120	30.0	"	2000	106	85-115				
Manganese	56.5	5.00	"	50.0	113	85-115				
Potassium	2140	300	"	2000	107	85-115				
Barium	55.3	4.00	"	50.0	111	85-115				
Sodium	2180	250	"	2000	109	85-115				
Selenium	56.4	5.00	"	50.0	113	85-115				

DUP (1204558922 D)

Source: Y005081-01

Prepared: 05/11/2020 Analyzed: 05/13/2020

Selenium	ND	5.00	ug/L	<2.00	0-20	57.1	20	U		
Barium	51.5	4.00	"	52.3	0-20	1.47	20			
Boron	430	150	"	410	0-20	4.8	20			
Calcium	1770	200	"	1720	0-20	2.74	20			
Iron	214	100	"	221	0-20	3.35	20			
Magnesium	404	30.0	"	414	0-20	2.3	20			
Manganese	11.8	5.00	"	12.1	0-20	2.86	20			
Sodium	344000	2500	"	340000	0-20	1.16	20			
Strontium	77.3	10.0	"	75.5	0-20	2.31	20			
Potassium	1480	300	"	1490	0-20	0.876	20			

MS (1204558923 S)

Source: Y005081-01

Prepared: 05/11/2020 Analyzed: 05/13/2020

Strontium	137	10.0	ug/L	50.0	75.5	123	75-125			
Calcium	3920	200	"	2000	1720	110	75-125			
Iron	2270	100	"	2000	221	103	75-125			
Magnesium	2450	30.0	"	2000	414	102	75-125			
Boron	537	150	"	100	410	0	75-125			
Manganese	64.6	5.00	"	50.0	12.1	105	75-125			

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
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996144 - EPA 200.2

MS (1204558923 S)

Source: Y005081-01

Prepared: 05/11/2020 Analyzed: 05/13/2020

Sodium	350000	2500	ug/L	2000	340000	0	75-125			
Selenium	53.9	5.00	"	50.0	<2.00	107	75-125			
Potassium	3590	300	"	2000	1490	105	75-125			
Barium	105	4.00	"	50.0	52.3	105	75-125			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1995841 - SW846 3535A										
BLANK (1204558277-BLK)					Prepared: 05/11/2020 Analyzed: 05/11/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	13.6		"	20.0		68	40-109			
LCS (1204558278-BKS)					Prepared: 05/11/2020 Analyzed: 05/11/2020					
Diesel Range Organics	913	200	ug/L	1000		91	45-119			
Surrogate: o-Terphenyl	18.9		"	20.0		94	40-109			
MS (1204558588 S)					Source: 510909001 Prepared: 05/11/2020 Analyzed: 05/11/2020					
Diesel Range Organics	3400	1000	ug/L	5000	<375	68	41-118			
Surrogate: o-Terphenyl	72.8		"	100	59.0	73	40-109			
MSD (1204558589 SD)					Source: 510909001 Prepared: 05/11/2020 Analyzed: 05/11/2020					
Diesel Range Organics	3070	1000	ug/L	5000	<375	61	41-118	10	20	
Surrogate: o-Terphenyl	59.8		"	100	59.0	60	40-109			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1996289 -										
BLANK (1204559292-BLK)					Prepared: Analyzed: 05/11/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0464		"	0.0500		93	75-127			
LCS (1204559293-BKS)					Prepared: Analyzed: 05/11/2020					
Gasoline Range Organics	0.447	0.100	mg/L	0.500		89	80-120			
Surrogate: Bromofluorobenzene	0.0476		"	0.0500		95	75-127			
PS (1204559294 S)					Source: 510982001 Prepared: Analyzed: 05/11/2020					
Gasoline Range Organics	0.530	0.100	mg/L	0.500		75	68-127			
Surrogate: Bromofluorobenzene	0.0407		"	0.0500		81	75-127			
PSD (1204559295 SD)					Source: 510982001 Prepared: Analyzed: 05/11/2020					
Gasoline Range Organics	0.503	0.100	mg/L	0.500		69	68-127	5	30	
Surrogate: Bromofluorobenzene	0.0475		"	0.0500		95	75-127			

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
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Nitrate/Nitrite by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1995314 -										
BLANK (1204557298-BLK)					Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204557299-BKS)					Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	1.02	0.0200	mg/L	1.00		102	90-110			
DUP (1204557300 D)					Source: 510564001 Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	0.0260	0.0200	mg/L		0.0279		0-20	7.05	20	
PS (1204557302 S)					Source: 510564001 Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	0.970	0.0200	mg/L	1.00		94.2	90-110			

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
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Total Alkalinity by 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1995925 -										
LCS (1204558468-BKS)					Prepared: Analyzed: 05/11/2020					
Alkalinity, Total as CaCO3	106	4.00	mg/L	100		106	90-110			
DUP (1204558469 D)					Source: 510982001 Prepared: Analyzed: 05/11/2020					
Alkalinity, Total as CaCO3	553	4.00	mg/L		543		0-20	1.83	20	
Bicarbonate alkalinity (CaCO3)	492	4.00	"		488		0-20	0.818	20	
Carbonate alkalinity (CaCO3)	60.2	4.00	"		54.2		0-20	10.5	20	
MS (1204558470 S)					Source: 510982001 Prepared: Analyzed: 05/11/2020					
Alkalinity, Total as CaCO3	660	4.00	mg/L	100	543	0	80-120			

Origins Laboratory, Inc.



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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Christine Hamlin
 Project Number: [none]
 Project: PDC - Morales Methane Investigation

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1995313 - EPA 365.4 Prep										
BLANK (1204557290-BLK)					Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204557291-BKS)					Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204557294 D)					Source: 510569001 Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	0.103	0.0500	mg/L		0.0861		0-41	17.9	41	
MS (1204557295 S)					Source: 510569001 Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	1.11	0.0500	mg/L	1.00	0.0861	102	70-136			

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
6855 West 119th Avenue
Broomfield CO 80020

Christine Hamlin
Project Number: [none]
Project: PDC - Morales Methane Investigation

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

~9000 ~9000

~1400 ~1400

~100 ~100

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.



dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

Job #: 20054013
Lab #: DIG-022879
Client: Origins Laboratory
Sample Name(s): CASIAS-MORALES WELL

The analytical results, opinions, or interpretations contained in this report are based upon information and material supplied by the client for whose exclusive and confidential use this report has been made. The analytical results, opinions, or interpretations expressed represent the best judgment of Dolan Integration Group based on its experience, but any interpretation of test or other data, and any recommendation(s) based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions which are not infallible, and with respect to which professional engineers and analysts may differ. Accordingly, Dolan Integration Group makes no warranty or representation, expressed or implied, of any type, and expressly disclaims same as to the productivity, proper operations, or profitability of any oil, gas, coal, or other mineral, property, well, or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced, in whole or in part, without the written approval of Dolan Integration Group.

Dolan Integration Group shall use commercially reasonable efforts to maintain the Samples it receives from Customer in the condition in which same were initially received, and shall store, free of charge, any portion(s) of the Sample(s) not consumed or altered in the course of testing and analysis for a period of 60 days after their initial receipt, after which time the Samples will be destroyed. At Customer's written request and expense, Dolan Integration Group shall return unused Samples to Customer. At Customer's written request, Dolan Integration Group will also store and maintain Customer's Samples beyond the Free Storage Period for a monthly fee in accordance with Dolan Integration Group's the current storage rates. If Customer fails to timely pay any applicable storage charges, Dolan Integration Group shall be free to destroy the Sample.

Analytical Report



Job #: 20054013
 Lab #: DIG-022879
 Client: Origins Laboratory
 Sample Name: CASIAS-MORALES WELL
 Date Sampled: 05/06/20
 Time Sampled: 14:55
 Sample Description: Water
 Sampling Notes:
 Date Received: 05/15/20
 Date Analyzed: Gas Composition: 05/21/20 $\delta^{13}\text{C}$: 05/28/20 δD : 05/23/20
 Date Reported: 06/01/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	255049	39.22	-	-	-	
Oxygen + Argon (O ₂ +Ar)	64093	9.86	-	-	-	
Carbon Dioxide (CO ₂)	1179	0.18	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	278798	42.87	84.48	-54.9	-268	
Ethane (C ₂ H ₆)	31521	4.85	9.55	-33.5	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	13756	2.12	4.17	-29.8	-	
iso-Butane (C ₄ H ₁₀)	1708	0.26	0.52	-31.3	-	
n-Butane (C ₄ H ₁₀)	2836	0.44	0.86	-28.8	-	
iso-Pentane (C ₅ H ₁₂)	598	0.09	0.18	-	-	
n-Pentane (C ₅ H ₁₂)	495	0.08	0.15	-	-	
Hexanes + (C ₆ H ₁₄)	307	0.05	0.09	-	-	

Calculated Values:	
Total HCs (ppm)	330017
Gas Wetness (mol % C ₂ +C ₁ +))	15.52
C ₁ /(C ₂ +C ₃) (mol/mol)	6

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

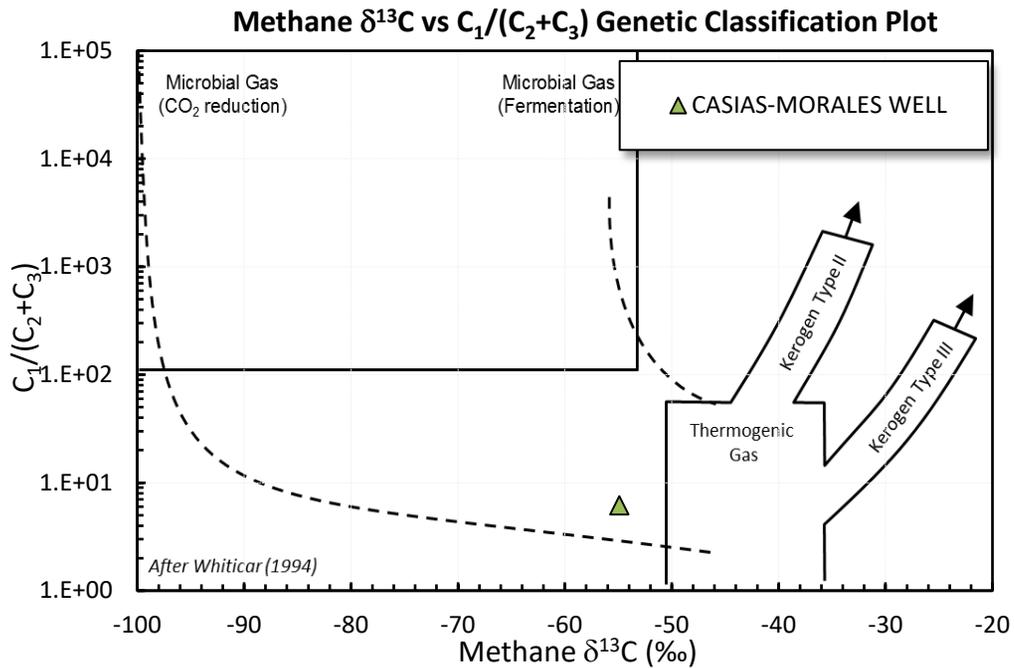
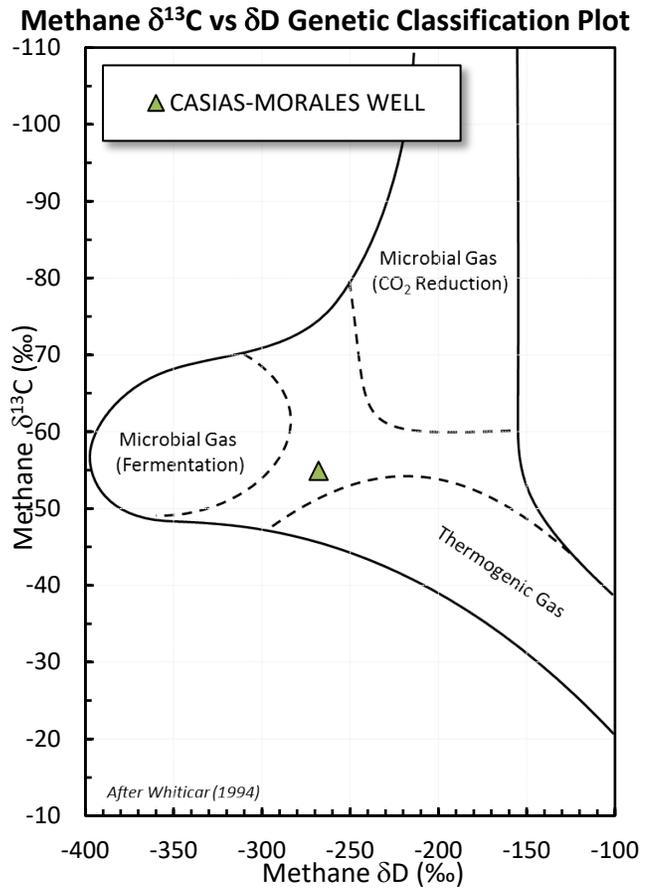
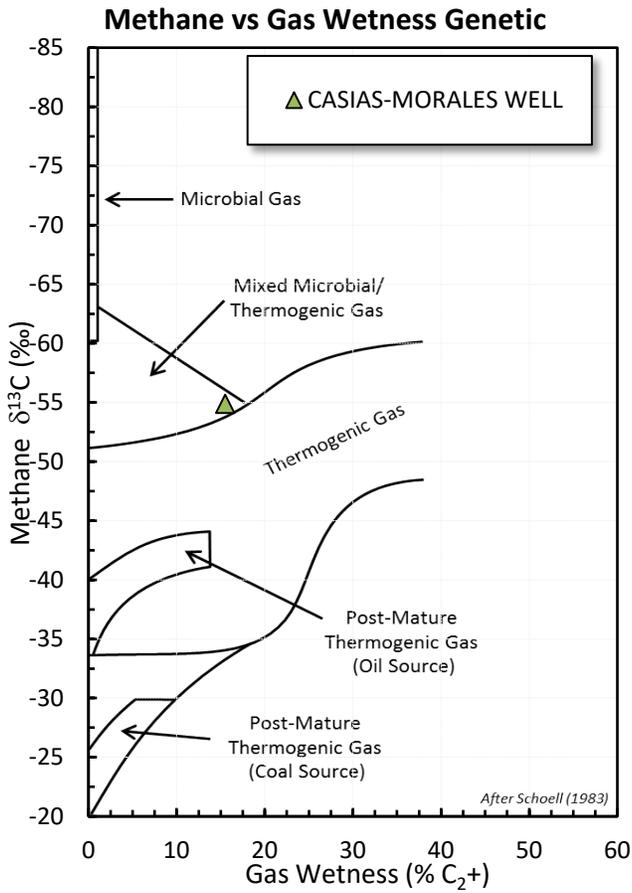
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB 20054013

