



March 12, 2024

Tasman Geosciences

Andy Sagen

6855 West 119th Avenue

Broomfield CO 80020

Project Name - KMG - Ludwig 17-1

Project Number - [none]

Attached are your analytical results for KMG - Ludwig 17-1 received by Origins Laboratory, Inc. February 27, 2024. This project is associated with Origins project number Y402656-01.

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

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

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

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

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

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



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

Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Andy Sagen
 Project Number: [none]
 Project: KMG - Ludwig 17-1

CROSS REFERENCE REPORT

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
FL-B06R@4'	Y402656-01	Soil	February 27, 2024 9:00	02/27/2024 14:52
FL-B09R@4'	Y402656-02	Soil	February 27, 2024 9:02	02/27/2024 14:52
FL-BG04@4'	Y402656-03	Soil	February 27, 2024 9:04	02/27/2024 14:52
FL-BG05@4'	Y402656-04	Soil	February 27, 2024 9:06	02/27/2024 14:52
FL-BG06@4'	Y402656-05	Soil	February 27, 2024 9:08	02/27/2024 14:52
WH-B05R@16'	Y402656-06	Soil	February 27, 2024 9:10	02/27/2024 14:52
WH-W05R@14'	Y402656-07	Soil	February 27, 2024 9:12	02/27/2024 14:52
WH-BG07@14'	Y402656-08	Soil	February 27, 2024 9:14	02/27/2024 14:52
WH-BG07@16'	Y402656-09	Soil	February 27, 2024 9:16	02/27/2024 14:52
WH-BG08@14'	Y402656-10	Soil	February 27, 2024 9:18	02/27/2024 14:52
WH-BG08@16'	Y402656-11	Soil	February 27, 2024 9:20	02/27/2024 14:52

Origins Laboratory, Inc.



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ORIGINS LABORATORY, INC

Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

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

Sample Receipt Checklist

Origins Work Order: 4402650 Client: Tasman
 Checklist Completed by: JTB/MS Client Project ID: Ludwig 17-1
 Date/time completed: 2/27/24 Shipped Via: FD
 (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, 9 °C _____ °C _____ °C (Describe) _____ °C
 Thermometer ID: 1004

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>SD</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) [Signature] Date/Time Reviewed 2/27/24

Origins Laboratory, Inc.
[Signature]

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Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

FL-B06R@4'

2/27/2024 9:00:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-01 (Soil)

Table 915 metals by EPA 6020B

Arsenic	1.78	0.277	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	51.7	9.55	"	"	"	HJD	"	"	

Origins Laboratory, Inc.

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Jordan A. Bynon, Project Manager



Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

FL-B09R@4'

2/27/2024 9:02:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-02 (Soil)

Metals by Saturated Paste by EPA 6010

Calcium	ND	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	ND	0.823	"	"	"	ACC	"	"	
Sodium	2.14	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	4.89	0.0100	SAR	1	B4B2804	ACC	"	"	
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Origins Laboratory, Inc.

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Jordan A. Bynon, Project Manager



Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Andy Sagen
 Project Number: [none]
 Project: KMG - Ludwig 17-1

FL-BG04@4'

2/27/2024 9:04:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-03 (Soil)

Metals by Saturated Paste by EPA 6010

Calcium	1.20	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	ND	0.823	"	"	"	ACC	"	"	
Sodium	3.80	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	4.25	0.0100	SAR	1	B4B2804	ACC	"	"	
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Table 915 metals by EPA 6020B

Arsenic	1.98	0.252	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	44.3	8.70	"	"	"	HJD	"	"	

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Jordan A. Bynon, Project Manager



Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

FL-BG05@4'
2/27/2024 9:06:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-04 (Soil)

Metals by Saturated Paste by EPA 6010

Calcium	ND	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	ND	0.823	"	"	"	ACC	"	"	
Sodium	1.43	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	2.78	0.0100	SAR	1	B4B2804	ACC	"	"	
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Table 915 metals by EPA 6020B

Arsenic	1.50	0.273	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	39.7	9.43	"	"	"	HJD	"	"	

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6855 West 119th Avenue
Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

FL-BG06@4'
2/27/2024 9:08:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-05 (Soil)

Metals by Saturated Paste by EPA 6010

Calcium	ND	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	ND	0.823	"	"	"	ACC	"	"	
Sodium	1.35	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	2.40	0.0100	SAR	1	B4B2804	ACC	"	"	
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Table 915 metals by EPA 6020B

Arsenic	2.14	0.259	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	48.1	8.95	"	"	"	HJD	"	"	

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6855 West 119th Avenue
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Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

WH-B05R@16'
2/27/2024 9:10:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-06 (Soil)

Table 915 metals by EPA 6020B

Arsenic	1.59	0.260	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
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Jordan A. Bynon, Project Manager



Tasman Geosciences
6855 West 119th Avenue
Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

WH-W05R@14'
2/27/2024 9:12:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-07 (Soil)

Table 915 metals by EPA 6020B

Arsenic	1.65	0.277	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Andy Sagen
 Project Number: [none]
 Project: KMG - Ludwig 17-1

WH-BG07@14'
2/27/2024 9:14:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-08 (Soil)

Metals by Saturated Paste by EPA 6010


Calcium	5.17	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	1.96	0.823	"	"	"	ACC	"	"	
Sodium	5.42	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	2.87	0.0100	SAR	1	B4B2804	ACC	"	"	
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Table 915 metals by EPA 6020B

Arsenic	3.02	0.258	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	93.1	8.90	"	"	"	HJD	"	"	

Origins Laboratory, Inc.