DIG -022879



Geochemistry
for Energy

main 303.531.2030 • info@digforenergy.com • digforenergy.com

Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerrill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y005081
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (≤ 10 business days) Rush (≤ 5 business days) Expedited Rush (≤ 3 business days)

Sample Description				Analysis Requested						Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	RSK-175: N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ with dissolved C ₁ , C ₂ , & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane-Pentane (C ₂ -C ₅ if present)	δ ¹³ C CO ₂ (if present)	
Y005081-01	Casias-Morales Well	5/16	1455	X		X	X			

Chain-of-Custody Record

Signature	Company	Date	Time
	Origins	5/15/20	1427
	DIG	5/15/20	1427

*Gas composition vs RSK-175. Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). RSK-175 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

May 15, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Roland **Project Number - 020-1374**

Attached are your analytical results for Morales Methane Investigation - Roland received by Origins Laboratory, Inc. May 08, 2020. This project is associated with Origins project number Y005108-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Roland

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Roland_268360	Y005108-01	Water	May 8, 2020 10:50	05/08/2020 11:50

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Origins Laboratory

Sample Receipt Checklist

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

Origins Work Order: Y005108

Client: Olsson

Client Project ID: Morales Investigation - Ro

Checklist Completed by: JG

Shipped Via: HD

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

Date/time completed: 5/8/2020

Airbill #: N/A

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

Cooler Number/Temperature: 1 12.6 °C 1 °C 1 °C (Describe) °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⁾ ?		<input checked="" type="checkbox"/>		<u>Some Dry</u>
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.

Reviewed by (Project Manager) JM

5-11-20
 Date/Time Reviewed

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Roland 268360
5/8/2020 10:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005108-01 (Water)

Anions by EPA 300.0

Bromide	1.10	0.200	mg/L	1	1996106	LXA2	05/08/2020	05/09/2020	
Chloride	106	4.00	"	20	"	LXA2	"	"	
Fluoride	2.12	0.100	"	1	"	LXA2	"	"	
Nitrate	ND	0.100	"	"	"	LXA2	"	"	U
Nitrite	ND	0.100	"	"	"	LXA2	"	"	U
Sulfate	0.152	0.400	"	"	"	LXA2	"	"	J

Bacterial Activity Reaction Tests

Iron Related Bacteria	~35000		CFU/mL	1	11111	ARB	"	05/08/2020	
Slime Forming Bacteria	~2500		"	"	"	ARB	"	"	
Sulfate Reducing Bacteria	~6000		"	"	"	ARB	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0E0815	ZZZ	05/08/2020	05/13/2020	Ua
Toluene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	ZZZ	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	91.2 %	70-130				"	"	"	
Surrogate: Toluene-d8	100 %	70-130				"	"	"	
Surrogate: 4-Bromofluorobenzene	102 %	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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Roland 268360
5/8/2020 10:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Pace Analytical
Y005108-01 (Water)

Dissolved Gasses by RSK 175

Ethane	3160	10.0	ug/L	1	11111		05/08/2020	05/11/2020	
Methane	11600	10.0	"	"	"		"	"	
n-Propane	2400	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	54.9	4.00	ug/L	1	1996258	SKJ	05/12/2020	05/13/2020	
Boron	355	150	"	10	"	SKJ	"	"	
Calcium	2180	200	"	1	"	SKJ	"	"	
Iron	130	100	"	"	"	SKJ	"	"	
Magnesium	381	30.0	"	"	"	SKJ	"	"	
Manganese	17.5	5.00	"	"	"	SKJ	"	"	
Potassium	1350	300	"	"	"	SKJ	"	"	
Selenium	ND	5.00	"	"	"	SKJ	"	"	U
Sodium	337000	2500	"	10	"	SKJ	"	"	
Strontium	83.5	10.0	"	1	"	SKJ	"	"	

DRO by 8015C

Diesel Range Organics	99.8	193	ug/L	1	1996317	RXC1	"	05/13/2020	J
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Surrogate: o-Terphenyl 82 % 40-109 " " "

GRO by SW 8015C

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Roland 268360
5/8/2020 10:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005108-01 (Water)

GRO by SW 8015C

Gasoline Range Organics	0.156	0.100	mg/L	1	1996289	RXY1	05/08/2020	05/11/2020	
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Surrogate: Bromofluorobenzene	101 %	75-127				"	"	"	
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Nitrate/Nitrite by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.100	mg/L	5	1995314	KLP1	"	05/13/2020	U
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pH in Water by EPA 9040C

pH	8.64		pH Units	1	B0E0820	DJL	05/08/2020	05/08/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	1270	5.00	uS/cm	"	B0E0821	DJL	05/08/2020	05/14/2020	
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Total Alkalinity by SM 2320B

Alkalinity, Total as CaCO3	543	4.00	mg/L	1	1995925	RXB5	05/08/2020	05/11/2020	
Bicarbonate alkalinity (CaCO3)	488	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	54.2	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	772	5.00	mg/L	1	B0E0801	DJL	05/08/2020	05/12/2020	
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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Roland

Roland 268360
5/8/2020 10:50:00AM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y005108-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.120	0.0500	mg/L	1	1995313	KLP1	05/11/2020	05/12/2020	
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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0815 - EPA 5030B (Water)

Blank (B0E0815-BLK1)

Prepared: 05/08/2020 Analyzed: 05/13/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
<i>Surrogate: 1,2-Dichloroethane-d4</i>	<i>57</i>		<i>"</i>	<i>62.5</i>		<i>91.6</i>	<i>70-130</i>			
<i>Surrogate: Toluene-d8</i>	<i>61</i>		<i>"</i>	<i>62.5</i>		<i>97.6</i>	<i>70-130</i>			
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>63</i>		<i>"</i>	<i>62.5</i>		<i>101</i>	<i>70-130</i>			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0815 - EPA 5030B (Water)

LCS (B0E0815-BS1)

Prepared: 05/08/2020 Analyzed: 05/13/2020

Benzene	44.5	1.00	ug/L	50.0		89.0	70-130			
Toluene	44.5	1.00	"	50.0		89.0	70-130			
Ethylbenzene	54.1	1.00	"	50.0		108	70-130			
m,p-Xylene	107	2.00	"	100		107	70-130			
o-Xylene	49.8	1.00	"	50.0		99.6	70-130			
Surrogate: 1,2-Dichloroethane-d4	61		"	62.5		97.4	70-130			
Surrogate: Toluene-d8	63		"	62.5		101	70-130			
Surrogate: 4-Bromofluorobenzene	62		"	62.5		99.2	70-130			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0815 - EPA 5030B (Water)

Matrix Spike (B0E0815-MS1)	Source: Y005107-01			Prepared: 05/08/2020 Analyzed: 05/13/2020						
Benzene	49.0	1.00	ug/L	50.0	ND	98.0	70-130			
Toluene	49.6	1.00	"	50.0	ND	99.2	70-130			
Ethylbenzene	61.1	1.00	"	50.0	ND	122	70-130			
m,p-Xylene	119	2.00	"	100	ND	119	70-130			
o-Xylene	54.5	1.00	"	50.0	ND	109	70-130			
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5		95.1	70-130			
Surrogate: Toluene-d8	63		"	62.5		100	70-130			
Surrogate: 4-Bromofluorobenzene	64		"	62.5		102	70-130			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E0815 - EPA 5030B (Water)

Matrix Spike Dup (B0E0815-MSD1)	Source: Y005107-01			Prepared: 05/08/2020 Analyzed: 05/13/2020						
Benzene	47.8	1.00	ug/L	50.0	ND	95.6	70-130	2.46	20	
Toluene	49.0	1.00	"	50.0	ND	98.0	70-130	1.26	20	
Ethylbenzene	60.9	1.00	"	50.0	ND	122	70-130	0.328	20	
m,p-Xylene	119	2.00	"	100	ND	119	70-130	0.520	20	
o-Xylene	54.7	1.00	"	50.0	ND	109	70-130	0.458	20	
Surrogate: 1,2-Dichloroethane-d4	59		"	62.5		94.0	70-130			
Surrogate: Toluene-d8	63		"	62.5		102	70-130			
Surrogate: 4-Bromofluorobenzene	63		"	62.5		101	70-130			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Volatile Organic Compounds by GC/MS SW846 8260D - 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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Classical Chemistry Parameters - 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 B0E0801 - NO PREP

Blank (B0E0801-BLK1)

Prepared: 05/08/2020 Analyzed: 05/12/2020

Total Dissolved Solids ND 5.00 mg/L

LCS (B0E0801-BS1)

Prepared: 05/08/2020 Analyzed: 05/12/2020

Total Dissolved Solids 732 5.00 mg/L 716 102 85-115

Duplicate (B0E0801-DUP1)

Source: Y005081-01

Prepared: 05/08/2020 Analyzed: 05/12/2020

Total Dissolved Solids 750 5.00 mg/L 748 0.214 20

Batch B0E0820 - NO PREP

Duplicate (B0E0820-DUP1)

Source: Y005108-01

Prepared: 05/08/2020 Analyzed: 05/14/2020

pH 8.64 pH Units 8.64 0.00 200

Batch B0E0821 - NO PREP

Blank (B0E0821-BLK1)

Prepared: 05/08/2020 Analyzed: 05/14/2020

Specific Conductance (EC) 1.50 5.00 uS/cm

Duplicate (B0E0821-DUP1)

Source: Y005108-01

Prepared: 05/08/2020 Analyzed: 05/14/2020

Specific Conductance (EC) 1260 5.00 uS/cm 1270 1.04 10

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996106 -

BLANK (1204558844-BLK)

Prepared: Analyzed: 05/09/2020

Sulfate	ND	0.400	mg/L				-			U
Nitrite	ND	0.100	"				-			U
Nitrate	ND	0.100	"				-			U
Fluoride	ND	0.100	"				-			U
Bromide	ND	0.200	"				-			U
Chloride	ND	0.200	"				-			U

LCS (1204558845-BKS)

Prepared: Analyzed: 05/09/2020

Bromide	1.28	0.200	mg/L	1.25		102	90-110			
Sulfate	10.2	0.400	"	10.0		102	90-110			
Nitrite	2.58	0.100	"	2.50		103	90-110			
Nitrate	2.50	0.100	"	2.50		100	90-110			
Chloride	4.99	0.200	"	5.00		99.7	90-110			
Fluoride	2.54	0.100	"	2.50		102	90-110			

DUP (1204558848 D)

Source: 510933001

Prepared: Analyzed: 05/09/2020

Bromide	ND	4.00	mg/L		<1.34		0-20	0	20	U
Chloride	119	4.00	"		119		0-20	0.166	20	
Fluoride	ND	2.00	"		0.894		0-20	70.1	20	U
Nitrate	17.5	2.00	"		17.5		0-20	0.32	20	
Nitrite	ND	2.00	"		<0.660		0-20	0	20	U
Sulfate	157	8.00	"		156		0-20	0.141	20	

PS (1204558849 S)

Source: 510933001

Prepared: Analyzed: 05/09/2020

Sulfate	370	8.00	mg/L	10.0		107	90-110			
Chloride	229	4.00	"	5.00		110	90-110			
Fluoride	52.9	2.00	"	2.50		104	90-110			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996106 -

PS (1204558849 S)

Source: 510933001

Prepared: Analyzed: 05/09/2020

Nitrate	69.6	2.00	mg/L	2.50		104	90-110			
Nitrite	52.5	2.00	"	2.50		105	90-110			
Bromide	26.8	4.00	"	1.25		107	90-110			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996258 -

FLTB (1204558982-BLK)

Prepared: 05/12/2020 Analyzed: 05/13/2020

Selenium	ND	5.00	ug/L				-			U
Strontium	ND	10.0	"				-			U
Iron	ND	100	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Barium	ND	4.00	"				-			U
Boron	ND	15.0	"				-			U
Calcium	ND	200	"				-			U
Sodium	ND	250	"				-			U

BLANK (1204559230-BLK)

Prepared: 05/12/2020 Analyzed: 05/13/2020

Boron	ND	15.0	ug/L				-			U
Potassium	ND	300	"				-			U
Strontium	ND	10.0	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Calcium	ND	200	"				-			U
Barium	ND	4.00	"				-			U
Iron	ND	100	"				-			U

LCS (1204559231-BKS)

Prepared: 05/12/2020 Analyzed: 05/13/2020

Manganese	52.7	5.00	ug/L	50.0		105	85-115			
Selenium	46.7	5.00	"	50.0		93.5	85-115			
Sodium	2150	250	"	2000		108	85-115			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996258 - EPA 200.2

LCS (1204559231-BKS)

Prepared: 05/12/2020 Analyzed: 05/13/2020

Strontium	46.9	10.0	ug/L	50.0		93.7	85-115			
Potassium	1700	300	"	2000		85.1	85-115			
Iron	2150	100	"	2000		107	85-115			
Magnesium	1740	30.0	"	2000		86.8	85-115			
Barium	48.7	4.00	"	50.0		97.5	85-115			
Calcium	2030	200	"	2000		102	85-115			
Boron	94.9	15.0	"	100		94.9	85-115			

DUP (1204559232 D)

Source: Y005108-01

Prepared: 05/12/2020 Analyzed: 05/13/2020

Selenium	ND	5.00	ug/L		<2.00		0-20	67.2	20	U
Sodium	340000	2500	"		337000		0-20	0.836	20	
Potassium	1410	300	"		1350		0-20	4.34	20	
Manganese	18.1	5.00	"		17.5		0-20	3.52	20	
Magnesium	421	30.0	"		381		0-20	9.98	20	
Iron	136	100	"		130		0-20	4.18	20	
Calcium	2310	200	"		2180		0-20	6.15	20	
Boron	350	150	"		355		0-20	1.52	20	
Barium	60.2	4.00	"		54.9		0-20	9.25	20	
Strontium	93.5	10.0	"		83.5		0-20	11.3	20	

MS (1204559234 S)

Source: Y005108-01

Prepared: 05/12/2020 Analyzed: 05/13/2020

Magnesium	2060	30.0	ug/L	2000	381	83.9	75-125			
Strontium	139	10.0	"	50.0	83.5	111	75-125			
Sodium	345000	2500	"	2000	337000	0	75-125			
Selenium	47.1	5.00	"	50.0	<2.00	94.1	75-125			
Manganese	67.3	5.00	"	50.0	17.5	99.7	75-125			
Iron	2130	100	"	2000	130	100	75-125			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1996258 - EPA 200.2

MS (1204559234 S)	Source: Y005108-01			Prepared: 05/12/2020 Analyzed: 05/13/2020						
Calcium	4180	200	ug/L	2000	2180	100	75-125			
Boron	459	150	"	100	355	104	75-125			
Barium	107	4.00	"	50.0	54.9	104	75-125			
Potassium	3030	300	"	2000	1350	83.8	75-125			

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DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1996317 - SW846 3535A										
BLANK (1204559342-BLK)					Prepared: 05/12/2020 Analyzed: 05/13/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	15.4		"	20.0		77	40-109			
LCS (1204559343-BKS)					Prepared: 05/12/2020 Analyzed: 05/13/2020					
Diesel Range Organics	616	200	ug/L	1000		62	45-119			
Surrogate: o-Terphenyl	16.1		"	20.0		80	40-109			
LCSD (1204559344-BKSD)					Prepared: 05/12/2020 Analyzed: 05/13/2020					
Diesel Range Organics	712	200	ug/L	1000		71	45-119	14	27	
Surrogate: o-Terphenyl	17.0		"	20.0		85	40-109			

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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

EPA 365.4 Phosphorus, Total in - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1995313 - EPA 365.4 Prep										
BLANK (1204557290-BLK)					Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204557291-BKS)					Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	1.07	0.0500	mg/L	1.00		107	80-124			
DUP (1204557294 D)					Source: 510569001 Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	0.103	0.0500	mg/L		0.0861		0-41	17.9	41	
MS (1204557295 S)					Source: 510569001 Prepared: 05/11/2020 Analyzed: 05/12/2020					
Phosphorus, Total as P	1.11	0.0500	mg/L	1.00	0.0861	102	70-136			

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Trent Watne
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 Project: Morales Methane Investigation - Roland

GRO by SW 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1996289 -										
BLANK (1204559292-BLK)					Prepared: Analyzed: 05/11/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0464		"	0.0500		93	75-127			
LCS (1204559293-BKS)					Prepared: Analyzed: 05/11/2020					
Gasoline Range Organics	0.447	0.100	mg/L	0.500		89	80-120			
Surrogate: Bromofluorobenzene	0.0476		"	0.0500		95	75-127			
PS (1204559294 S)					Source: Y005108-01		Prepared: Analyzed: 05/11/2020			
Gasoline Range Organics	0.530	0.100	mg/L	0.500		75	68-127			
Surrogate: Bromofluorobenzene	0.0407		"	0.0500		81	75-127			
PSD (1204559295 SD)					Source: Y005108-01		Prepared: Analyzed: 05/11/2020			
Gasoline Range Organics	0.503	0.100	mg/L	0.500		69	68-127	5	30	
Surrogate: Bromofluorobenzene	0.0475		"	0.0500		95	75-127			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Nitrate/Nitrite by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1995314 -										
BLANK (1204557298-BLK)					Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204557299-BKS)					Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	1.02	0.0200	mg/L	1.00		102	90-110			
DUP (1204557300 D)					Source: 510564001 Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	0.0260	0.0200	mg/L		0.0279		0-20	7.05	20	
PS (1204557302 S)					Source: 510564001 Prepared: Analyzed: 05/13/2020					
Nitrogen, Nitrate/Nitrite	0.970	0.0200	mg/L	1.00		94.2	90-110			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Roland

Total Alkalinity by SM 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1995925 -										
LCS (1204558468-BKS)					Prepared: Analyzed: 05/11/2020					
Alkalinity, Total as CaCO3	106	4.00	mg/L	100		106	90-110			
DUP (1204558469 D)					Source: Y005108-01 Prepared: Analyzed: 05/11/2020					
Bicarbonate alkalinity (CaCO3)	492	4.00	mg/L		488		0-20	0.818	20	
Alkalinity, Total as CaCO3	553	4.00	"		543		0-20	1.83	20	
Carbonate alkalinity (CaCO3)	60.2	4.00	"		54.2		0-20	10.5	20	
MS (1204558470 S)					Source: Y005108-01 Prepared: Analyzed: 05/11/2020					
Alkalinity, Total as CaCO3	660	4.00	mg/L	100	543	0	80-120			

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.

Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Roland

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

J Greater than the detection limit but less than the reporting limit

~6000 ~6000

~35000 ~35000

~2500 ~2500

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.



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dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

**Hydrocarbon Gas Composition and Stable Isotopes
Data and Interpretation**

Job #: 20054012
Lab #: DIG-022878
Client: Origins Laboratory
Sample Name(s): ROLAND-268360

The analytical results, opinions, or interpretations contained in this report are based upon information and material supplied by the client for whose exclusive and confidential use this report has been made. The analytical results, opinions, or interpretations expressed represent the best judgment of Dolan Integration Group based on its experience, but any interpretation of test or other data, and any recommendation(s) based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions which are not infallible, and with respect to which professional engineers and analysts may differ. Accordingly, Dolan Integration Group makes no warranty or representation, expressed or implied, of any type, and expressly disclaims same as to the productivity, proper operations, or profitableness of any oil, gas, coal, or other mineral, property, well, or sand in connection with which such report is used or relied upon for any reason whatsoever. This report shall not be reproduced, in whole or in part, without the written approval of Dolan Integration Group.

Dolan Integration Group shall use commercially reasonable efforts to maintain the Samples it receives from Customer in the condition in which same were initially received, and shall store, free of charge, any portion(s) of the Sample(s) not consumed or altered in the course of testing and analysis for a period of 60 days after their initial receipt, after which time the Samples will be destroyed. At Customer's written request and expense, Dolan Integration Group shall return unused Samples to Customer. At Customer's written request, Dolan Integration Group will also store and maintain Customer's Samples beyond the Free Storage Period for a monthly fee in accordance with Dolan Integration Group's the current storage rates. If Customer fails to timely pay any applicable storage charges, Dolan Integration Group shall be free to destroy the Sample.

Analytical Report



Job #: 20054012
 Lab #: DIG-022878
 Client: Origins Laboratory
 Sample Name: ROLAND-268360
 Date Sampled: 05/08/20
 Time Sampled: 10:50
 Sample Description: Water
 Sampling Notes:
 Date Received: 05/15/20
 Date Analyzed: Gas Composition: 05/21/20 $\delta^{13}\text{C}$: 05/28/20 δD : 05/23/20
 Date Reported: 06/01/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	251644	24.75	-	-	-	
Oxygen + Argon (O ₂ +Ar)	39996	3.93	-	-	-	
Carbon Dioxide (CO ₂)	633	0.06	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	619337	60.91	85.49	-54.3	-273	
Ethane (C ₂ H ₆)	55043	5.41	7.60	-33.6	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	32643	3.21	4.51	-29.8	-	
iso-Butane (C ₄ H ₁₀)	6013	0.59	0.83	-31.4	-	
n-Butane (C ₄ H ₁₀)	7695	0.76	1.06	-28.1	-	
iso-Pentane (C ₅ H ₁₂)	1777	0.17	0.25	-27.7	-	
n-Pentane (C ₅ H ₁₂)	1283	0.13	0.18	-29.0	-	
Hexanes + (C ₆ H ₁₄)	675	0.07	0.09	-	-	

Calculated Values:	
Total HCs (ppm)	724466
Gas Wetness (mol % C ₂ +C ₁ +))	14.51
C ₁ /(C ₂ +C ₃) (mol/mol)	7