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 6855 West 119th Avenue
 Broomfield CO 80020

Andy Sagen
 Project Number: [none]
 Project: KMG - Ludwig 17-1

WH-BG07@16'
2/27/2024 9:16:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-09 (Soil)

Metals by Saturated Paste by EPA 6010

Calcium	3.85	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	1.46	0.823	"	"	"	ACC	"	"	
Sodium	3.66	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	2.25	0.0100	SAR	1	B4B2805	ACC	"	"	
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Table 915 metals by EPA 6020B

Arsenic	2.58	0.251	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	73.4	8.66	"	"	"	HJD	"	"	

Origins Laboratory, Inc.

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Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Andy Sagen
 Project Number: [none]
 Project: KMG - Ludwig 17-1

WH-BG08@14'
2/27/2024 9:18:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-10 (Soil)

Metals by Saturated Paste by EPA 6010


Calcium	4.55	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	2.12	0.823	"	"	"	ACC	"	"	
Sodium	3.88	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	2.12	0.0100	SAR	1	B4B2805	ACC	"	"	
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Table 915 metals by EPA 6020B

Arsenic	3.76	0.253	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	136	8.72	"	"	"	HJD	"	"	

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6855 West 119th Avenue
Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

WH-BG08@16'
2/27/2024 9:20:00AM

Analyte	Result	Limit	Units	Dilution	Batch	Analyst	Prepared	Analyzed	Notes
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Origins Laboratory, Inc.
Y402656-11 (Soil)

Metals by Saturated Paste by EPA 6010

Calcium	3.86	0.499	meq/L	10	[CALC]	ACC	02/28/2024	02/29/2024	
Magnesium	1.93	0.823	"	"	"	ACC	"	"	
Sodium	3.23	0.435	"	"	"	ACC	"	"	

SAR by 20B Saturated Paste

SAR	1.90	0.0100	SAR	1	B4B2805	ACC	"	"	
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Table 915 metals by EPA 6020B

Arsenic	4.08	0.257	mg/kg	10	B4B2729	HJD	02/27/2024	03/08/2024	
Barium	103	8.87	"	"	"	HJD	"	"	

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 6855 West 119th Avenue
 Broomfield CO 80020

Andy Sagen
 Project Number: [none]
 Project: KMG - Ludwig 17-1

Metals by EPA 6000/7000 Series Methods - 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 B4B2729 - EPA 3050B

Blank (B4B2729-BLK1)

Prepared: 02/27/2024 Analyzed: 03/08/2024

Arsenic	ND	0.290	mg/kg							
Barium	ND	10.0	"							

LCS (B4B2729-BS1)

Prepared: 02/27/2024 Analyzed: 03/08/2024

Arsenic	5.46	0.290	mg/kg	5.00		109	80-120			
Barium	489	10.0	"	500		97.7	80-120			

Matrix Spike (B4B2729-MS1)

Source: Y402609-02

Prepared: 02/27/2024 Analyzed: 03/08/2024

Arsenic	7.96	0.279	mg/kg	4.81	2.32	117	75-125			
Barium	528	9.63	"	481	46.5	100	75-125			

Matrix Spike Dup (B4B2729-MSD1)

Source: Y402609-02

Prepared: 02/27/2024 Analyzed: 03/08/2024

Arsenic	8.56	0.284	mg/kg	4.90	2.32	128	75-125	7.33	20	QM-07
Barium	531	9.80	"	490	46.5	98.9	75-125	0.607	20	

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Jordan A. Bynon, Project Manager



Tasman Geosciences
 6855 West 119th Avenue
 Broomfield CO 80020

Andy Sagen
 Project Number: [none]
 Project: KMG - Ludwig 17-1

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 B4B2804 - Saturated Paste Metals

Blank (B4B2804-BLK1)

Prepared: 02/28/2024 Analyzed: 02/29/2024

Calcium PPM	ND	10.0	mg/L							
SAR	ND	0.0100	SAR							
Magnesium PPM	ND	10.0	mg/L							
Sodium PPM	ND	10.0	"							

Duplicate (B4B2804-DUP1)

Source: Y402637-02

Prepared: 02/28/2024 Analyzed: 02/29/2024

SAR	ND	0.0100	SAR	0.965				200		
Calcium PPM	71.4	10.0	mg/L	76.9			7.40	50		
Magnesium PPM	17.9	10.0	"	19.6			8.91	50		
Sodium PPM	34.3	10.0	"	36.6			6.48	50		

Batch B4B2805 - Saturated Paste Metals

Blank (B4B2805-BLK1)

Prepared: 02/28/2024 Analyzed: 02/29/2024

Calcium PPM	ND	10.0	mg/L							
SAR	ND	0.0100	SAR							
Magnesium PPM	ND	10.0	mg/L							
Sodium PPM	ND	10.0	"							

Duplicate (B4B2805-DUP1)

Source: Y402658-01

Prepared: 02/28/2024 Analyzed: 02/29/2024

SAR	ND	0.0100	SAR	1.77				200		
Calcium PPM	119	10.0	mg/L	100			17.7	50		
Magnesium PPM	1.28	10.0	"	2.98			79.8	50	QR-DUP	
Sodium PPM	59.4	10.0	"	66.0			10.5	50		

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Jordan A. Bynon, Project Manager

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Broomfield CO 80020

Andy Sagen
Project Number: [none]
Project: KMG - Ludwig 17-1

Notes and Definitions

QR-DUP RPD exceeds QC acceptance criteria, this indicates source sample is not homogenous.

QM-07 The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on acceptable LCS recovery.

ND Analyte NOT DETECTED at or above the reporting limit

RPD Relative Percent Difference

All soil results are reported at a wet weight basis.

Origins Laboratory, Inc.



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Jordan A. Bynon, Project Manager