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

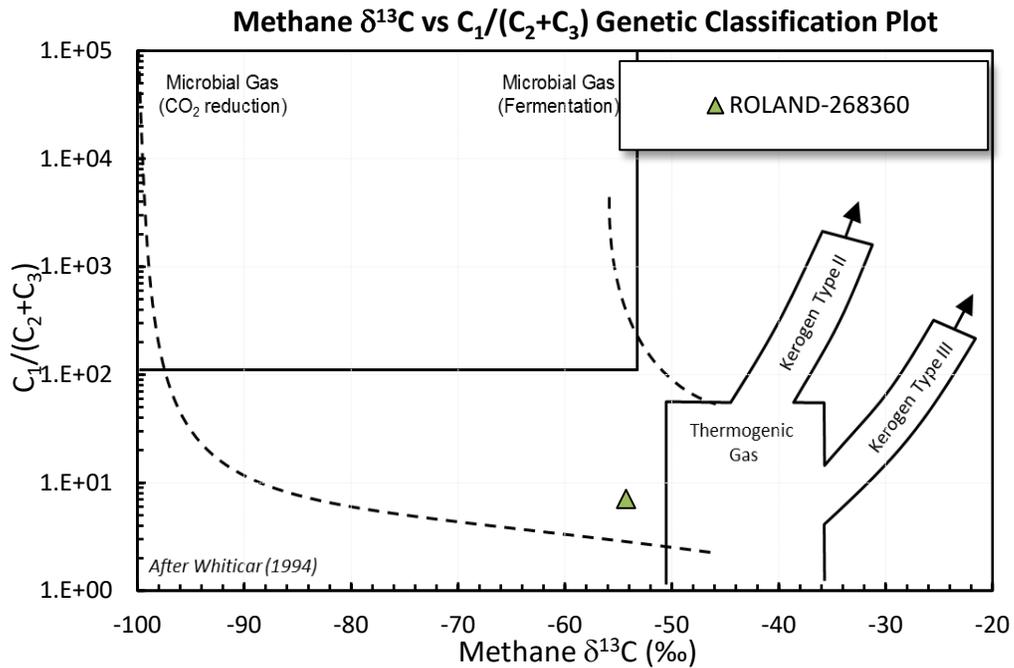
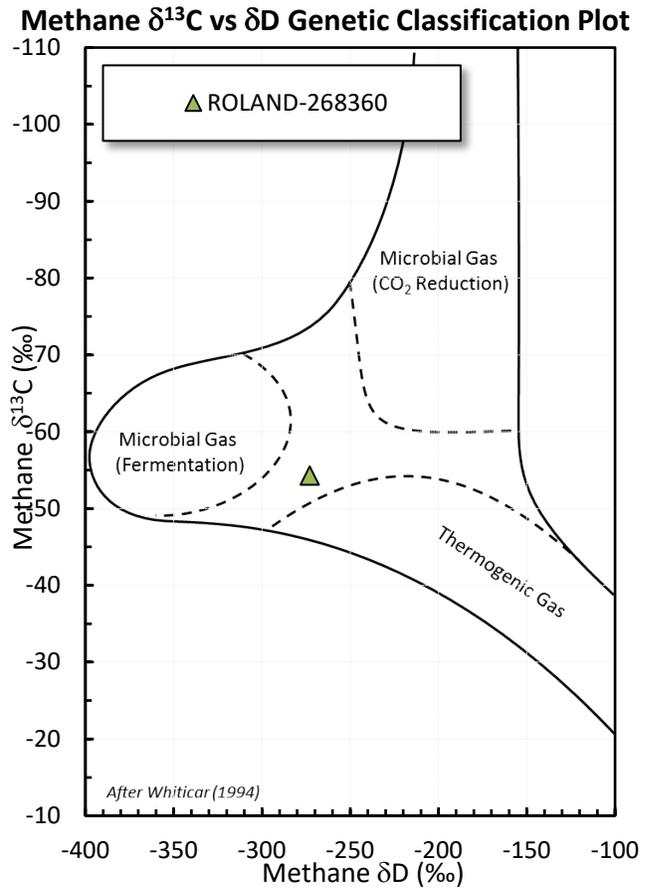
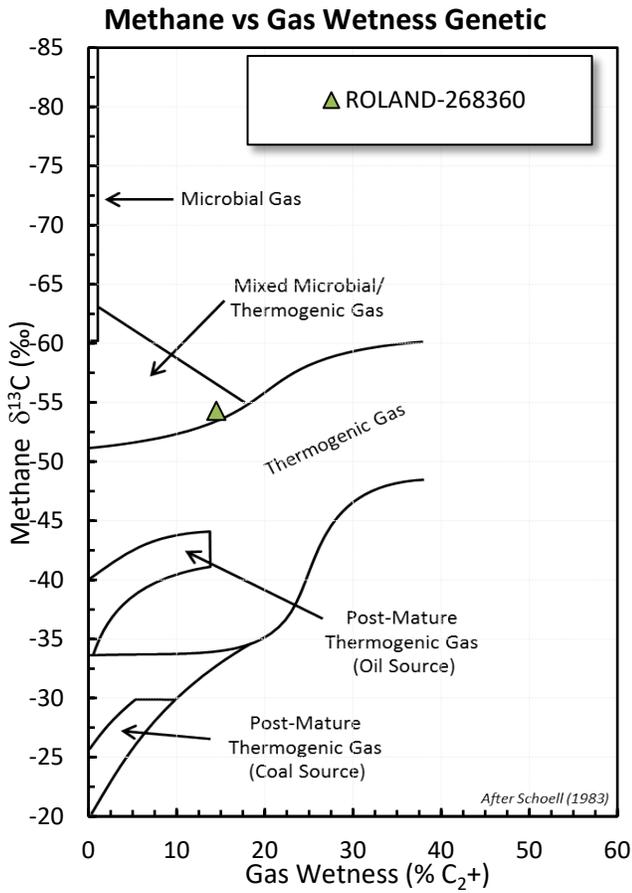
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB 20054012

DIG-022878



Geochemistry
for Energy

main 303.531.2030 • info@digforenergy.com • digforenergy.com

Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y005108
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (≤ 10 business days) Rush (≤ 5 business days) Expedited Rush (≤ 3 business days)

Sample Description				Analysis Requested						Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	RSK-175: N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ + with dissolved C ₁ , C ₂ , & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane- Pentane (C ₂ - C ₅ if present)	δ ¹³ C CO ₂ (if present)	
Y005108-01	Poland-268300	5/8	1050	X		X	X			

Chain-of-Custody Record

Signature	Company	Date	Time
	Origins	5/15/20	1427
	DIG	5/15/20	1427

*Gas composition vs. RSK-175- Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-175 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). RSK-175 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

June 08, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver CO 80204

Project Name - Morales Methane Investigation - Flora **Project Number - 020-1374**

Attached are your analytical results for Morales Methane Investigation - Flora received by Origins Laboratory, Inc. May 28, 2020. This project is associated with Origins project number Y005368-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Flora

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Flora-131321	Y005368-01	Water	May 28, 2020 15:20	05/28/2020 16:27

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y005368

Client: Olsson

Client Project ID: Morales - Flora

Checklist Completed by: JG

Shipped Via: HD

Date/time completed: 5/29/2020

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

Airbill #: N/A

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

Cooler Number/Temperature: 1 / 8.6 °C 1 / 1 °C 1 / 1 °C 1 / 1 °C (Describe)

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⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>Same Day</u>
Are custody seals present on cooler? (if so, document in comments if they are signed and dated, broken or intact)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Were all samples received intact ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Was adequate sample volume provided ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are short holding time analytes or samples with HTs due within 48 hours present ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is a chain-of-custody (COC) present and filled out completely ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the COC agree with the number and type of sample bottles received ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Do the sample IDs on the bottle labels match the COC ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the COC properly relinquished by the client with date and time recorded ⁽¹⁾ ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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"/>	<input type="checkbox"/>	<input 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.

JM
 Reviewed by (Project Manager)

6-1-20
 Date/Time Reviewed

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.

Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Flora-131321
5/28/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005368-01 (Water)

Anions by EPA 300.0

Bromide	0.542	0.200	mg/L	1	2006309	JLD1	05/28/2020	05/30/2020	
Chloride	50.3	2.00	"	10	"	JLD1	"	06/01/2020	
Fluoride	1.62	0.100	"	1	"	JLD1	"	05/30/2020	
Nitrate	ND	0.100	"	"	"	JLD1	"	"	U
Nitrite	ND	0.100	"	"	"	JLD1	"	"	U
Sulfate	ND	0.400	"	"	"	JLD1	"	"	U

Bacterial Activity Reaction Tests

Iron Related Bacteria	~8		CFU/mL	1	11111	DJL	"	05/28/2020	
Slime Forming Bacteria	<20		"	"	"	DJL	"	"	
Sulfate Reducing Bacteria	~20		"	"	"	DJL	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0E2902	ZZZ	05/29/2020	05/29/2020	Ua
Toluene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	ZZZ	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	99.9 %	70-130			"	"		"	
Surrogate: Toluene-d8	97.9 %	70-130			"	"		"	
Surrogate: 4-Bromofluorobenzene	110 %	70-130			"	"		"	

Origins Laboratory, Inc.



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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Flora-131321
5/28/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Pace Analytical
Y005368-01 (Water)

Dissolved Gasses by RSK 175

Ethane	28.5	10.0	ug/L	1	11111		05/28/2020	06/02/2020	
Methane	7180	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	40.9	4.00	ug/L	1	2006502	SKJ	06/02/2020	06/03/2020	
Boron	290	75.0	"	5	"	SKJ	"	06/04/2020	
Calcium	1640	200	"	1	"	SKJ	"	06/03/2020	
Iron	ND	100	"	"	"	SKJ	"	"	U
Magnesium	318	30.0	"	"	"	SKJ	"	"	
Manganese	ND	5.00	"	"	"	SKJ	"	"	U
Potassium	1110	300	"	"	"	PRB	"	06/04/2020	
Selenium	ND	5.00	"	"	"	SKJ	"	06/03/2020	U
Sodium	246000	1250	"	5	"	SKJ	"	06/04/2020	
Strontium	51.7	10.0	"	1	"	SKJ	"	06/03/2020	

DRO by 8015C

Diesel Range Organics	ND	192	ug/L	1	2006403	RXC1	"	06/04/2020	U
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Surrogate: o-Terphenyl 74 % 40-109 " " "

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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Flora-131321
5/28/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005368-01 (Water)

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	2006534	RXY1	05/28/2020	06/02/2020	U
<i>Surrogate: Bromofluorobenzene</i>	90 %	75-127			"	"	"	"	

Nitrate/Nitrite by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L	1	2007011	KLP1	"	06/02/2020	U
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pH in Water by EPA 9040C

pH	8.90		pH Units	1	B0E2812	KDK	05/29/2020	05/29/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	973	5.00	uS/cm	"	B0E2813	KDK	05/29/2020	05/29/2020	
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Total Alkalinity by SM 2320B

Alkalinity, Total as CaCO3	443	4.00	mg/L	1	2006305	RXB5	05/28/2020	06/02/2020	
Bicarbonate alkalinity (CaCO3)	395	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	48.1	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	576	5.00	mg/L	1	B0F0204	DJL	06/02/2020	06/02/2020	
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Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Flora

Flora-131321

5/28/2020 3:20:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y005368-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.135	0.0500	mg/L	1	2007010	KLP1	06/02/2020	06/03/2020	
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Origins Laboratory, Inc.



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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch B0E2902 - EPA 5030B (Water)

Blank (B0E2902-BLK1)

Prepared: 05/29/2020 Analyzed: 05/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	65		"	62.5		105	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		105	70-130			

Origins Laboratory, Inc.



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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E2902 - EPA 5030B (Water)

LCS (B0E2902-BS1)

Prepared: 05/29/2020 Analyzed: 05/29/2020

Benzene	47.5	1.00	ug/L	50.0		95.1	70-130			
Toluene	54.0	1.00	"	50.0		108	70-130			
Ethylbenzene	51.2	1.00	"	50.0		102	70-130			
m,p-Xylene	103	2.00	"	100		103	70-130			
o-Xylene	56.1	1.00	"	50.0		112	70-130			
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5		103	70-130			
Surrogate: Toluene-d8	65		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.3	70-130			

Origins Laboratory, Inc.



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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch B0E2902 - EPA 5030B (Water)

Matrix Spike (B0E2902-MS1)	Source: Y005373-01			Prepared: 05/29/2020 Analyzed: 05/29/2020						
Benzene	46.6	1.00	ug/L	50.0	ND	93.2	70-130			
Toluene	54.4	1.00	"	50.0	ND	109	70-130			
Ethylbenzene	50.9	1.00	"	50.0	0.470	101	70-130			
m,p-Xylene	100	2.00	"	100	0.580	99.5	70-130			
o-Xylene	54.4	1.00	"	50.0	0.380	108	70-130			
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5		99.3	70-130			
Surrogate: Toluene-d8	66		"	62.5		106	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.5	70-130			

Origins Laboratory, Inc.



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 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

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

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

Batch B0E2902 - EPA 5030B (Water)

Matrix Spike Dup (B0E2902-MSD1)	Source: Y005373-01			Prepared: 05/29/2020 Analyzed: 05/29/2020						
Benzene	48.2	1.00	ug/L	50.0	ND	96.4	70-130	3.42	20	
Toluene	53.5	1.00	"	50.0	ND	107	70-130	1.56	20	
Ethylbenzene	52.1	1.00	"	50.0	0.470	103	70-130	2.29	20	
m,p-Xylene	104	2.00	"	100	0.580	103	70-130	3.69	20	
o-Xylene	54.9	1.00	"	50.0	0.380	109	70-130	0.934	20	
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		100	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.2	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.1	70-130			

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006309 -

DUP (1204569973 D)		Source: 512313001			Prepared: Analyzed: 05/30/2020					
Sulfate	ND	0.400	mg/L		0.244		0-20	10.2	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Fluoride	3.06	0.100	"		3.07		0-20	0.248	20	
Chloride	32.3	1.00	"		32.3		0-20	0.0139	20	
Bromide	0.319	0.200	"		0.320		0-20	0.376	20	

PS (1204569974 S)		Source: 512313001			Prepared: Analyzed: 05/30/2020					
Nitrate	2.40	0.100	mg/L	2.50		95.8	90-110			
Nitrite	2.42	0.100	"	2.50		96.6	90-110			
Bromide	1.56	0.200	"	1.25		99.1	90-110			
Fluoride	5.77	0.100	"	2.50		108	90-110			
Chloride	58.6	1.00	"	5.00		105	90-110			
Sulfate	9.89	0.400	"	10.0		96.5	90-110			

BLANK (1204569975-BLK)		Prepared: Analyzed: 05/30/2020								
Bromide	ND	0.200	mg/L							U
Chloride	ND	0.200	"							U
Fluoride	ND	0.100	"							U
Nitrate	ND	0.100	"							U
Nitrite	ND	0.100	"							U
Sulfate	ND	0.400	"							U

LCS (1204569976-BKS)		Prepared: Analyzed: 05/30/2020								
Fluoride	2.51	0.100	mg/L	2.50		100	90-110			
Sulfate	9.53	0.400	"	10.0		95.3	90-110			
Nitrate	2.35	0.100	"	2.50		93.9	90-110			

Origins Laboratory, Inc.



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Trent Watne
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 Project: Morales Methane Investigation - Flora

Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006309 -

LCS (1204569976-BKS)

Prepared: Analyzed: 05/30/2020

Chloride	4.66	0.200	mg/L	5.00	93.3	90-110				
Bromide	1.23	0.200	"	1.25	98.8	90-110				
Nitrite	2.38	0.100	"	2.50	95.2	90-110				

DUP (1204569977 D)

Source: Y005368-01

Prepared: Analyzed: 05/30/2020

Bromide	0.557	0.200	mg/L		0.542	0-20	2.62	20		
Chloride	50.3	2.00	"		50.3	0-20	0.0457	20		
Fluoride	1.62	0.100	"		1.62	0-20	0.352	20		
Nitrate	ND	0.100	"		<0.0330	0-20	0	20		U
Nitrite	ND	0.100	"		<0.0330	0-20	0	20		U
Sulfate	ND	0.400	"		0.234	0-20	10.2	20		U

PS (1204569978 S)

Source: Y005368-01

Prepared: Analyzed: 05/30/2020

Sulfate	20.1	0.400	mg/L	20.0	99.6	90-110				
Bromide	2.98	0.200	"	2.50	97.6	90-110				
Nitrate	4.92	0.100	"	5.00	98.4	90-110				
Fluoride	6.93	0.100	"	5.00	106	90-110				
Nitrite	4.93	0.100	"	5.00	98.7	90-110				
Chloride	102	2.00	"	5.00	103	90-110				

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006502 -

FLTB (1204570049-BLK)

Prepared: 06/02/2020 Analyzed: 06/03/2020

Selenium	ND	5.00	ug/L				-			U
Barium	ND	4.00	"				-			U
Sodium	ND	250	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Boron	ND	15.0	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204570438-BLK)

Prepared: 06/02/2020 Analyzed: 06/04/2020

Boron	ND	15.0	ug/L				-			U
Calcium	ND	200	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Strontium	ND	10.0	"				-			U
Barium	ND	4.00	"				-			U
Iron	ND	100	"				-			U

LCS (1204570439-BKS)

Prepared: 06/02/2020 Analyzed: 06/04/2020

Boron	101	15.0	ug/L	100	101	85-115				
Strontium	49.5	10.0	"	50.0	98.9	85-115				
Sodium	1750	250	"	2000	87.6	85-115				

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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006502 - EPA 200.2

LCS (1204570439-BKS)

Prepared: 06/02/2020 Analyzed: 06/03/2020

Selenium	52.1	5.00	ug/L	50.0		104	85-115			
Potassium	2010	300	"	2000		100	85-115			
Manganese	49.4	5.00	"	50.0		98.8	85-115			
Magnesium	1710	30.0	"	2000		85.4	85-115			
Calcium	2000	200	"	2000		100	85-115			
Barium	49.8	4.00	"	50.0		99.5	85-115			
Iron	2000	100	"	2000		99.8	85-115			

DUP (1204570440 D)

Source: 512313001

Prepared: 06/02/2020 Analyzed: 06/04/2020

Boron	205	150	ug/L		216		0-20	5.63	20	
Strontium	73.8	10.0	"		74.7		0-20	1.21	20	
Sodium	274000	2500	"		277000		0-20	1.1	20	
Selenium	ND	5.00	"		<2.00		0-20	38.4	20	U
Potassium	1350	300	"		1360		0-20	0.322	20	
Manganese	8.21	5.00	"		8.31		0-20	1.23	20	
Magnesium	482	30.0	"		483		0-20	0.122	20	
Calcium	2560	200	"		2540		0-20	0.871	20	
Iron	ND	100	"		57.5		0-20	1.49	20	U
Barium	64.2	4.00	"		64.9		0-20	1.16	20	

MS (1204570441 S)

Source: 512313001

Prepared: 06/02/2020 Analyzed: 06/03/2020

Barium	115	4.00	ug/L	50.0	64.9	99.7	75-125			
Strontium	126	10.0	"	50.0	74.7	104	75-125			
Sodium	279000	2500	"	2000	277000	0	75-125			
Selenium	49.8	5.00	"	50.0	<2.00	99.2	75-125			
Potassium	3260	300	"	2000	1360	95.2	75-125			
Manganese	54.6	5.00	"	50.0	8.31	92.5	75-125			

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 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006502 - EPA 200.2

MS (1204570441 S)	Source: 512313001			Prepared: 06/02/2020 Analyzed: 06/03/2020						
Magnesium	2090	30.0	ug/L	2000	483	80.5	75-125			
Iron	1930	100	"	2000	57.5	93.7	75-125			
Boron	305	150	"	100	216	88.1	75-125			
Calcium	4480	200	"	2000	2540	97.3	75-125			

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DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2006403 - SW846 3535A										
BLANK (1204570203-BLK)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	15.2		"	20.0		76	40-109			
LCS (1204570204-BKS)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Diesel Range Organics	699	200	ug/L	1000		70	45-119			
Surrogate: o-Terphenyl	16.1		"	20.0		81	40-109			
LCSD (1204570205-BKSD)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Diesel Range Organics	909	200	ug/L	1000		91	45-119	26	27	
Surrogate: o-Terphenyl	17.2		"	20.0		86	40-109			

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Olsson Associates
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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006534 -

BLANK (1204570507-BLK)

Prepared: Analyzed: 06/02/2020

Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0459		"	0.0500		92	75-127			

LCS (1204570508-BKS)

Prepared: Analyzed: 06/02/2020

Gasoline Range Organics	0.493	0.100	mg/L	0.500		99	80-120			
Surrogate: Bromofluorobenzene	0.0436		"	0.0500		87	75-127			

PS (1204570509 S)

Source: 512313001

Prepared: Analyzed: 06/02/2020

Gasoline Range Organics	0.507	0.100	mg/L	0.500		101	68-127			
Surrogate: Bromofluorobenzene	0.0462		"	0.0500		92	75-127			

PSD (1204570510 SD)

Source: 512313001

Prepared: Analyzed: 06/02/2020

Gasoline Range Organics	0.525	0.100	mg/L	0.500		105	68-127	4	30	
Surrogate: Bromofluorobenzene	0.0480		"	0.0500		96	75-127			

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Nitrate/Nitrite by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2007011 -										
BLANK (1204570909-BLK)					Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204570910-BKS)					Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	1.06	0.0200	mg/L	1.00		106	90-110			
DUP (1204570911 D)					Source: 512112001 Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	0.259	0.0200	mg/L		0.257		0-20	0.775	20	
PS (1204570913 S)					Source: 512112001 Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	1.31	0.0200	mg/L	1.00		105	90-110			

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Total Alkalinity by SM 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2006305 -										
LCS (1204569962-BKS)					Prepared: Analyzed: 06/02/2020					
Alkalinity, Total as CaCO3	106	4.00	mg/L	100		106	90-110			
DUP (1204569963 D)					Source: 511982002 Prepared: Analyzed: 06/02/2020					
Carbonate alkalinity (CaCO3)	82.2	4.00	mg/L		84.3		0-20	2.41	20	
Bicarbonate alkalinity (CaCO3)	532	4.00	"		528		0-20	0.758	20	
Alkalinity, Total as CaCO3	614	4.00	"		612		0-20	0.327	20	
MS (1204569965 S)					Source: 511982002 Prepared: Analyzed: 06/02/2020					
Alkalinity, Total as CaCO3	719	4.00	mg/L	100	612	0	80-120			

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Olsson Associates
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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Flora

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2007010 - EPA 365.4 Prep										
BLANK (1204570899-BLK)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204570900-BKS)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	1.21	0.0500	mg/L	1.00		121	80-124			
DUP (1204570903 D)					Source: 512245001 Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	0.0972	0.0500	mg/L		0.137		0-41	34	41	
MS (1204570906 S)					Source: 512245001 Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	1.31	0.0500	mg/L	1.00	0.137	117	70-136			

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Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Flora

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

<20 <20

~8 ~8

~20 ~20

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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Analytical Report



Job #: 20064057
 Lab #: DIG-022944
 Client: Origins Laboratory
 Sample Name: Y005368-01 C Flora-131321
 Date Sampled: 05/28/20
 Time Sampled: 15:20
 Sample Description: 1L DIG Bottle
 Sampling Notes:
 Date Received: 06/04/20
 Date Analyzed: Gas Composition: 06/05/20 $\delta^{13}\text{C}$: 06/06/20 δD : 06/09/20
 Date Reported: 06/17/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	236706	50.50	-	-	-	
Oxygen + Argon (O ₂ +Ar)	13224	2.82	-	-	-	
Carbon Dioxide (CO ₂)	522	0.11	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	217925	46.50	99.86	-72.7	-261	
Ethane (C ₂ H ₆)	314	0.07	0.14	-	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	nd	nd	nd	-	-	
iso-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
n-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
iso-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
n-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
Hexanes + (C ₆ H ₁₄)	nd	nd	nd	-	-	

Calculated Values:	
Total HCs (ppm)	218239
Gas Wetness (mol % C ₂ +C ₁ +)	0.14
C ₁ /(C ₂ +C ₃) (mol/mol)	694

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰



dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

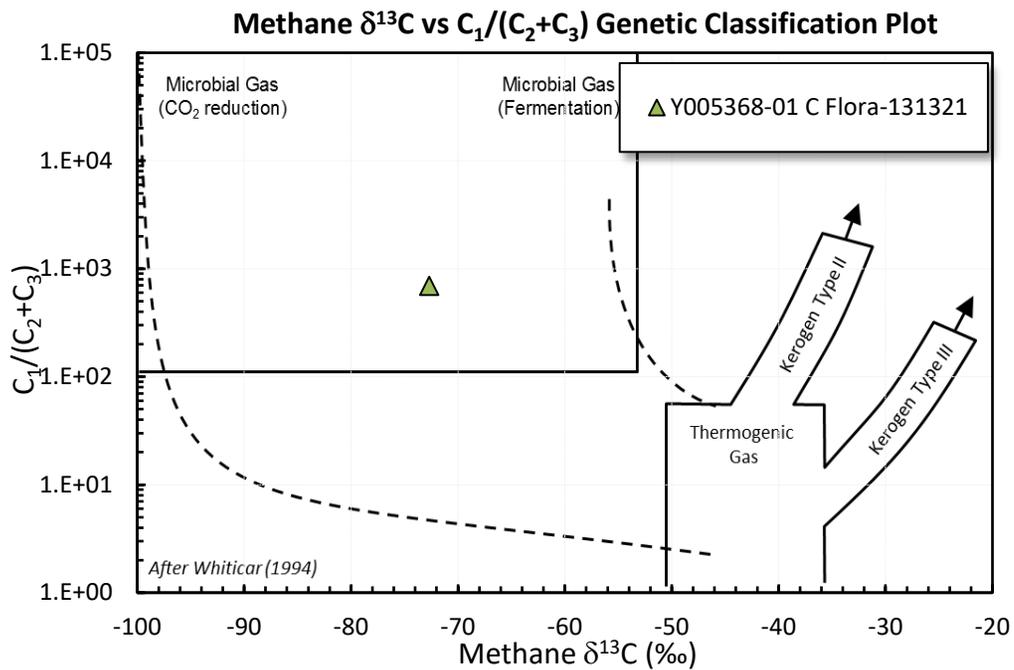
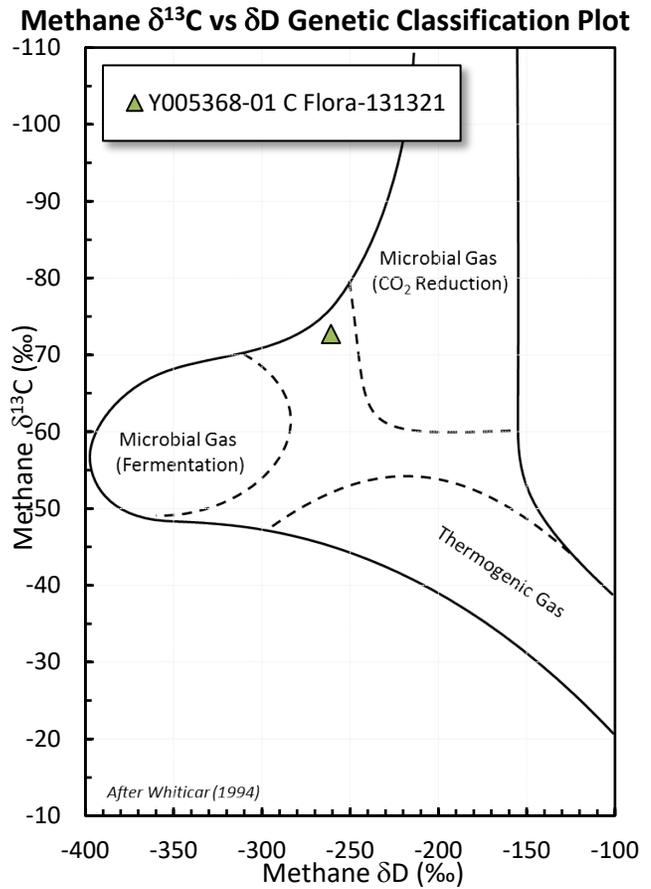
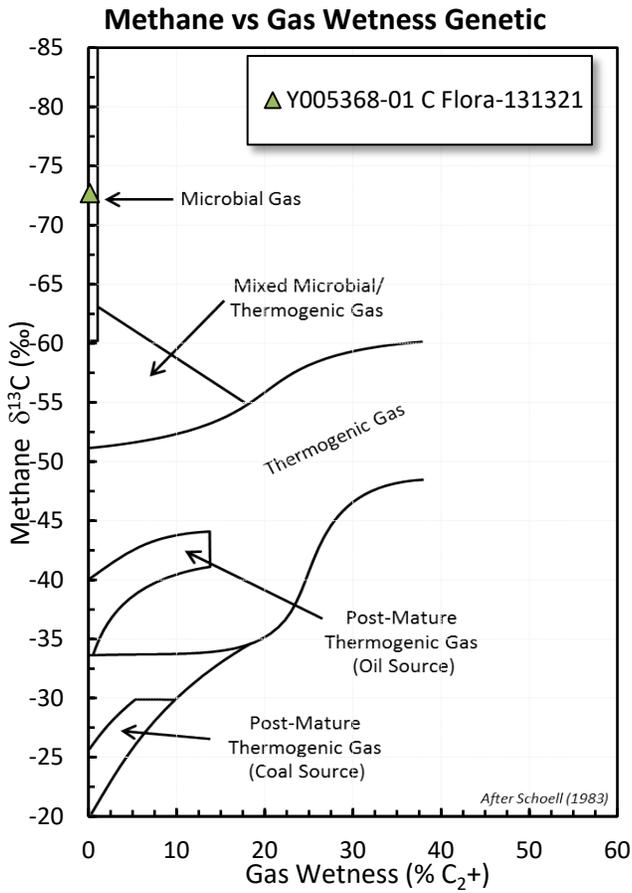
Hydrocarbon Gas Composition and Stable Isotopes Data and Interpretation

Job #: 20064057
Lab #: DIG-022944
Client: Origins Laboratory
Sample Name(s): Y005368-01 C Flora-131321

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Stable Isotope Interpretive Plots



Chain of Custody Form



JOB: 20064057 DIG-022944



main 303.531.2030 • info@digforenergy.com • digforenergy.com
Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1725 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerill@originslab.com

Send Invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y000308
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (20 business days) Rush (2-3 business days) Expedited Rush (2-3 business days)

Sample Description				Analysis Requested					Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ + with dissolved C ₁ , C ₂ & C ₃ (water samples only)	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane-Pentane (C ₂ -C ₅ if present)	δ ¹³ C CO ₂ (if present)	
Y000308	Flora-131321	5/28	1520	X	X	X			

Chain-of-Custody Record

Signature	Company	Date	Time
	Origins	6/4/20	1320
	DIG	6-4-20	1:20

*Gas composition to 554-115. Gas composition is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). RSK-115 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why one or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (i.e., gas wetness). RSK-115 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

June 08, 2020

Olsson Associates

Trent Watne

1525 Raleigh St, Suite 400

Denver

CO 80204

Project Name - Morales Methane Investigation - Arthur **Project Number - 020-1374**

Attached are your analytical results for Morales Methane Investigation - Arthur received by Origins Laboratory, Inc. May 28, 2020. This project is associated with Origins project number Y005369-01.

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



Olsson Associates
1525 Raleigh St, Suite 400
Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Arthur

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
Arthur_71950	Y005369-01	Water	May 28, 2020 14:30	05/28/2020 16:27

Origins Laboratory, Inc.



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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

1005369

Baseline Water Quality Chain of Custody
 020-1374

olsson

PROJECT NAME Morales Methane Investigation-Arthur	PROJECT NUMBER 144-2266	DISPOSAL	By Lab	PAGE	1	of	1
COMPANY NAME Olsson	PHONE NUMBER 303-237-2072	LAB USE ONLY: Temperature upon receipt: <u>8.6</u> Custody seals in tact: Yes No N/A					
ADDRESS 1525 Raleigh St, Ste. 400	CITY/STATE/ZIP Denver, CO 80204	Turn Around Time (check)					
PROJECT MANAGER Trent Watne	PM EMAIL twatne@olsson.com	Standard	x				
SAMPLER Trent Watne		72hr					
		48hr					
		24hr					
		Same Day					
DIRECT BILL CLIENT? YES: <input type="checkbox"/> NO: <input checked="" type="checkbox"/>	CLIENT COMPANY: DOC/ENOC	PH (SM4500H) / EC (SM2510) 250poly					
SEND COPY OF ANALYTICAL TO CLIENT? YES: <input type="checkbox"/> NO: <input checked="" type="checkbox"/>	CLIENT NAME:	TDS (SM2540C) 500poly					
	CLIENT EMAIL:	Anions / Alkalinity (carbonate / bicarbonate) (EPA 300.0) 500poly					
	CLIENT PROJECT #:	Nitrate, Nitrite) (EPA 300.0) (H2S04) (SM2320) 500poly					
Lab ID	Field ID	Matrix	Sample Date	Sample Time	Sample #	Bottles	Notes:
	Arthur_71950	GW	5/28/20	1430	10		Iron Related Bacteria, Sulfur Related Bacteria, Slime Forming Bacteria (BART) 3x 40ml
	Trap-Blank				2		DRO (8015) 3x 40ml
							Methane, Ethane, Propane (RSK 175) 3x 40ml
							GRO (8015) 3x 40ml
							BTEX (8260) 3x 40ml
							Cations (Ca, Fe, Mg, Mn, K, NA) 250 Poly
							Total Phosphorous (SM4500) (H2SO4) 250 Poly

RELINQUISHED BY Trent Watne	PRINTED NAME Trent Watne	SIGNATURE <i>Trent Watne</i>	DATE 5/28/20	TIME 1627
RECEIVED BY Olsson			5/28/20	1627
RELINQUISHED BY				
RECEIVED BY				
RELINQUISHED BY				

Comments:
Hold ISO flask until methane results return

CC PACKAGE (check below)	
X LEVEL I (Standard CC)	
LEVEL III (Std CC + forms)	
LEVEL IV (Std CC + forms + raw data)	

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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

Origins Laboratory

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

Sample Receipt Checklist

Origins Work Order: Y005369

Client: Olsson

Client Project ID: Morales - Arthur

Checklist Completed by: JG

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

Date/time completed: 5/29/2020

Airbill #: N/A

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

Cooler Number/Temperature: 1 18.6 °C / °C / °C / °C (Describe)

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⁾ ?		<input checked="" type="checkbox"/>		
Is there ice present (document if blue ice is used)	<input checked="" type="checkbox"/>			<u>Some Dry</u>
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.

Jm
 Reviewed by (Project Manager)

6-1-20
 Date/Time Reviewed

Origins Laboratory, Inc.

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

Arthur 71950
5/28/2020 2:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005369-01 (Water)

Anions by EPA 300.0

Bromide	0.320	0.200	mg/L	1	2006309	JLD1	05/28/2020	05/30/2020	
Chloride	32.3	1.00	"	5	"	JLD1	"	06/01/2020	
Fluoride	3.07	0.100	"	1	"	JLD1	"	05/30/2020	
Nitrate	ND	0.100	"	"	"	JLD1	"	"	U
Nitrite	ND	0.100	"	"	"	JLD1	"	"	U
Sulfate	ND	0.400	"	"	"	JLD1	"	"	U

Bacterial Activity Reaction Tests

Iron Related Bacteria	~25		CFU/mL	1	11111	DJL	"	05/28/2020	
Slime Forming Bacteria	~2500		"	"	"	DJL	"	"	
Sulfate Reducing Bacteria	~6000		"	"	"	DJL	"	"	

BTEX by EPA 8260D

Benzene	ND	1.00	ug/L	1	B0E2902	ZZZ	05/29/2020	05/29/2020	Ua
Toluene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Ethylbenzene	ND	1.00	"	"	"	ZZZ	"	"	Ua
Xylenes, total	ND	1.00	"	"	"	ZZZ	"	"	Ua

Surrogate: 1,2-Dichloroethane-d4	99.7 %	70-130			"	"	"	"	
Surrogate: Toluene-d8	100 %	70-130			"	"	"	"	
Surrogate: 4-Bromofluorobenzene	102 %	70-130			"	"	"	"	

Origins Laboratory, Inc.



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 Project: Morales Methane Investigation - Arthur

Arthur 71950
5/28/2020 2:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Pace Analytical
Y005369-01 (Water)

Dissolved Gasses by RSK 175

Ethane	33.8	10.0	ug/L	1	11111		05/28/2020	06/02/2020	
Methane	9860	10.0	"	"	"		"	"	
n-Propane	ND	20.0	"	"	"		"	"	

Dissolved Metals by 200.8

Barium	64.9	4.00	ug/L	1	2006502	SKJ	06/02/2020	06/03/2020	
Boron	216	150	"	10	"	SKJ	"	06/04/2020	
Calcium	2540	200	"	1	"	SKJ	"	06/03/2020	
Iron	ND	100	"	"	"	SKJ	"	"	U
Magnesium	483	30.0	"	"	"	SKJ	"	"	
Manganese	8.31	5.00	"	"	"	SKJ	"	"	
Potassium	1360	300	"	"	"	PRB	"	06/04/2020	
Selenium	ND	5.00	"	"	"	SKJ	"	06/03/2020	U
Sodium	277000	2500	"	10	"	SKJ	"	06/04/2020	
Strontium	74.7	10.0	"	1	"	SKJ	"	06/03/2020	

DRO by 8015C

Diesel Range Organics	ND	208	ug/L	1	2006403	RXC1	"	06/03/2020	U
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Surrogate: o-Terphenyl 90 % 40-109 " " "

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Arthur 71950
5/28/2020 2:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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GEL Laboratories, LLC
Y005369-01 (Water)

GRO by 8015C

Gasoline Range Organics	ND	0.100	mg/L	1	2006534	RXY1	05/28/2020	06/02/2020	U
<i>Surrogate: Bromofluorobenzene</i>	94 %	75-127			"	"	"	"	

Nitrate/Nitrite by EPA 353.2

Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L	1	2007011	KLP1	"	06/02/2020	U
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pH in Water by EPA 9040C

pH	8.58		pH Units	1	B0E2812	KDK	05/29/2020	05/29/2020	
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Specific Conductance by Modified 9050A

Specific Conductance (EC)	1080	5.00	uS/cm	"	B0E2813	KDK	05/29/2020	05/29/2020	
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Total Alkalinity by SM 2320B

Alkalinity, Total as CaCO3	552	4.00	mg/L	1	2006305	RXB5	05/28/2020	06/02/2020	
Bicarbonate alkalinity (CaCO3)	520	4.00	"	"	"	RXB5	"	"	
Carbonate alkalinity (CaCO3)	32.1	4.00	"	"	"	RXB5	"	"	

Total Dissolved Solids by 2540C

Total Dissolved Solids	659	5.00	mg/L	1	B0F0204	DJL	06/02/2020	06/02/2020	
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Arthur 71950
5/28/2020 2:30:00PM

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y005369-01 (Water)

Total Phosphorus by EPA 365.4

Phosphorus, Total as P	0.194	0.0500	mg/L	1	2007010	KLP1	06/02/2020	06/03/2020	
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 Denver CO 80204

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 Project: Morales Methane Investigation - Arthur

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E2902 - EPA 5030B (Water)

Blank (B0E2902-BLK1)

Prepared: 05/29/2020 Analyzed: 05/29/2020

Benzene	ND	1.00	ug/L							Ua
Toluene	ND	1.00	"							Ua
Ethylbenzene	ND	1.00	"							Ua
Xylenes, total	ND	1.00	"							Ua
Surrogate: 1,2-Dichloroethane-d4	65		"	62.5		105	70-130			
Surrogate: Toluene-d8	64		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	65		"	62.5		105	70-130			

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 Project: Morales Methane Investigation - Arthur

Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E2902 - EPA 5030B (Water)

LCS (B0E2902-BS1)

Prepared: 05/29/2020 Analyzed: 05/29/2020

Benzene	47.5	1.00	ug/L	50.0		95.1	70-130			
Toluene	54.0	1.00	"	50.0		108	70-130			
Ethylbenzene	51.2	1.00	"	50.0		102	70-130			
m,p-Xylene	103	2.00	"	100		103	70-130			
o-Xylene	56.1	1.00	"	50.0		112	70-130			
Surrogate: 1,2-Dichloroethane-d4	64		"	62.5		103	70-130			
Surrogate: Toluene-d8	65		"	62.5		103	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.3	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E2902 - EPA 5030B (Water)

Matrix Spike (B0E2902-MS1)	Source: Y005373-01			Prepared: 05/29/2020 Analyzed: 05/29/2020						
Benzene	46.6	1.00	ug/L	50.0	ND	93.2	70-130			
Toluene	54.4	1.00	"	50.0	ND	109	70-130			
Ethylbenzene	50.9	1.00	"	50.0	0.470	101	70-130			
m,p-Xylene	100	2.00	"	100	0.580	99.5	70-130			
o-Xylene	54.4	1.00	"	50.0	0.380	108	70-130			
Surrogate: 1,2-Dichloroethane-d4	62		"	62.5		99.3	70-130			
Surrogate: Toluene-d8	66		"	62.5		106	70-130			
Surrogate: 4-Bromofluorobenzene	60		"	62.5		95.5	70-130			

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Volatile Organic Compounds by GC/MS SW846 8260D - 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 B0E2902 - EPA 5030B (Water)

Matrix Spike Dup (B0E2902-MSD1)	Source: Y005373-01			Prepared: 05/29/2020 Analyzed: 05/29/2020						
Benzene	48.2	1.00	ug/L	50.0	ND	96.4	70-130	3.42	20	
Toluene	53.5	1.00	"	50.0	ND	107	70-130	1.56	20	
Ethylbenzene	52.1	1.00	"	50.0	0.470	103	70-130	2.29	20	
m,p-Xylene	104	2.00	"	100	0.580	103	70-130	3.69	20	
o-Xylene	54.9	1.00	"	50.0	0.380	109	70-130	0.934	20	
Surrogate: 1,2-Dichloroethane-d4	63		"	62.5		100	70-130			
Surrogate: Toluene-d8	62		"	62.5		99.2	70-130			
Surrogate: 4-Bromofluorobenzene	61		"	62.5		97.1	70-130			

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Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006309 -

DUP (1204569973 D)		Source: Y005369-01			Prepared: Analyzed: 05/30/2020					
Sulfate	ND	0.400	mg/L		0.244		0-20	10.2	20	U
Nitrite	ND	0.100	"		<0.0330		0-20	0	20	U
Nitrate	ND	0.100	"		<0.0330		0-20	0	20	U
Fluoride	3.06	0.100	"		3.07		0-20	0.248	20	
Chloride	32.3	1.00	"		32.3		0-20	0.0139	20	
Bromide	0.319	0.200	"		0.320		0-20	0.376	20	

PS (1204569974 S)		Source: Y005369-01			Prepared: Analyzed: 05/30/2020					
Nitrate	2.40	0.100	mg/L	2.50		95.8	90-110			
Nitrite	2.42	0.100	"	2.50		96.6	90-110			
Bromide	1.56	0.200	"	1.25		99.1	90-110			
Fluoride	5.77	0.100	"	2.50		108	90-110			
Chloride	58.6	1.00	"	5.00		105	90-110			
Sulfate	9.89	0.400	"	10.0		96.5	90-110			

BLANK (1204569975-BLK)		Prepared: Analyzed: 05/30/2020								
Bromide	ND	0.200	mg/L							U
Chloride	ND	0.200	"							U
Fluoride	ND	0.100	"							U
Nitrate	ND	0.100	"							U
Nitrite	ND	0.100	"							U
Sulfate	ND	0.400	"							U

LCS (1204569976-BKS)		Prepared: Analyzed: 05/30/2020								
Fluoride	2.51	0.100	mg/L	2.50		100	90-110			
Sulfate	9.53	0.400	"	10.0		95.3	90-110			
Nitrate	2.35	0.100	"	2.50		93.9	90-110			

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Anions by EPA 300.0 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006309 -

LCS (1204569976-BKS)

Prepared: Analyzed: 05/30/2020

Chloride	4.66	0.200	mg/L	5.00	93.3	90-110				
Bromide	1.23	0.200	"	1.25	98.8	90-110				
Nitrite	2.38	0.100	"	2.50	95.2	90-110				

DUP (1204569977 D)

Source: 512314001

Prepared: Analyzed: 05/30/2020

Bromide	0.557	0.200	mg/L		0.542	0-20	2.62	20		
Chloride	50.3	2.00	"		50.3	0-20	0.0457	20		
Fluoride	1.62	0.100	"		1.62	0-20	0.352	20		
Nitrate	ND	0.100	"		<0.0330	0-20	0	20		U
Nitrite	ND	0.100	"		<0.0330	0-20	0	20		U
Sulfate	ND	0.400	"		0.234	0-20	10.2	20		U

PS (1204569978 S)

Source: 512314001

Prepared: Analyzed: 05/30/2020

Sulfate	20.1	0.400	mg/L	20.0	99.6	90-110				
Bromide	2.98	0.200	"	2.50	97.6	90-110				
Nitrate	4.92	0.100	"	5.00	98.4	90-110				
Fluoride	6.93	0.100	"	5.00	106	90-110				
Nitrite	4.93	0.100	"	5.00	98.7	90-110				
Chloride	102	2.00	"	5.00	103	90-110				

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 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006502 -

FLTB (1204570049-BLK)

Prepared: 06/02/2020 Analyzed: 06/03/2020

Selenium	ND	5.00	ug/L				-			U
Barium	ND	4.00	"				-			U
Sodium	ND	250	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Iron	ND	100	"				-			U
Calcium	ND	200	"				-			U
Boron	ND	15.0	"				-			U
Strontium	ND	10.0	"				-			U

BLANK (1204570438-BLK)

Prepared: 06/02/2020 Analyzed: 06/04/2020

Boron	ND	15.0	ug/L				-			U
Calcium	ND	200	"				-			U
Sodium	ND	250	"				-			U
Selenium	ND	5.00	"				-			U
Potassium	ND	300	"				-			U
Manganese	ND	5.00	"				-			U
Magnesium	ND	30.0	"				-			U
Strontium	ND	10.0	"				-			U
Barium	ND	4.00	"				-			U
Iron	ND	100	"				-			U

LCS (1204570439-BKS)

Prepared: 06/02/2020 Analyzed: 06/04/2020

Boron	101	15.0	ug/L	100	101	85-115				
Strontium	49.5	10.0	"	50.0	98.9	85-115				
Sodium	1750	250	"	2000	87.6	85-115				

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Olsson Associates
 1525 Raleigh St, Suite 400
 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006502 - EPA 200.2

LCS (1204570439-BKS)

Prepared: 06/02/2020 Analyzed: 06/03/2020

Selenium	52.1	5.00	ug/L	50.0		104	85-115			
Potassium	2010	300	"	2000		100	85-115			
Manganese	49.4	5.00	"	50.0		98.8	85-115			
Magnesium	1710	30.0	"	2000		85.4	85-115			
Calcium	2000	200	"	2000		100	85-115			
Barium	49.8	4.00	"	50.0		99.5	85-115			
Iron	2000	100	"	2000		99.8	85-115			

DUP (1204570440 D)

Source: Y005369-01

Prepared: 06/02/2020 Analyzed: 06/04/2020

Boron	205	150	ug/L		216		0-20	5.63	20	
Strontium	73.8	10.0	"		74.7		0-20	1.21	20	
Sodium	274000	2500	"		277000		0-20	1.1	20	
Selenium	ND	5.00	"		<2.00		0-20	38.4	20	U
Potassium	1350	300	"		1360		0-20	0.322	20	
Manganese	8.21	5.00	"		8.31		0-20	1.23	20	
Magnesium	482	30.0	"		483		0-20	0.122	20	
Calcium	2560	200	"		2540		0-20	0.871	20	
Iron	ND	100	"		57.5		0-20	1.49	20	U
Barium	64.2	4.00	"		64.9		0-20	1.16	20	

MS (1204570441 S)

Source: Y005369-01

Prepared: 06/02/2020 Analyzed: 06/03/2020

Barium	115	4.00	ug/L	50.0	64.9	99.7	75-125			
Strontium	126	10.0	"	50.0	74.7	104	75-125			
Sodium	279000	2500	"	2000	277000	0	75-125			
Selenium	49.8	5.00	"	50.0	<2.00	99.2	75-125			
Potassium	3260	300	"	2000	1360	95.2	75-125			
Manganese	54.6	5.00	"	50.0	8.31	92.5	75-125			

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Trent Watne
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 Project: Morales Methane Investigation - Arthur

Dissolved Metals by 200.8 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 2006502 - EPA 200.2

MS (1204570441 S)	Source: Y005369-01			Prepared: 06/02/2020 Analyzed: 06/03/2020						
Magnesium	2090	30.0	ug/L	2000	483	80.5	75-125			
Iron	1930	100	"	2000	57.5	93.7	75-125			
Boron	305	150	"	100	216	88.1	75-125			
Calcium	4480	200	"	2000	2540	97.3	75-125			

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DRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2006403 - SW846 3535A										
BLANK (1204570203-BLK)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Diesel Range Organics	ND	200	ug/L				-			U
Surrogate: o-Terphenyl	15.2		"	20.0		76	40-109			
LCS (1204570204-BKS)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Diesel Range Organics	699	200	ug/L	1000		70	45-119			
Surrogate: o-Terphenyl	16.1		"	20.0		81	40-109			
LCSD (1204570205-BKSD)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Diesel Range Organics	909	200	ug/L	1000		91	45-119	26	27	
Surrogate: o-Terphenyl	17.2		"	20.0		86	40-109			

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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

GRO by 8015C - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2006534 -										
BLANK (1204570507-BLK)					Prepared: Analyzed: 06/02/2020					
Gasoline Range Organics	ND	0.100	mg/L				-			U
Surrogate: Bromofluorobenzene	0.0459		"	0.0500		92	75-127			
LCS (1204570508-BKS)					Prepared: Analyzed: 06/02/2020					
Gasoline Range Organics	0.493	0.100	mg/L	0.500		99	80-120			
Surrogate: Bromofluorobenzene	0.0436		"	0.0500		87	75-127			
PS (1204570509 S)					Source: Y005369-01 Prepared: Analyzed: 06/02/2020					
Gasoline Range Organics	0.507	0.100	mg/L	0.500		101	68-127			
Surrogate: Bromofluorobenzene	0.0462		"	0.0500		92	75-127			
PSD (1204570510 SD)					Source: Y005369-01 Prepared: Analyzed: 06/02/2020					
Gasoline Range Organics	0.525	0.100	mg/L	0.500		105	68-127	4	30	
Surrogate: Bromofluorobenzene	0.0480		"	0.0500		96	75-127			

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 Project: Morales Methane Investigation - Arthur

Nitrate/Nitrite by EPA 353.2 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2007011 -										
BLANK (1204570909-BLK)					Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	ND	0.0200	mg/L				-			U
LCS (1204570910-BKS)					Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	1.06	0.0200	mg/L	1.00		106	90-110			
DUP (1204570911 D)					Source: 512112001 Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	0.259	0.0200	mg/L		0.257		0-20	0.775	20	
PS (1204570913 S)					Source: 512112001 Prepared: Analyzed: 06/02/2020					
Nitrogen, Nitrate/Nitrite	1.31	0.0200	mg/L	1.00		105	90-110			

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Olsson Associates
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 Denver CO 80204

Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

Total Alkalinity by SM 2320B - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2006305 -										
LCS (1204569962-BKS)					Prepared: Analyzed: 06/02/2020					
Alkalinity, Total as CaCO3	106	4.00	mg/L	100		106	90-110			
DUP (1204569963 D)					Source: 511982002 Prepared: Analyzed: 06/02/2020					
Carbonate alkalinity (CaCO3)	82.2	4.00	mg/L		84.3		0-20	2.41	20	
Bicarbonate alkalinity (CaCO3)	532	4.00	"		528		0-20	0.758	20	
Alkalinity, Total as CaCO3	614	4.00	"		612		0-20	0.327	20	
MS (1204569965 S)					Source: 511982002 Prepared: Analyzed: 06/02/2020					
Alkalinity, Total as CaCO3	719	4.00	mg/L	100	612	0	80-120			

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Trent Watne
 Project Number: 020-1374
 Project: Morales Methane Investigation - Arthur

Total Phosphorus by EPA 365.4 - Quality Control
GEL Laboratories, LLC

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 2007010 - EPA 365.4 Prep										
BLANK (1204570899-BLK)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	ND	0.0500	mg/L				-			U
LCS (1204570900-BKS)					Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	1.21	0.0500	mg/L	1.00		121	80-124			
DUP (1204570903 D)					Source: 512245001 Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	0.0972	0.0500	mg/L		0.137		0-41	34	41	
MS (1204570906 S)					Source: 512245001 Prepared: 06/02/2020 Analyzed: 06/03/2020					
Phosphorus, Total as P	1.31	0.0500	mg/L	1.00	0.137	117	70-136			

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Denver CO 80204

Trent Watne
Project Number: 020-1374
Project: Morales Methane Investigation - Arthur

Notes and Definitions

Ua Sample is Non-Detect.

U Result not detected above the detection limit

~6000 ~6000

~2500 ~2500

~25 ~25

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.



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dig
Dolan Integration Group

Geochemistry for Energy

11025 Dover Street Unit 800
Westminster, CO 80021
p: 303.531.2030

**Hydrocarbon Gas Composition and Stable Isotopes
Data and Interpretation**

Job #: 20064056
Lab #: DIG-022943
Client: Origins Laboratory
Sample Name(s): Y005369-01 C Arthur-71950

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Analytical Report



Job #: 20064056
 Lab #: DIG-022943
 Client: Origins Laboratory
 Sample Name: Y005369-01 C Arthur-71950
 Date Sampled: 05/28/20
 Time Sampled: 14:30
 Sample Description: 1L DIG Bottle
 Sampling Notes:
 Date Received: 06/04/20
 Date Analyzed: Gas Composition: 06/05/20 $\delta^{13}\text{C}$: 06/06/20 δD : 06/09/20
 Date Reported: 06/17/20
 Comments:

Measured Values:	Measured ppm	Analyte mol % ^a	HC mol %	$\delta^{13}\text{C}$ ‰ VPDB	δD ‰ VSMOW	Comments
Nitrogen (N ₂)	238802	50.73	-	-	-	
Oxygen + Argon (O ₂ +Ar)	32707	6.95	-	-	-	
Carbon Dioxide (CO ₂)	1406	0.30	-	-	-	
Helium (He) ^b	na	na	-	-	-	Helium added to create headspace.
Hydrogen (H ₂)	nd	nd	-	-	-	
Methane (CH ₄)	197604	41.97	99.87	-74.1	-274	
Ethane (C ₂ H ₆)	256	0.05	0.13	-	-	
Ethene (C ₂ H ₄)	nd	nd	nd	-	-	
Propane (C ₃ H ₈)	nd	nd	nd	-	-	
iso-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
n-Butane (C ₄ H ₁₀)	nd	nd	nd	-	-	
iso-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
n-Pentane (C ₅ H ₁₂)	nd	nd	nd	-	-	
Hexanes + (C ₆ H ₁₄)	nd	nd	nd	-	-	

Calculated Values:	
Total HCs (ppm)	197860
Gas Wetness (mol % C ₂ +C ₁ +))	0.13
C ₁ /(C ₂ +C ₃) (mol/mol)	773

^a Analyte concentrations normalized to 100% (Mol. % is approximately equal to Vol. %)

^b Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

HC= Hydrocarbons

nd = not detected

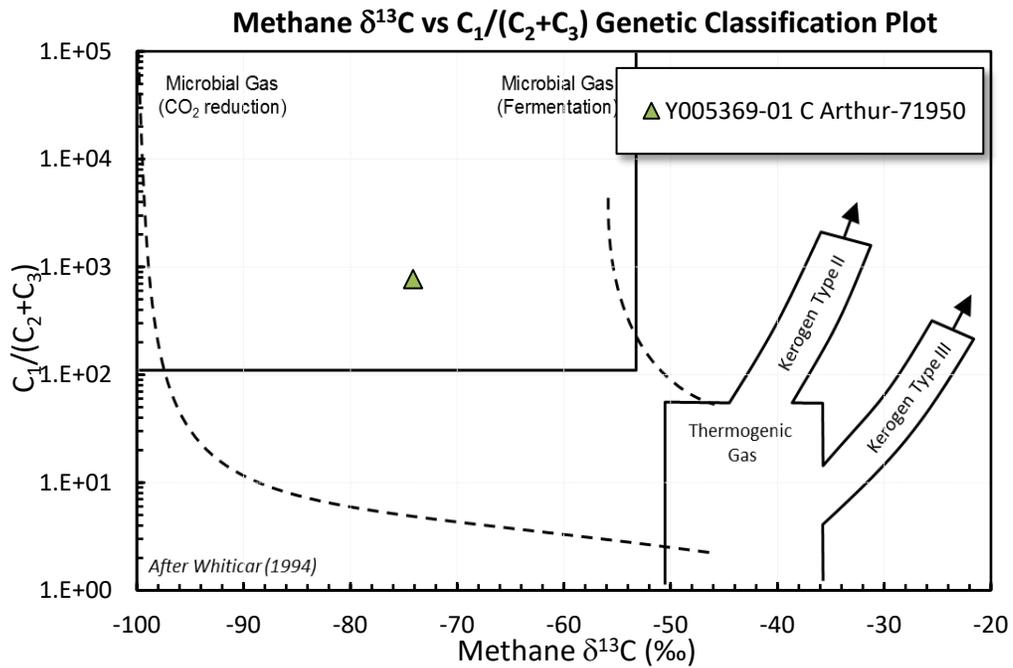
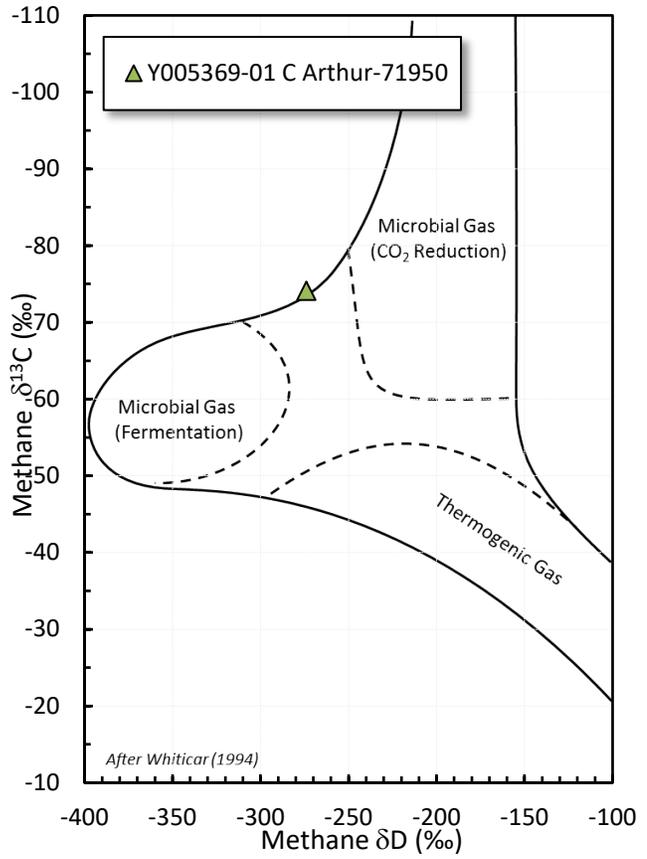
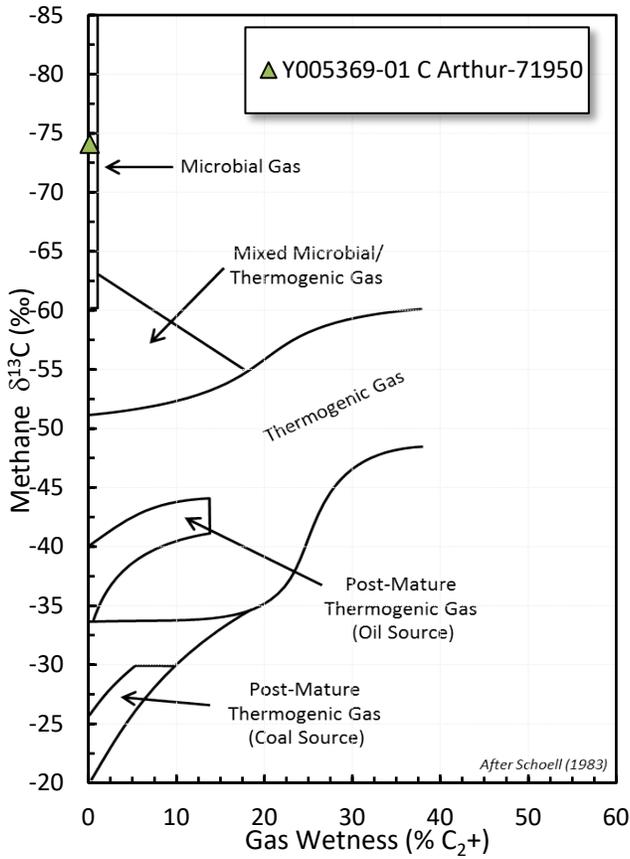
na = not analyzed

Stable isotope results based on multi-point laboratory calibration

Error $\delta^{13}\text{C}$ < 0.5 ‰

Error δD < 5.0 ‰

Stable Isotope Interpretive Plots



Chain of Custody Form



JOB: 20064056 DIG-022943



main 303.531.2030 • info@digforenergy.com • digforenergy.com
Office and Lab 11025 Dover St • Ste 800 • Westminster, CO 80021

Send Data to:	
Name:	Jordan Merrill
Company:	Origins Laboratory
Address:	1728 W Elk Pl
City, State:	Denver, CO
Phone:	303-433-1322
Email:	jmerrill@originslab.com

Send invoice to (if different):	
Name:	
Company:	
Address:	
City, State:	
Phone:	
Email:	

Additional Information:	
AFE #:	
Project:	Y005309
PO #:	
Location:	
Sampled By:	
Notes:	

Turnaround Time: Standard (c. 10 business days) Rush (c. 5 business days) Expedited Rush (c. 2 business days)

Sample Description				Analysis Requested					Comments
Container Number	Sample Identification	Date Sampled	Time	Gas Composition* N ₂ , O ₂ +Ar, CO ₂ , He, H ₂ , C ₁ -C ₆ +	δ ¹³ C Methane (Carbon)	δD Methane (Hydrogen)	δ ¹³ C Ethane- Pentane (C ₂ - C ₅ if present)	δ ¹³ C CO ₂ (if present)	
Y005309-01	Arthur_71950	6/28	1430	X	X	X			

Chain-of-Custody Record

Signature	Company	Date	Time
	Origins	6/4/20	1320
Doug Decker	RIG	6-4-20	1120

*See instruction on R96-176. This cooperative is a basic analysis of the concentration (ppm) of gases within the headspace of the sample (headspace is created at the lab). R96-176 is a specific analysis technique combined with calculations to give the total dissolved gas of each species in the water sample (mg/L). Why use or the other? Gas composition gives us a quick, general look at relative concentrations and ratios (e.g., gas wetness). R96-176 gives us an exact total of gas present in the sample (headspace and dissolved in the water). Questions? Give us a call at 303-531-2030.

